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Evaluating Outcomes of an Immersive-Field-Study Program on Fifth-Grade Students' Connectedness with Nature

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EVALUATING OUTCOMES OF AN IMMERSIVE-FIELD-STUDY PROGRAM ON FIFTH-GRADE STUDENTS' CONNECTEDNESS WITH NATURE

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DISSERTATION ABSTRACT

The purpose of this research was to investigate to what extent an immersive-field-study experience influenced fifth-grade students' connection to nature. Two instruments were used to collect data: Connection to Nature Index (CNI) obtained pre- and postfield study and students' field journals with prompts.

The coding of the journals was based on the four components of CNI: Enjoyment of Nature, Empathy for Creatures, Sense of Oneness, and Sense of Responsibility. These components were built on the three basic components of nature connectedness described by Schultz (2002) as "cognitive (connectedness), affective (caring), and behavioral (commitment)" (p. 61).

Data were gathered from 317 fifth-grade students from 12 separate classes in three public schools from one county in Northern California who were scheduled to spend 4 days in an immersive-field-study program at Walker Creek Ranch during three different timeframes: February, April, and June. The research questions addressed how students' connection to nature changed pre- and postparticipation in the immersive-field-study program.

Both quantitative and qualitative data indicated that an immersive-field-study experience is useful for increasing students' connection to nature, but only if the participant comes away with a positive experience of nature.

Although not the intent of this research, the most revealing finding was that the weather conditions had an influence on developing nature connectedness in fifth-grade students. Students who participated in February experienced inclement weather that forced an early end to the field study and changes in the usual activities like the campfire.

These students also had lower ratings, on average, on post-CNI than on pre-CNI. The weather for students who attended the field trips in April and June was better, and their post-CNI ratings were higher, on average, than their pre-CNI scores. Students who attended in June had the sunniest and warmest weather and had the highest rating, on average, on their post-CNI.

The weather influenced the breadth and depth of outdoor activities in which students were able to participate. The most popular activity was solo hiking. Students journaled that the activities that presented challenges they could overcome, such as solo hiking, gave them the greatest sense of accomplishment and connection to nature.

This dissertation, written under the direction of the candidate's dissertation committee and approved by the members of the committee, has been presented to and accepted by the Faculty of the School of Education in partial fulfillment of the requirements for the degree of Doctor of Education. The content and research methodologies presented in this work represent the work of the candidate alone.

Laleh Talebpour	May 7, 2018
Candidate	Date

Dissertation Committee

Dr. Patricia L. Busk	May 7, 2018
Chairperson	
Dr. Kevin Oh	May 7, 2018
Dr. Patricia Mitchell	May 7, 2018

DEDICATION

I dedicate this work to Almighty God, Who has given us the awesome gift of nature. By valuing and studying this special gift, it is our responsibility to take care of it, not just for ourselves, but also for generations to come.

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If I named everyone I would like to acknowledge, I would never finish; however, I would like to take this opportunity to thank some of the key people who helped and supported me in this effort.

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CHAPTER I

RESEARCH PROBLEM

> "The battle for the environment cannot be won unless it is based on a new ethic of the relationship of human beings with nature" (UNESCO-UNEP, 1989, p. 2).

Earth is suffering from environmental instability that has been magnified by a loss of biodiversity, climate change, and extreme weather events (Intergovernmental Panel on Climate Change, 2015; Millennium Ecosystem Assessment, 2005; Steffen et al., 2011). This crisis has been generated partially because humans are not practicing environmentally responsible behaviors in part due to a lack of connection to nature. Countering the calamity of environmental degradation requires a positive human-nature relationship (Chawla, 1988, 1999; Frantz & Mayer, 2014; UNESCO-UNEP, 1989) and a shift in educational goals (Heimlich, 2002; Orr, 1992, 1993; Pyle, 1993) toward creating citizens with a vision that includes environmental responsibility, good stewardship, and sustainable development (Coyle, 2005; Elder, 2003; Kahn, 2010; Lieberman & Hoody, 1998; Monroe et al., 2007; Orr, 1992; Sobel, 2004, 2008; Stone & Barlow, 2005). The need for this educational shift has been acknowledged worldwide by the United Nations (UNESCO, 1997, 2010; UNESCO-ESD, 2009; UNESCO-UNEP, 1972, 1976).

Regardless of this urgent need to educate a future generation of environmental stewards (National Environmental Education Foundation, 2015), many individuals in the industrial world, including children, are deficient in their knowledge of and their ability to relate to nature because they spend a high percentage of their time on indoor activities that prevent them from having direct contact with the natural environment (Charles & Wheeler, 2012; Coyle, 2005; Hofferth & Sandburg, 2001; Kahn et al., 2009; Louv, 2005; Pyle, 2002; Rideout et al., 2010).

Rideout, Foehr, and Roberts (2010) reported that children in the US spend an average of 50 hours a week indoors using technical devices. Time spent on these devices may prevent children from spending time outdoors; a problem confirmed by the Nature Conservancy in a report from 2011 stating that fully 90% of teens in the United States do not spend time outdoors on a daily basis (Florence, 2016; The Nature Conservancy, 2011). This problem is magnified by educational practices that emphasize technology and standardized testing, leaving little room for outdoor education as school children "spend even more time indoors, clicking away on their plastic mice, happily viewing images of the very plants and animals they could be finding in the woods, streams, and meadows they no longer visit" (Schmidly, 2005, p. 455).

Lack of time spent outside has created what experts call a *nature-deficit disorder* (NDD), a term coined by Richard Louv (2005), which refers to children's disconnection from nature and inability to be sensitive to that environment. To illustrate this disconnect from nature, Coyle (2005) noted, "the average seven year-old can identify up to 200 corporate logos but cannot name the type of tree in front of his or her home" (p. 97). Nature-deficit disorder is a concern because children who grow up with NDD will not connect with nature and, therefore, are less likely to care for nature and to enter into fields of study related to the natural environment: areas that need creativity and problem solving in this era of environmental crises (Bull, 1992; Chawla, 2007, 2009; Kahn, 2010; Louv, 2005; Orr, 2004; Pyle, 1993).

Auspiciously, research conducted on environmental education and connectedness with nature suggests that *nature connectedness* could be the missing link that is needed to ensure that a future generation of nature stewards develops in time to understand and care

about the importance of working to save the environment and this planet (Frantz & Mayer, 2014; Hinds & Sparks, 2008; Wells & Lekies, 2006), and "it should therefore be an important part of any assessment" (Frantz & Mayer, 2014, p. 85).

Defining Nature Connectedness

To describe the concept of human-nature relationship, researchers and scholars often use the term *nature connectedness*. Schultz (2002) defined nature connectedness as being composed of three basic components: "Cognitive (Connectedness), affective (caring), and behavioral (commitment)" (p. 61). The cognitive component is the basis of nature connectedness. It describes how much a person conceives of himself or herself as a part of nature. The affective component defines how much a person cares about nature, and the behavioral component covers how committed a person is in protecting nature and the environment. Prior to Schultz's (2002) work, others had described similar concepts that could measure how humans consider and interact with the natural environment, and the importance of this relationship. In 1973, Fromm used the term *biophilia* that he described as "the passionate love of life and of all that is alive" (p. 365). In 1984, Wilson explained *biophilia* as an "innate tendency to focus on life and lifelike processes" (p. 1), and suggested "that the urge to affiliate with other forms of life is to some degree innate, hence deserved to be called *biophilia*" (p. 85). Wilson (1984) believed that humans want to be near nature because nature connectedness is programed genetically in them given that humans developed in nature and survived through nature. Kellert (1997) expanded this definition by proposing that *biophilia* gives humans additional benefits such as a stronger sense of well-being. Kellert (1993) and Wilson (1993) based their theory on the belief that human needs and nature's need are so intertwined that if one suffers the other

will suffer as well. The ultimate insight, however, comes from Kals, Schumacher, and Montada (1999) who suggested that nature connectedness is not represented by a knowledge of nature, but an emotional affinity toward nature. Kals et al. (1999) believed that "one can have scientific interest in nature issues without feeling any emotional affinity" (p. 182). Thus, they differentiated between a scientific interest in nature and an emotional affinity toward nature, a key component of nature connectedness.

Promoting Nature Connectedness Through Environmental Education

Research suggests that connectivity with nature could be promoted through environmental education (Cheng & Monroe, 2012; Ernsta & Theimer, 2011; Frantz & Mayer, 2014; Hinds & Sparks, 2008; Liefländer et al., 2013). Environmental education is defined as a process that is meant

> To develop a world population that is aware of, and concerned about, the total environment and its associated problems, and which has the knowledge, attitudes, skills, motivation, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones. (UNESCO-UNEP, 1976, p. 2)

The above definition for environmental education was developed by representatives to the United Nations in Belgrade and was included in what came to be known as the *Belgrade Charter*. The following year, delegates from 66 nations who participated in the first intergovernmental conference on environmental education in Tbilisi, Georgia, former Union of Soviet Socialist Republics (USSR), elaborated upon the concept of environmental education and wrote a new document, known as the *Tbilisi Declaration* (UNESCO, 1977). The Tbilisi Declaration (UNESCO, 1977) emphasized the importance of environmental education across all age groups to improve the understanding of connectedness in nature. The ultimate goal of environmental education is to prepare

"students to become critical thinkers, informed decision-makers and able communicators" (Athman & Monroe, 2001, p. 37), so that they may better practice environmentally responsible behavior (UNESCO, 1977). Both the *Belgrade Charter* (1976) and the *Tbilisi Declaration* (1977) are considered to be the most important documents concerning environmental education, and everything that followed in the field of environmental education has been an offshoot of these documents (Ardoin, 2009).

One of the characteristics of environmental education is a deeper experience in nature for a richer connection to the natural world (UNESCO, 1977). Through the integration of understanding in different disciplines, "Knowledge, values, attitudes, and practical skills" can be established to further the relationship with the natural world (UNESCO, 1977, p. 1). Another underlying goal of environmental education is to understand the complexity of the natural environment and the connectivity between all organisms, and to use this knowledge to develop a Sense of Responsibility to take care of the earth. Along with the Sense of Responsibility comes a new set of behaviors toward the environment, such as a wide range of different activities from "driving a hybrid vehicle … and changing a policy to make such cars more affordable" to "putting a nest box" in one's backyard or "joining neighbors in a community habitat improvement event" (Monroe, 2003, p. 114). The ultimate goal of environmental education is to effect a change in an individual's behavior (Heimlich, 2010; Heimlich & Ardoin, 2008, p. 215).

Among the many purposes of environmental education is the need for more thorough critical thinking and deeper experiential learning, which can occur through immersive-field-study programs also known as residential environmental-education programs that take place in nature (UNESCO, 1977). One of the important outcomes of

the immersive-field-study programs is a holistic experience that leads to a successful program (Ardoin et al., 2013; Stern et al., 2014). In addition, this type of education, where participants learn new skills and attitudes, engenders environmental stewardship (UNESCO, 1977).

To establish positive human-nature relationships, researchers often examine the effect of immersive-field-study programs of several days or weeks in length (Liefländer et al., 2013; Stern et al., 2008). These programs have been identified as one powerful way for cultivating nature connectedness early in life (Cheng & Monroe, 2012; Frantz & Mayer, 2014; Hinds & Sparks, 2008; Liefländer et al., 2013; Stern et al., 2008). Educators take students on an immersive field-study experience, in a residential nature reserve in the United States. During these field trips, students live, study, and play under the guidance of their teachers, the naturalists, or both. In many state parks, independent nonprofit organizations operate to provide curriculum and instruction for these programs (Bogner, 1998; Stern et al., 2008, 2011).

Environmental-education programs often utilize field journals as a part of their curricula (Arnold, 2012; Petko et al., 2014). A field journal is a notebook where one records observations, perceptions, and thoughts about the natural world through writing, drawing, photography, and visual arts (Laws, 2016; Leslie, 2010; Leslie & Roth, 2003). These journals are used to encourage students to observe, reflect, and remember their experiences in environmental-education programs, thus deepening understanding gained during the programs (Dyment & O'Connell, 2007; Hammond, 2002). In addition, journaling can empower shy students to express themselves (Cole, 1994). Also students whose artistic skills are better developed than their writing skills are encouraged to

express themselves (McMillan & Wilhelm, 2007).

Purpose of the Study

The purpose of this study was to investigate the outcomes of an immersive-field-study program on fifth-grade students' connectedness with nature using a pre- and post-Connection to Nature Index (CNI) and students' field journals. This study was conducted with 317 fifth-grade students from three public schools who were scheduled to participate in a 4-day and 3-night field-study program at three different times during the first half of 2017: February, April, and June at an outdoor-education center of a coastal county in Northern California. This outdoor-education center offers an environmental-education program designed for elementary-school students.

Each year, several thousand 8- to 12-year-old students attend such programs. Although schools are not required to participate, the California education code allows for schools to participate in such programs. Such programs must be certified by California Department of Education by California Outdoor School Association, Residential Outdoor Science School Certification program to ensure that "all students in California have the opportunity to participate in an outdoor school experience as delineated in California Education Code Sections 8760-8774" (California Department of Education, California Outdoor School Association, 2017). These programs are held "during the school year between September and June" (California Department of Education, California Outdoor School Association, 2017, para 3). Students participate in a minimum 4-day and 3-night program and a maximum of 5-day and 4-night program (California Legislative Information, 2017).

In this study, *nature connectedness* was the dependent variable that was assessed

with two instruments: the Connection to Nature Index (CNI) and students' field journals. A pre- and post-Likert-scale CNI was used to compare students' level of nature connectedness pre- and postfield study. The coding of the journals was based on the four components of CNI. These components were sourced from the three basic components of nature connectedness described by Schultz (2002) as "cognitive (connectedness), affective (caring), and behavioral (commitment)" (p. 61).

Significance of the Study

There is a worldwide movement to connect children with nature (Charles & Wheeler, 2012). Examples include *Children and Nature Network* in the USA (Children and Nature Network, 2017); *Children and Nature Alliance*, in Canada (Children and Nature Alliance, 2017); and *Project Wild Thing*, in the UK (Project Wild Thing, 2017). There also is ample literature to show that the influence of early-childhood experiences in natural settings is one of the most important factors in facilitating connectedness with nature later in life, although that path can be impeded or improved by many other factors (Chawla, 1988, 1999; Collado et al., 2015; Louv, 2005; Wells & Lekies, 2006).

Immersive-field-study programs of several days or more in nature have been identified as powerful tools for nurturing nature connectedness early in life (Liefländer et al., 2013). The benefits of such field-studies can include inspiring *biophilia* or love of nature in a future generation of environmental stewards through helping them connect with nature (Kellert, 1993, 2002; Wilson, 1993; UNESCO-UNEP, 1976). The effects of these field studies, however, are often difficult to measure because of the complexity of measuring nature connectedness and the myriad expected outcomes of immersive environmental-education programs (Bogner, 1998). For example, the studies conducted

by Ardoin et al. (2015), Farmer et al. (2007), and Stern et al. (2008) did not specify how different practices, activities, or both were effective in facilitating nature connectedness.

My study aimed at gaining insights on how to enhance nature connectedness through an immersive-field-study program by helping to identify successful practices and or activities in immersive-field-study programs. Although the scope of the study was to explore to what extent such programs increased children's connection to nature and whether nature activities played a role in this process, an outcome of this study was the influence of the weather on the development of nature connectedness in fifth-grade students.

Theoretical Framework

This research was guided by Kolb's (1984) Model of Experiential Learning. This model draws from the work of notable scholars including Lewin, Dewey, and Piaget, who created a foundation for bringing education outside the classroom where students can learn through hands-on experiences. Kolb (1984) expanded the understanding of experiential learning by the aforementioned scholars and suggested "a holistic integrative perspective on learning that combines experience, perception, cognition, and behavior" through experiential learning theory (pp. 20-21). He defined learning as "the process whereby knowledge is created through the transformation of experience" (p. 38). Kolb (1984) stated that learners go through four stages in this process (p. 41; McLeod, 2010):

1. Concrete Experience: a learner encounters new information in the form of an experience, situation, or event.
2. Reflective Observation: a learner reflects on the concrete experience, focusing on how the experience may differ from previous understanding.

3. Abstract Conceptualization: new understanding arises by making changes to previous understanding, incorporating observations of the concrete experience.
4. Active Experimentation: the learner applies the new theory in further observations of experiences, noting the results and engaging in further reiterations of the cycle ad infinitum.

Kolb's (1984) Model of Experiential Learning allows young learners to connect with new information by placing experience at the center of their learning. Because this theory posits that learning is most successful when learners have first-hand experiences in the field of inquiry, by doing, reflecting, conceptualizing, and experimenting, hands-on field experiences in natural settings are by their nature experiential learning situations.

This study relied on assumptions about the effects of concrete experiences and the reflective observations and reasoning they generated among fifth-grade students that they documented in their journals. Through journaling, students conceptualized those experiences by putting them into their own words.

Background and Need for the Research

This study is based on previous research findings that a lack of awareness and appropriate environmental behaviors primarily are due to a disconnect from nature. Research has suggested that immersive-field-study programs are powerful tools to increase connection with nature (Cheng & Monroe, 2012; Ernsta & Theimer, 2011; Frantz & Mayer, 2014; Hinds & Sparks, 2008; Liefländer et al., 2013; Otto & Pensini, 2017; Wells & Lekies, 2006).

While they are still young, children are not only learning the skills and acquiring the knowledge they will need in the future but also are developing the behaviors and

beliefs that will guide their actions and determine the future of the earth (Athman & Monroe, 2001). Today's K-12 educational practices, however, leave limited room for outdoor-education programs in nature (Schmidly, 2005; Tewksbury et al., 2014).

Since November 2006 when "a back-to-nature movement to reconnect children with the outdoors" began (Louv, 2016, para 1), research in this field has grown substantially, and data are now available to show the positive effects of environmental education on the behavior as well as the intellectual and emotional development of students. Research, however, has not been focused on the collection and evaluation of data relative to participant activities to improve the understanding and development of immersive-field-study programs. The need for this study is driven by the dearth of knowledge about the success of an immersive-field-study program in achieving its objective of nature connectedness in participants.

Research Questions

This study aimed to answer the following three research questions:

1. To what extent does students' nature connectedness change after participation in the immersive-field-study program as measured by pre- and post-Connection to Nature Index?
2. To what extent does the students' change in nature connectedness vary from school to school as measured by the difference in pre- and post-Connection to Nature Index values?
3. How do students express their connection to nature in their journals?

Definition of Terms

A definition of terms is provided here and has been designed to help the reader understand certain words and concepts used throughout this research. Although there may be other definitions for these terms, the ones presented here are germane to this research study.

Connecting: White's (2012) definition of *connecting* within the context of nature connection was referred to in this study: "the process of bonding, integrating, and/or combining through respectful, empathic relationship with another being or object" (p. 349). White (2012) further explained that "the essence of the nature connection experience … was an immersive, relational, and loving one of being bonded and nurtured by nature, or some aspect of a natural area, characterized by a variety of positive cognitive, affective, and spiritual states that led to increased awareness, perspective, and an expanded sense of self and being-in-the-world" (p. 351).

Connection to Nature Index (CNI): The Connection to Nature Index, developed by Cheng and Monroe (2012) was used in this study to collect information about students' perception and attitudes toward nature. The researchers categorized these 16 items under the following headings to indicate how children connect with nature: Enjoyment of Nature, Empathy for Creatures, Sense of Oneness [with nature], and Sense of Responsibility [for the natural world] (p. 31).

Enjoyment of Nature: The definition for Enjoyment of Nature is implied in the items in the CNI developed by Cheng and Monroe (2012). They characterized *Enjoyment of Nature* as a series of statements expressing positive emotions such as "I like" or "makes me happy" or "is fun" related to spending time in nature. Six items on the CNI compose

the Enjoyment of Nature subfactor: "I like to hear different sounds in nature," "I like to see wild flowers in nature," "When I feel sad, I like to go outside and enjoy nature," "Being in the natural environment makes me feel peaceful," "I like to garden," and "Collecting rocks and shells is fun."

Environmentally Responsible Behavior or Pro-environmental Behavior: Environmentally Responsible Behavior or Pro-environmental Behavior is defined as engaging in behaviors that foster and protect the environment. Monroe (2003) elucidated that environmentally responsible behavior encompasses a wide range of different activities from "driving a hybrid vehicle … and changing a policy to make such cars more affordable" to "putting a nest box" in one's backyard or "joining neighbors in a community habitat improvement event" (p. 114). The ultimate goal of environmental education is to effect a change in an individual's behavior (Heimlich, 2010; Heimlich & Ardoin, 2008, p. 215).

Empathy for Creatures: Cheng and Monroe (2012) used Schultz's (2000) description of *empathy* as "other-oriented feelings of concern about the perceived welfare of another" (p. 402). Four items on the CNI compose the Empathy for Creatures subfactor: "I feel sad when wild animals are hurt," "I like to see wild animals living in a clean environment," "I enjoy touching animals and plants," and "Taking care of animals is important to me."

Field Journal: A notebook where one records observations, thoughts, and perceptions, about the natural world through writing, drawing, visual arts, and photography (Laws, 2016; Leslie, 2010; Leslie & Roth, 2003). These journals are used to encourage students to observe, reflect, and remember their experiences during field studies, thus deepening

understanding gained during the programs (Dyment & O'Connell, 2007; Hammond, 2002; Kalvaitis et al., 2012). The outdoor-education center provided students with a journal with prompts to write about their experience.

Field Journaling: Field journaling is the process of recording one's observations, reflections, perceptions, and memories about the natural world through writing, drawing, photography, and visual arts (Laws, 2016; Leslie, 2010; Leslie & Roth, 2003).

Immersive-field-study (IFS) Program: An immersive-field-study program is a short- or long-term residence program where participants reside at the field-study location. For this research, field-study programs were designed for 4 days and 3 nights.

Leave No Trace: Leave no trace means that those who go out in nature should leave it the same way they found it by not disturbing any living elements of nature such as plants and animals or nonliving elements of nature such as rocks; leave the area as if you were never there.

Nature: In the words of Starr, Evers, and Starr (2008), "Nature is everything in the universe *except* what humans have manufactured. It encompasses every substance, event, force, and energy – sunlight, flowers, animals, bacteria, rocks, thunder, waves, and so on. It excludes everything artificial" (p. 4).

Nature Connectedness (definition): Schultz (2002) defined nature connectedness as being composed of three basic components: "Cognitive (Connectedness), affective (caring), and behavioral (commitment)" (p. 61). The cognitive component is the basis of nature connectedness, describing how much a person conceives of himself or herself as a part of nature. The affective component defines how much a person cares about nature, and the behavioral component covers how committed a person is to protecting nature and

the environment. In this study, nature connectedness was assessed using a pre- and post-Connection to Nature Index (CNI) and students' field journals.

Residential Environmental Education Field Studies: Residential Environmental Education Field Studies are organized programs that provide students with an immersive environmental education at a residential environmental camp or in a natural setting.

Respect Wildlife: Respecting wildlife means to "observe wildlife from a distance and never allow wild animals to access your food" (NatureBridge Field Journal, 2012, p. 3).

Sense of Oneness: Cheng and Monroe (2012) employed Mayer, Frantz, Bruehlman-Senecal, and Dolliver's (2009) definition of *oneness with nature* that was adapted from Leopold's (1949) assertion that people need to "view themselves as egalitarian members of the broader natural community; feel a sense of kinship with it and view themselves as belonging to the natural world as much as it belongs to them; and view their welfare as related to the welfare of the natural world" (Mayer & Frantz, 2004, p. 505). Three items on the CNI compose the Sense of Oneness subfactor: "Humans are part of the natural world," "People cannot live without plants and animals," and "Being outdoors makes me happy."

Sense of Responsibility: The definition for Sense of Responsibility is implied in the items in the CNI developed by Cheng and Monroe (2012). The researchers characterized *Sense of Responsibility* with the series of statements reflecting understanding of how human actions effect the environment both positively and negatively (p. 41). Three items on the CNI compose the Sense of Oneness subfactor: "My actions will make the natural world different," "Picking up trash on the ground can help the environment," and "People do not have the right to change the natural environment."

Summary

This chapter provided the background and need for an evaluation of an immersive-field-study program with the purpose of increasing nature connectedness. Kolb's (1984) Model of Experiential Learning is a strong basis for the research to investigate how an immersive-field-study program can influence students throughout an experiential learning. The significance of the study was presented, research questions were outlined, and terms were defined. The relevant literature in the field pertaining to environmental education and nature connectedness is reviewed in chapter II. Chapter III includes research design, sample, protection of human subjects, instrumentation, pilot study, description of the outdoor-education center, research procedures, and the manner in which data were gathered and analyzed. The findings of the study are presented in chapter IV. Chapter V includes the study summary, limitations, discussion, implications, recommendations, and conclusions.

CHAPTER II

REVIEW OF THE LITERATURE

The purpose of this study was to evaluate the outcomes of an immersive-field-study program on fifth-grade students' connectedness with nature using a pre- and post-Connection to Nature Index (CNI) and students' field journals. Specific concepts about nature connectedness and environmental education as well as the background and the need for achieving nature connectedness were provided in chapter I. The purpose of chapter II is to develop a framework for the study by presenting an overview of related literature on developing nature connectedness and identifying instruments for measuring nature connectedness, both quantitatively and qualitatively for young students before, during, and after participating in an immersive-field-study program. The first section of this literature review presents the empirical results of scholars' views on achieving nature connectedness through residential-field-study programs. The role of nature-based-outdoor activities also is provided. The second section contains information on different instruments to measure nature connectedness quantitatively. The third section provides details on how field journals are used to evaluate qualitatively the effectiveness of multiday residential-field-study programs.

Achieving Nature Connectedness

Connection to nature takes place in the natural environment where an individual is in direct contact with nature (Chawla, 1988, 2002; Collado et al., 2013; Duerden & Witt, 2010; Pyle, 1993). Kellert (2002) proposed that having a direct experience with nature in a holistic way has a great influence on children to connect with the natural environment. Cheng and Monroe (2012) found that "children's interest in participating in nature-based

activities and performing environmentally friendly practices in the future" was predictable by their sense of connection to nature (Cheng & Monroe, 2012, p. 46). The section that follows demonstrates how learners can connect with nature through immersive-field-study programs.

Making Connections to Nature Through Field-Study Programs

Research has shown that time spent immersed in nature can be an effective way to develop nature connectedness (Chawla, 2007, 2009; Kals et al., 1999; Stern et al., 2008). More importantly, research has discovered that nature connectedness could be achieved through immersive-field-study programs, also called residential-environmental-education programs, or field-based-environmental-education programs, where students can be immersed in nature (Ardoin et al., 2015, 2016; Farmer et al., 2007; Liefländer et al., 2013; Stern et al., 2008; Wells & Lekies, 2006).

Stern, Powell, and Ardoin's (2008) study assessed the influence of 3- and 5-day residential-environmental-education programs with 300 fourth- to seventh-grade students in the Great Smoky Mountains National Park (GSMNP). Students were given a pretest before the program began, a posttest as the program was ending, and a follow-up survey 3 months later. Four instruments were designed to measure four areas: "connection with nature," "environmental stewardship," "interest in learning and discovery," and "knowledge and awareness of GSMNP and biological diversity (awareness)" (Stern et al., 2008, p. 34).

To measure "connection with nature," the researchers used a *connection-with-nature index* composed of seven items: "I feel comfortable in the outdoors," "Humans are a part of nature, not separate," "When I'm outside, I pay close attention to different plants

and animals," "I'd rather play outside than inside," "I'd rather visit a national park than see a movie," "I'd rather play video games than explore the woods," and "I'd rather go to a shopping mall than Great Smoky Mountains National Park" (Stern et al., 2008, p. 36).

Results of the paired-sample *t* tests demonstrated a statistically significant short-term gains in all seven items in the immediate postexperience with the largest change occurring in "I feel comfortable in the outdoors," "Humans are a part of nature, not separate," and "When I'm outside, I pay close attention to different plants and animals" (Stern et al., 2008, p. 34). Students expressed being comfortable outdoors and viewing humans as a part of nature, as well as continuing to pay attention to the animals and plants that they observed while being in nature (Stern et al., 2008, p. 35).

The research of Farmer, Knapp, and Benton (2007) showed that a day-long intensive-field study at the Great Smoky Mountains National Park increased fourth-grade students' pro-environmental attitudes (a component of nature connectedness), whereas the research of Kossack and Bogner (2011) on 123 sixth-grade students in Germany did not show a positive gain in all students after a day-long intensive-field study.

The research conducted by Liefländer, Fröhlich, Bogner, and Schultz (2013) showed that a 4-day field-study program positively contributed to nature connectedness in children of age 9 to 13 in Germany. Using the Inclusion of Nature in Self (INS), researchers conducted two studies to investigate the differences in nature connectedness between fourth-grade (age 9 to 10) and sixth-grade (age 11 to 13) students who participated in a residential-environmental-education program. The researchers also investigated whether environmental education can encourage the long-term practice of nature connectedness.

In their first study, the sample consisted of 154 fourth-grade and 150 sixth-grade students who attended the immersive-field-study program. Students were assessed immediately postouting. Researchers found that both fourth- and sixth-grade students made a positive connection with nature postouting. In the second study, the sample consisted of 135 fourth-grade and 55 sixth-grade students at the same school who attended the immersive-field-study program where they received 6 hours of instruction, including multisensory activities. They were assessed after 4 weeks. In addition, 74 students were designated as control group (39 fourth-grade and 35 sixth-grade students).

Although all students initially had higher INS scores in Study 1, only the younger students (fourth-grade students) showed an increased level of INS after 4 weeks with test-retest reliability of .84. Researchers concluded that "strengthening connectedness to nature is more sustainable before the age of 11" (p. 370). This finding confirms results of a previous study by Wells and Lekies (2006) that a positive childhood experience with "*wild* nature before age 11 is a particularly potent pathway" to enhance stewardship in adulthood (p. 13). The research of Braun and Dierkes (2017) on 601 students from primary- and secondary-school classes in Singapore also found that 7- to 9-years-old children made the strongest shifts toward connecting with nature than older children.

Otto and Pensini (2017) gathered data from 358 fourth- to sixth-grade students in Berlin to study the connection between participation in nature-based environmental education, ecological behavior, environmental knowledge, and connectedness to nature. The researchers used the responses of 255 students who answered "the crucial question about how often they visited nature-based environmental educational facilities" (p. 91).

The result of the study was that knowledge combined with a connection to nature drives environmentally responsible behavior.

Ardoin, DiGiano, Bundy, Chang, Holthuis, and O'Connor (2014) studied the situational interest of 28 youths in an environmental-education summer-camp program. Students were prompted to take pictures of what they found interesting, wanted to learn more about, and remembered about their experience. Results showed that students made positive connections with nature and were most engaged by experiential learning when they experienced *flow* — a "particular kind of experience that is so engrossing and enjoyable (that it is) worth doing for its own sake even though it has no consequences outside itself" (Csikszentmihalyi, 1990, p. 824). Another relevant finding was that the photos elicited a slightly higher rate of positive connections to nature and affective responses (28.9% and 66%) compared with (24% and 52%) journal entries.

To assess programmatic outcomes of a 5-day field-based-environmental-education program, Ardoin, DiGiano, O'Connor, and Holthuis (2016) evaluated 58 fifth-grade students' blogging. Students were asked to write about who they were and what they thought people should know about them before the field trip, so their first blog entries focused on describing themselves and their interests. During and after the program, students described shifting interests, particularly an increased interest in science and in their practice of environmentally responsible behaviors. Students reported interests in activities such as recycling and saving energy, implying that the field trip had an influence on students' sense of self and their behaviors toward the environment. Based on the above studies, I evaluated a multiday immersive-field-study program as a method for connecting fifth-grade students to nature.

Outdoor Activities That Connect Children With Nature

Palmberg and Kuru (2000) examined the aim of nature-related-outdoor activities such as "field trips, hiking, camps, adventure activities" and "overnight skiing trips" within various environmental-education programs to develop an affective relationship with the natural environment with children of ages 11 and 12 in Finland (p. 32). They found that students "who had experience with outdoor activities" increased their knowledge and strengthened values such as empathy used for decision making about the dependence of and the interaction with nature by people like themselves and their families.

In Australia, results of Ballantyne and Packer's (2002) study of 580 students, 8- to 17-years-old showed that outdoor learning was popular among students especially seeing and interacting with wildlife; however, students did not enjoy maintaining notebooks or journals during their activities.

Chawla (2007) highlighted the importance of the garden in establishing a close relationship with nature. The 56 environmentalists from Europe and the United States who Chawla (2007) interviewed all shared their stories of spending time in the woods or gardens as children. They expressed that these experiences were fundamental to their lifelong commitment to environmental stewardship.

Seven- to 12-years-old children's relationship with plants in a garden camp in Finland was studied by Laaksoharju, Rappe, and Kaivola (2012). They found that the program affords children the opportunity to connect with nature. The researchers concluded that "garden day camps can be one solution for bringing children closer to nature" (p. 202).

Fancovicova and Pavol (2011) gathered data from 34 fifth-grade students in Slovakia on the effect that outdoor-environmental-education programs have on students' knowledge about and attitudes toward plants. The researchers found that students who participated in the program by planting trees developed positive attitudes toward plants.

Previous research showed that children who participate in field trips in natural areas remember empathic reactions they had to what they learned (Hoffman, 2000). Farmer et al. (2007) interviewed 15 fourth-grade students a year after an all-day field trip to the Great Smoky Mountains National Park (GSMNP). Interviews were open-ended, and data were all qualitative. Results showed that students' clearest memories were of activities they did that showed them how the natural world is interconnected. One example was an activity about the effect of an invasive species on the conifer forest of the GSMNP. One student remarked, "This is how the trees are now that there are insects that keep doing that until they die, because they can't get any more water and it's because those little insects are eating up all the trees" (p. 37). This recall of information shows that children understand that there is a connection between the various components of the ecosystems that they visited and were concerned about the fate of the trees. Although students sometimes had forgotten key terms or mispronounced them, their understanding of the general concepts they had learned through hands-on activities on their field trip was demonstrated.

These students also retained information about how human activity had harmed the natural environment they visited. Another activity demonstrated how pollution affected the students. Students developed an interest in how man-made changes in nature affected plants, animals, and people because they all are connected by nature. One

student remarked, “We had to look around and they discussed how far a hundred years ago we could see and now we can only see like twenty miles or something” (p. 38). The children retained this information about the lasting influence of human beings on the environment, suggesting that such impressions are typical learning outcomes of an environmental-education field-study program. These researchers concluded that such field trips could make a lasting impression on students’ views of and connection with nature. Based on the results of the above studies, my study also evaluated the influence of outdoor activities in connecting children to nature as reported in their journal.

Measuring Nature Connectedness Quantitatively

In order to study how and when educational activities succeed in increasing nature connectedness, researchers have developed and validated several instruments to measure this connectedness both with adults and children (Beery, 2013; Cheng & Monroe, 2012; Mayer & Frantz, 2004; Nisbet et al., 2009; Schultz, 2002; Schultz & Tabanico, 2007). Instruments to measure children’s nature connectedness include Connection to Nature Index (CNI), Nature Relatedness Short-Form Version (NR-6), and Inclusion of Nature in Self (INS). When measuring the connection to nature for 76 children, age 7 to 13, Bragg, Wood, Barton, and Pretty (2013) used three separate instruments including the CNI, the INT, and the INS. Based on Bragg et al.’s (2013) study of these three instruments, the CNI was determined by participants to be the easiest to understand for children between the ages of 8 to 12.

Connection to Nature Index (CNI)

Cheng and Monroe (2012) developed an instrument to measure students’ connectedness with nature and investigate what factors in their lives could be predictors

of both connectedness with nature and environmentally friendly behavior in order to evaluate the Lagoon Quest program in Florida. The instrument was adapted from two previous instruments with adults: Mayer and Frantz's (2004) connection to nature and Clayton's (2003) environmental identity. After interviewing approximately 80 fourth-grade students, Cheng and Monroe (2012) adjusted the nuances of language to the perceptions of the students. The instrument was pilot tested with 22 items with 2 fourth-grade classes. They revised this instrument based on the reliability results of the pilot study. Using the revised instrument, Cheng and Monroe (2012) collected data from 5,400 fourth-grade students who had completed a mandatory environmental-education program called Lagoon Quest in Brevard County, Florida. The data gathered included a 16-item Connection to Nature Index, which categorized the items under the following headings that indicate how children connect with nature: Enjoyment of Nature, Empathy for Creatures, Sense of Oneness, and Sense of Responsibility (p. 31). The instrument was validated for children aged 8 to 12. The researchers reported a Cronbach coefficient alpha of .87, a very high level of reliability.

In developing their study, Cheng and Monroe (2012) used Schultz's (2000) description of *empathy* as "other-oriented feelings of concern about the perceived welfare of another" (p. 402). The researchers also employed Mayer and Frantz's (2004) definition of *oneness with nature* as "sense of kinship with animals and plants, and sense of equality between the self and nature" (Mayer et al., 2009, p. 614). Although Cheng and Monroe (2012) did not provide definitions for Enjoyment of Nature and Sense of Responsibility from the literature, definitions of these terms are implied in the items in the Connection to Nature Index they developed. They characterized *Enjoyment of Nature*

as a series of statements expressing positive emotions such as “I like” or “makes me happy” or “is fun” related to spending time in nature. The researchers characterized *Sense of Responsibility* with the series of statements reflecting understanding of how human actions affect the environment both positively and negatively (p. 41). One item “Being outdoors makes me happy” had multiple paths and so was listed twice. Two other instruments, developed to measure nature connectedness, were later modified to create shorter versions. These are the Nature Relatedness and the Inclusion of Nature in Self.

Nature Relatedness Short-Form Version (NR-6)

Nisbet, Zelenski, and Murphy (2009) developed the Nature Relatedness instrument with 30 nature relatedness (NR) statements using a Likert scale, ranging from 1 (*agree strongly*) to 5 (*disagree strongly*), with higher values indicating stronger connection to nature. Based on a discrimination between people with high and low nature relatedness, nine items were deleted resulting in a 21-item questionnaire with three subfactors: NR-self, NR-perspective, and NR-experience. The instrument had a high reliability evidence of .87.

Later, in 2013, Nisbet and Zelenski modified this instrument to a shorter version with just six items from the self and experience subfactor resulting in a measure of connectedness elements rather than environmental attitudes. The shorter version also had a high reliability evidence of .87. This shorter version was used by Bragg et al. (2013) to measure young learners’ (ages 7 to 13) level of nature connectedness, indicating this shorter version could be used with children.

Inclusion of Nature in Self (INS)

The Inclusion of Nature in Self measures specific elements of nature

connectedness by asking adult participants to choose between options that best describe their relationship with nature themselves. Schultz (2002) modified an instrument that previously was developed by Aron et al. (1991, 1992) to "assess closeness in interpersonal relationships" (Schultz, 2002, p. 72). Inclusion of Nature in Self (INS) measures the extent to which individuals view nature as a part of their identity. It uses seven pairs of circles differing in the amount they overlap with each other. Circles are labeled as *Self* and *Nature*, and participants will choose the pair of circles that best describes their relationship to the natural world. It is measured using a modified Likert scale because the nonoverlapping circles are scored as a 1, which demonstrates no connection with nature and the completely overlapping circles are scored as a 7 and show a complete connection with nature. The instrument was "found to be reliable across time, and to correlate positively with biospheric attitudes, scores on the NEP [new environmental paradigm], ecocentrism, and self-reported behavior" (Schultz, 2002, p. 72).

Several studies have used the INS instrument to measure either adults' or children's relationships to nature (Braun & Dierkes, 2017; Bruni et al., 2008; Kossack & Bogner, 2011; Liefländer et al., 2013). The wording of the instrument and the number of the items in the instrument were sometimes adjusted when administered to children. For example, Braun and Dierkes (2017) changed the wording of the instrument from *Self* and *Nature* to *Me* and *Nature*, but maintained the seven items, whereas Bragg et al. (2013) adjusted both the wording and the number of items.

When measuring the connection to nature of 76 children, age 7 to 13, Bragg et al. (2013) used three separate instruments including the INS. These researchers dropped the

number of items in INS from seven to five to make it consistent with the other measurement instruments they used. Bragg et al. (2013) reported that the students frequently asked adults to explain the INS instrument. Overall, the INS scored the lowest. Braun and Direkes (2017) found that the INS allowed participants to say how much they connected to nature, but researchers were concerned that it did not yield test-retest reliability values as robust as had been found in other studies. Based on the results of Bragg et al. (2013) and Braun and Direkes (2017) studies, the INS instrument was not considered for use in this dissertation.

The Reliability of CNI

Bragg et al. (2013) conducted a study to evaluate three separate instruments used for measuring connection to nature among children: Connection to Nature Index (CNI), Inclusion of Nature in Self (INS), and Nature Relatedness Short-Form Version (NR-6). Both the INS and NR-6 originally were developed to be administered to adults, whereas the CNI was developed to be administered to children.

Bragg et al. (2013) evaluated the three instruments on 76 children aged 7- to 13-years old (47% boys, 53% girls) to investigate effectiveness, ease of understanding and practicality of administration. Of these 76 children, 70 were between age 8 and 12 with the majority being 10 years old. Some of the children were part of a school visit to the Royal Society for the Protection of Birds (RSPB) reserves, and others were "part of Wildlife Explore club on a weekend" (p. 26). They were also a smaller group of children that did not visit an RSPB site but participated in the pilot study.

Bragg et al. (2013) examined the performance of these instruments in terms of (a) statistical reliability, (b) interscale comparisons and correlations, and (c) ease of

understanding and administration. The CNI was found to have "the highest internal consistency ($\alpha = 0.82$)" among all the instruments they used (p. 8). Of the CNI subfactors, Enjoyment of Nature, Empathy for Creatures, and Sense of Responsibility showed acceptable internal consistency, whereas "oneness" did not. The full CNI correlated strongly with all of its four subfactors, whereas the NR-6 showed moderate correlation. Both measures showed the strongest correlation with Enjoyment of Nature. In addition, researchers found that the CNI instrument "works well with children between the ages of 8-12 years" (p. 63).

The majority (78% to 85%) of the 76 children who participated in the study said they did not have a problem understanding any of the three instruments. A majority of the children, however, told researchers that they preferred the CNI over the NR-6 and INS. Overall, the CNI scored the highest, and children found it the easiest to complete.

Although the study was not designed to look at the difference in scores between children who participated in outdoor sessions and those who stayed indoors, the means for the outside students were slightly higher than for children who had been inside. Based on the results of Bragg et al.'s (2013) study, the CNI instrument was used in this dissertation because of the ease of use with children, reliability of the total score and two subfactors, and supporting validity evidence.

Measuring Nature Connectedness Qualitatively

Researchers have used journaling as an instrument to obtain qualitative data from participants in immersive field studies (Ardoin et al., 2014, 2016). Through journaling, participants can express in their own words how and to what extent they connect with nature (Ardoin et al., 2016). There are a variety of structures that a journal may take

(Cole, 1994). These include both unprompted and prompted journals (Hastie et al., 2012; Petko et al., 2014). Although unprompted journaling may allow students a free range of creative thought and expression, well-designed journal prompts can help students focus their thoughts (Berthold et al., 2007, 2009; Petko et al., 2014).

Field Journals

Environmental-education programs often use field journals as a part of their curricula (Arnold, 2012; Petko et al., 2014). Dyment and O'Connell (2007) studied 880 journal entries to evaluate aspects of journal writing in wilderness outings. Following a framework by Lefebvre, they suggested that journal entries could help students with the following:

> (1) put emphasis on interacting with nature and learning with nature; (2) make interconnections between the societal (including political), economic, and ecological aspects of issues covered; (3) support community involvement and participation so that educational endeavors are contextually appropriate, relevant, and culturally sensitive and inclusive; and (4) develop skills, values, and attitudes that allow for reflection, critical thinking, collaboration, and action for social change. (p. 139)

Dyment and O'Connell (2007) made three important recommendations based on this study and their other studies: (a) teachers and students need training and well-designed prompts to both learn to write effective journals and to help them engage in higher-order thinking; (b) teachers need to prepare students so that when the students begin journaling, they are considering the ideas they have encountered with their instructors; and (c) teachers need to be aware that different students will have varying needs when it comes to journaling.

Ardoin et al. (2016) used blogging as an instrument to understand the experiences of fifth-grade students during a 5-day field-based-environmental-education program in

the San Francisco Bay Area. The purpose of the study was to find out more about how students perceived and made meaning of such a program through blogging. The researchers found that that journaling is an effective tool for evaluating student experiences in residential-environmental-education programs.

In a different study, Ardoin et al. (2014) used journaling to learn about the situational interest of youth in an environmental-education summer-camp program. Students were prompted to take pictures of what they found interesting, wanted to learn more about, and remembered about their experience. Notwithstanding the success of well-designed prompts, photos elicited a slightly higher rate of positive connections to nature and affective responses (28.9% and 66%) compared with (24% and 52%) journal entries.

The purpose of McMillan and Wilhelm's (2007) study was to examine whether keeping a *moon journal* would increase students' nature connectedness and their literary abilities. Data were gathered from 67 seventh-grade students who studied the moon in language, art, science, and mathematics. Students drew and wrote about the moon every night for one month while learning about the moon in their classes across the curriculum and studying moon metaphors, moon myths, and moon vocabulary in their English Language Arts class. Students were not asked to write much, but, at the end of the period, they created a moon project and wrote moon poetry. Researchers found that not only did the students produce profound and varied poetry journal entries but also they expressed careful scientific observations of the moon and emotional connections with it, including gratitude and a sense of awe toward nature.

Based on the results of the above studies, journaling can be used to obtain qualitative information regarding students' experiences during an immersive-field-study program.

Journal Prompts

Berthold et al. (2007) defined prompts as "questions or hints that induce productive learning processes" (p. 566). Research shows that prompts are a way to reinforce learning and stimulate students to think about and internalize what has been taught (King, 1992). In Arnold's 2012 study, 60 students in an environmental sciences class were instructed to spend at least 15 minutes a week in a "nature place" and respond to journal prompts about what they saw. One of the goals of the study was to evaluate the effectiveness of journaling to "enrich and reinforce classroom concepts." The researcher concluded that journaling with prompts was most effective when it was related to subject matter being taught.

Leslie and Roth (2003) in *Keeping A Nature Journal* explained that "with beginning young journalists, offering prompts may help them focus" (p. 200). They stressed the importance of creating open-ended prompts that encourage ideas instead of restricting responses. Dyment and O'Connell (2007) also expressed the importance of the strategic use of prompts.

Students who participated in an immersive-field-study program in 2017 as part of the doctoral research were provided with journals some of whose pages were blank and some that contained prompts. One prompt, for example, was to report on the most interesting thing they learned or experienced each day.

Summary

Experiencing nature directly and in a holistic way is a method for developing connectedness with nature (Chawla, 1988, 2002; Collado et al., 2013, 2015; Duerden & Witt, 2010; Pyle, 1993). Research has revealed that immersive-field-study programs in nature are an excellent way for children and young adults to experience and relate to nature (Chawla, 2007; Kals et al., 1999; Stern et al., 2008), that this relationship is more sustainable before the age of 11 (Braun & Dierkes, 2017; Liefländer et al., 2013; Wells & Lekies, 2006), and that the relationship can be strengthened through immersive-field-study programs (Ardoin et al., 2015, 2016; Farmer et al., 2007; Liefländer et al., 2013; Stern et al., 2008).

Frantz and Mayer (2014) confirmed that the development of a connection to nature is an important step in the development of environmentally responsible behaviors. Research has found that residential-environmental-education programs provide an affective connection to nature (Cheng & Monroe, 2012; Ernsta & Theimer, 2011; Frantz & Mayer, 2014; Hinds & Sparks, 2008; Liefländer et al., 2013; Stern et al., 2008).

Stern et al. (2008) also studied 3- and 5-day residential environmental-education programs with 300 fourth- to seventh-grade students in the GSMNP and surveyed students in four areas using four instruments: “connection with nature,” “environmental stewardship,” “interest in learning and discovery,” and “knowledge and awareness of GSMNP and biological diversity” (p. 34). Students experienced a statistically significant short-term gain in all areas. Liefländer et al. (2013) studied the relationship between multiday field trips and an increase in nature connectedness. They concluded that these experiences are more likely to increase nature connectedness among young children, but

they did not identify which activities and events were more appealing to the students and had the most positive or negative influence on their perspective.

Well-designed and successfully executed environmental-education programs effectively can connect children to nature through activity-based learning (Ballantyne & Packer, 2002; Farmer et al., 2007; Laaksoharju et al., 2012; Palmberg & Kuru, 2000; Sobel, 2004, 2008). Farmer et al. (2007) looked at activities in which students engaged and their responses to those activities as well as the influence those activities had on students' perceptions of nature. They concluded that such field trips in the natural environment could make a lasting impression on students' views of and connection with nature.

Several measurement tools have been developed to collect and evaluate individual responses' level of connectedness to nature quantitatively. Instruments to measure children's nature connectedness include Connection to Nature Index, Nature Relatedness Short-Form Version, and Inclusion of Nature in Self. The CNI instrument was used in this dissertation because of the ease of use with children, reliability of the total score and two subfactors, and supporting validity evidence. In addition, because journaling is an instrument to collect qualitative information and because students' field journals were available, they were used as a tool to obtain qualitative data from participants in immersive-field-study programs in this research to obtain students' own words and drawings expressing their connection to nature.

Because there is a lack of information on the importance of activities and events in having an effect on the nature connectedness of participants and on what activities students found the most interesting, additional research was needed in this area. The

research conducted in this study involved the administration of pre- and post-Connection to Nature Index to participants in a multiday immersive-field-study program. In addition, each student received a journal with prompts in which they expressed their thoughts and reflections through words and pictures that led to their connection with nature.

CHAPTER III

METHODOLOGY

The purpose of this study was to evaluate the outcomes of an immersive-field-study program on fifth-grade students' connectedness with nature using a pre- and post-Connection to Nature Index (CNI) and students' field journals. This chapter includes an overview of research questions, research design, sample, protection of human subjects, instrumentation, pilot study, description of the outdoor-education center, research procedures, and the manner in which data were gathered and analyzed.

Overview of Research Questions

This study aimed to answer the following three research questions:

1. To what extent does students' nature connectedness change after participation in the immersive-field-study program as measured by pre- and post-Connection to Nature Index?
2. To what extent does the students' change in nature connectedness vary from school to school as measured by the difference in pre- and post-Connection to Nature Index values?
3. How do students express their connection to nature in their journals?

Research Design

This study employed "elements of both qualitative and quantitative approaches" (Creswell, 2015, p. 3). Quantitative data were gathered using Cheng and Monroe's (2012) Connection to Nature Index (CNI) to compare students' level of nature connectedness pre- and postimmersive-field-study program. The CNI was administered before and after the program to quantify students' *Enjoyment of Nature*, *Empathy for*

Creatures, *Sense of Oneness*, and *Sense of Responsibility* (Cheng & Monroe, 2012). Following the program, qualitative data were collected and analyzed from student field journals to gain insight into their thoughts and perceptions about nature during the program and about their favorite nature activities to examine the influence that the experience had on attendees. An overview of the phases of this study is reported in Table 1.

Table 1
Overview of the Phases of the Study

Quantitative Data Prefield study	Quantitative Data Postfield study	Qualitative Data Postfield study
Connection to Nature Index	**Connection to Nature Index**	**Field Journals**
Products: CNI Scores: (a) Enjoyment of Nature, (b) Empathy for Creatures, (c) Sense of Oneness, (d) Sense of Responsibility. Demographic data: gender	**Products:** CNI Scores: (a) Enjoyment of Nature, (b) Empathy for Creatures, (c) Sense of Oneness, (d) Sense of Responsibility. Demographic data: gender	**Products:** Analysis of the patterns in students' journals: Reflection on how children connect with nature. Learn about students' favorite nature activities during their participation in the immersive-field-study program.

Sample

The study was conducted with 317 fifth-grade students from 3 schools and 12 classes who were scheduled to spend 4 days in an outdoor-education center in a county in Northern California during the first 6 months of 2017: School 1 (n=150), School 2 (n=70), and School 3 (n=97). The three schools were from one county, with a higher socioeconomic status background.

All fifth-grade students whose parents agreed to let them participate in the study and were present on the day when the CNIs were administered before and after the field study are in the sample. The target students were from a county in Northern California with the following general demographics in 2015: 2.9% African American, 1.0% American Indian and Alaska Native, 6.2% Asian American, 0.2% Native Hawaiian and

Other Pacific Islander, 16.0% Hispanic or Latino American, 71.9% European American, and 3.8% two or more races. According to the United States Census Bureau (2016), the median household income (in 2015 dollars) for this county, during 2011-2015 was $93,257. The percentage of people living in poverty was 7.5%.

School 1 (The February Group)

The group was scheduled to spend 4 days at the outdoor-education center, but due to torrential downpours and immanent flooding, the session was ended a day earlier, and the children were evacuated. Students went to the outdoor-education center on a Monday and came back on a Wednesday afternoon. The weather influenced the breadth and depth of outdoor activities in which students were able to participate. As a result, several activities such as pond study, sit spot, and outdoor campfire were canceled due to this severally inclement weather. The campfire was held indoor. Because of the extreme storm conditions forecast both the outdoor-education center and the students' school were closed. As a result, students were not able to return directly to school for several days. Because of these circumstances, teachers had students complete the post-CNIs and parts of journals within 2 to 3 weeks after the trip when events were more settled in their mind.

School 2 (The April Group)

The group was scheduled to spend 4 days at the outdoor-education center. Students went to the outdoor-education center on a Tuesday and came back on a Friday afternoon, after which they immediately went on Spring break. Teachers had students complete the post-CNIs and the journals after the Spring break. This group was scheduled to spend 4 days at the outdoor-education center and stayed there for 4 days. They had good weather the first 2 days and were showered with heavy rain (not as stormy

as School 1's weather) the last 2 days. Some of the activities were adjusted due to the weather condition.

School 3 (The June Group)

The group was scheduled to spend 4 days at the outdoor-education center. Students went to the outdoor-education center on a Tuesday and came back on a Friday afternoon, as planned. Overall, they had very nice weather. Students were able to participate in outdoor activities as planned. Teachers had students complete the post-CNIs the following week, which was the last week of the school year. Because the week students returned was the last week of school, some teachers administered the CNI on Monday, and some teachers were unable to complete the post-CNIs with their classes and collect all of the journals, which were completed at the outdoor-education center. See the overview of scheduling and attendance in Table 2.

Table 2
Overview of Scheduling and Attendance

School	Date Attended	Scheduled	Attendance
1	February	4 days	3 days
2	April	4 days	4 days
3	June	4 days	4 days

Note: Routinely, each field trip is 4 to 5 days.

In total, I received 205 pre-CNIs: School 1 (81), School 2 (77), and School 3 (47); and 187 post-CNIs: School 1 (87), School 2 (80), and School 3 (20). Of these, 164 CNIs were matched: School 1 (71), School 2 (74), and School 3 (19). Students who were present to complete the CNIs and did not attend immersive-field-study program were omitted from dataset. Demographic frequencies and percentages for gender from CNIs by School are included in Table 3. A total of 159 journals were submitted to me. A diagram of the collected data is provided in Figure 1.

Table 3
Frequencies and Percentages for Participants' Gender by School

		Boys		Girls	
School	*n*	*f*	%	*F*	%
1	71	32	45.1	39	54.9
2	74	38	51.4	36	48.6
3	19	9	47.4	10	52.6

Note: The information includes only the 164 matched CNIs.

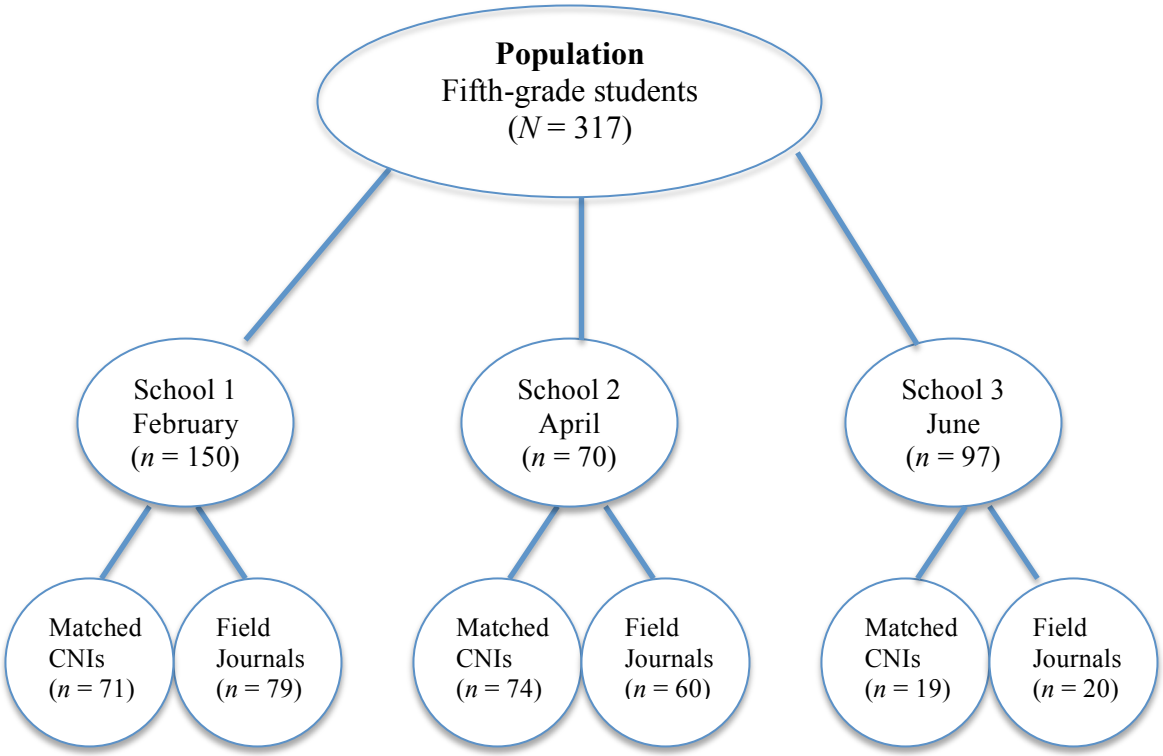

Figure 1. Collected data diagram.

Protection of Human Subjects

In accordance with Standard 8: Research and Publication (American Psychological Association, 2017) and the University of San Francisco Institutional Review Board for the Protection of Human Subjects, all information collected during this research remained confidential. An application was submitted to and approved by the University of San Francisco Institutional Review Board for the Protection of Human

Subjects. The outdoor-education center granted permission for this research providing me with schools and teachers' names that were scheduled to spend 4 days at the site. Parents' consent was obtained through teachers. Prior to participating in the study, teachers informed their principals and then distributed consent forms to parents and guardians of all potential participants. In School 1, teachers gave the permission slips to the students who brought them to their parents or guardians for their signatures. Then the students returned the signed forms to the teacher and a copy was submitted to me. School 2 confirmed that permission already had been provided for participation in research such as this. In School 3, permission slips were provided to parents with the instruction that they respond only if they did not give their permission for their child's participation in the study. The rights of all participants in this study were protected. Data were kept confidential and stored in a secure place. The identity of all participants is anonymous. CNIs were matched by coding that was provided by the individual teachers. For research integrity, I recoded all of the participants' in numerical sequence to ensure no numbers were duplicated. In addition to CNI, field journals were collected from students. Some field journals were identified with names, some were identified with numbers, some were identified with both, and some did not have any identification. I coded all field journals with a new identification number to address the issue of confidentiality. Because some of the journals did not have names or teacher-provided codes, it was not possible to match journals with CNI data.

Instrumentation

This study employed a combination of the CNI instrument and document analysis of students' field journals in order to increase the validity of the study and strengthen

findings. Quantitative data were gathered using Cheng and Monroe's (2012) CNI instrument to compare students' levels of nature connectedness pre- and postimmersive-field study. Through the qualitative analysis of the field journals, more indepth information was gained about changes in students' connection to nature that were the result of participation in an immersive-field-study program.

Connection to Nature Index (CNI)

Cheng and Monroe (2012) developed an instrument to measure students' connectedness with nature and to investigate what factors in their lives could be predictors of both connectedness with nature and environmentally friendly behavior. The instrument was adapted from previous studies with adults. After interviewing approximately 80 fourth-grade students, Cheng and Monroe (2012) adjusted the nuances of language to the perceptions of the students. Cheng and Monroe (2012) collected data from 5,400 fourth-grade students who had completed a mandatory environmental-education program in Florida. The data gathered included a 16-item Connection to Nature Index, which categorized the items under the following headings that indicate how children connect with nature: Enjoyment of Nature, Empathy for Creatures, Sense of Oneness, and Sense of Responsibility (p. 31). The instrument was validated as a reliable measure for children of aged 8 to 12. Cheng and Monroe (2012) reported a Cronbach coefficient alpha reliability of .87.

Cheng and Monroe (2012) grouped the following items under the *Enjoyment of Nature* heading: "I like to hear different sounds in nature," "I like to see wild flowers in nature," "When I feel sad, I like to go outside and enjoy nature," "Being in the natural environment makes me feel peaceful," "I like to garden," and "Collecting rocks and

shells is fun." The items they grouped under the *Empathy for Creatures* heading were "I feel sad when wild animals are hurt," "I like to see wild animals living in a clean environment," "I enjoy touching animals and plants," and "Taking care of animals is important to me." Under the *Sense of Oneness* heading, the two items were "Humans are part of the natural world," and "People cannot live without plants and animals." Under the *Sense of Responsibility* heading, items were "My actions will make the natural world different," "Picking up trash on the ground can help the environment," and "People do not have the right to change the natural environment." One item "Being outdoors makes me happy" had multiple paths and was listed under both the *Enjoyment of Nature* and the *Sense of Oneness* categories. I only used this item for *Sense of Oneness*. The items were designed to create a baseline from which to measure how connected students are with the natural world.

The CNI instrument was assessed by several studies. For example, the Royal Society for the Protection of Birds (2013) found the CNI to be a robust measure of nature connectedness in children aged 8 to 12 with an internal reliability of .84. Bragg, Wood, Barton, and Pretty (2013) assessed the workability of three different instruments to measure children's connectedness to nature and found that the CNI was "the most robust and practical instrument" and had the highest internal reliability of all with a Cronbach coefficient alpha of .82. In a 2015 study, in which 2,240 students from Ireland participated, Kerr (2015) found exactly the same value as the Cronbach coefficient alpha of .87 reported in the original study by Cheng and Monroe (2012).

The CNI instrument was administered prior to students' participation in the field study, then again after the last day of the field study. Quantitative data from the CNI

were used to address the first two research questions. Each questionnaire took students approximately 5 to 10 minutes to complete.

Because Cheng and Monroe (2012) asked participants to complete their CNI online, I created a hard copy of CNI to be used in an offline format. In creating this copy, I used the exact wording for the terms "*Strongly Disagree*, *Disagree, Neutral*, *Agree,* and *Strongly Agree*" from Cheng's dissertation (Cheng, 2008, p. 103), and the graphic layout from the Royal Society for the Protection of Birds (2013). The created copy was pilot tested. The language of the items was modified by Cheng and Monroe (2012) from traditional Likert-type scales for 8- to 12-year olds' understanding.

Pilot Study

A pilot study was completed with four classes of fifth-grade students (n=79) in School 2 in January 2017. Teachers were briefed on how to administer the CNI, and they were provided with the instructions to be read to the students (Appendix A). Those instructions were written based on my being present administrating the CNI, but the teachers decided to administer it themselves. After consulting with the teachers, we agreed to not provide children with a token of thanks.

The teachers administered the CNI instrument to each class. Students were told to respond the CNI as honestly as they could. Teachers ensured that students knew that they were not be graded and that there are no wrong answers. Students were told to read the CNI carefully and ask for clarification if they did not understand any part of it. If a student needed an item read to him or her, the teacher would read or explain it to ensure that the student understood the statements (Appendix A). The teachers collected the CNIs right after students complete them to return them to me.

Each student was provided with a printed CNI and was given up to 15 minutes to complete it. Pencils were distributed to the students as needed. The CNIs were completed within approximately 5 to 10 minutes. The only demographic information requested from students was gender. Results were analyzed for reliability evidence as well as to confirm the clarity of the statements and the exact time required to complete the CNI. The amount of time given the students to complete the CNI in the research study was based on the result of the pilot study.

The Cronbach coefficient alpha was computed to assess the overall reliability of the CNI as well as for each of the four components of nature connectedness categorized by Cheng and Monroe (2012): Enjoyment of Nature, Empathy for Creatures, Sense of Oneness, and Sense of Responsibility (Table 4). Two of the four subfactors had high measure of reliability with a Cronbach coefficient alpha above .70, whereas the other two subfactors had low reliability, which can most likely be attributed to the low number of items (three in each). All data are reported in Table 4.

Table 4
Reliability Statistics for Total CNI and Each of the Four Subfactors

Category	Items	M	SD	Cronbach coefficient alpha
Total CNI	16	4.16	.48	.83
Enjoyment of Nature	6	3.81	.64	.74
Empathy for Creatures	4	4.50	.57	.73
Sense of Oneness	3	4.33	.55	.36
Sense of Responsibility	3	4.13	.62	.39

Because the CNI had high reliability evidence, the total score was used with confidence. Subsequently, the first two subfactors, Enjoyment of Nature and Empathy

for Creatures, with high reliability evidence were used in the data analysis, whereas the last two subfactors that did not yield adequate reliability evidence were omitted from the data analysis.

Pretest correlation coefficients are related closely to those reported by Bragg et al. (2013). Total CNI is strongly correlated to its subfactors. Enjoyment of Nature is modestly correlated with other subfactors, whereas Empathy for Creatures, Sense of Oneness, and Sense of Responsibility are weakly related. See Table 5.

Table 5
Correlation Matrix for Total CNI and Each of the Four Subfactors Based on Pretest Data (*N*=164) and Bragg et al.'s (2013) Correlation Matrix (*N*=76)

	Total CNI	Enjoyment of Nature	Empathy for Creatures	Sense of Oneness	Sense of Responsibility
Total CNI		.92*	.69*	.68*	.72*
Enjoyment of Nature	.86*		.50*	.53*	.55*
Empathy for Creatures	.57*	.43*		.33*	.36*
Sense of Oneness	.75*	.57*	.23*		.37*
Sense of Responsibility	.71*	.50*	.43*	.50*	

* Correlation is statistically significant when the overall error rate is controlled at the 0.05 level (2-tailed).
Note: correlation coefficients based on pretest data are found in the upper diagonal and Bragg et al.'s (2013) correlation coefficients are in the lower diagonal of the Table.

Field Journals

Field journals, also called nature journals, provide a rich source of qualitative data. Leslie and Roth (2003) defined *nature journaling* as "the regular recording of observations, perceptions, and feelings about the natural world" (p. 5). They elaborated, "journaling involves stimulating curiosity about the world around you" (p. 187). In addition, research has found that journal prompts that involve making personal connections can help participants to focus their thoughts (Arnold, 2012; Berthold et al.,

2007, 2009; King, 1992; Petko et al., 2014) and, therefore, connect with nature.

As an integral part of its program, the outdoor-education center provides each student with a field journal. The field journal contains a pledge, a map, and indicators of natural life such as footprints and droppings. There is a catalogue of plants and animals to look for, nature concepts, life-cycle information, a history of early North Americans in the area, blank pages for children's observations, pages with prompts that help children reflect about their connection to nature, journal prompts for various activities such as arrival day, camp fire, week-day activities, night hikes, a barn dance, pages for memories, word games (crossword and word search), and a glossary.

Throughout the week, students participate in various activities, such as hiking, observing wildlife, identifying plants, touring a garden, visiting a pond, singing nature songs, and participating in special events. The naturalists work with individual groups to complete activities and write their thoughts, observations, and feelings in their field journals. This journal, therefore, consists of a review and reflection on the activities in which students participate. The coding and analysis of students' journals have revealed a great deal of information about how and why the field trips are transformative for participants.

The Study Site

The study site covers an area of pristine wilderness about an hour's drive north of the Golden Gate Bridge. The site includes open meadows, forest, chaparral, and riparian ecosystems. Local native animals include foxes, bobcats, coyotes, newts, salmon, bats, and owls. The mission of this outdoor-education center is to help elementary schools reach their educational goals through quality instruction that inspires children to achieve

an appreciation of and a deeper connection with nature that motivates stewardship.

Each year, over 5,000 fourth- to seventh-grade students from several counties in California attend this program, operated by a Northern California county's office of education. This program has a wealth of activities to spark a love of nature and a sense of responsibility that follows from that love.

Children study in groups of 20 or fewer under the guidance of a naturalist who helps them develop an understanding of and an appreciation for the natural environment by learning ecological concepts through games and activities, as well as a hands-on investigation of ponds, wetlands, mountains, and meadows. In addition, the center provides each student with a field journal with prompts to help them notice plants and animals and to think about their interrelationships, habitats, and adaptation to the environment.

This facility also has an organic garden that functions as an outdoor laboratory, in which students study and sample its produce, allowing children to connect to the plants and to their food sources. To reinforce the importance of environmentally responsible behavior, students are taught to collect and measure the food they do not eat (they waste) after meals. They also are taught by example how to compost and recycle.

Each day, students participate in a variety of field activities, which are developed by the outdoor-education center and are implemented by the site's naturalists. Although the goal of the program is the same for every participant, naturalists have discretion in choosing what specific activities they will do with their groups. Special efforts are made to ensure that children spend most of their time outdoors in order to have an opportunity to interact with and be immersed in nature. This center provides onsite cabin lodging. At

the end of the field study, there is a closing ceremony where students share what has changed in them (Naturalist Supervisor, personal communication, October 11, 2016).

Procedures

Data collection included the Connection to Nature Index and students' field journals. I contacted the manager of the outdoor-education center, who sent me an email to confirm that the center agreed to work with me for my research study. After I received approval from the USF Institutional Review Board for the Protection of Human Subjects and an official written consent for the study from the outdoor-education center, I contacted potential teachers through this outdoor-education center. With the assistance of participating teachers, I finalized parental consent.

Twelve fifth-grade classes and their teachers participated in the study. All participants' parents were notified that their child would be participating in a research study by letters sent through participating teachers to the parents or guardians. Parents' consent was obtained through teachers. Only data from students whose parents agreed to participate in the research were used. No general demographic information was requested from schools. However, as a part of the survey, students were only asked to provide gender demographic. Assumption were made on students' ages based on the fact that all participants were in the fifth grade. To protect the identity of the participants, upon receiving the consent forms, either I or the teachers replaced all names with identification numbers. These numbers were used to report data collected from participants.

All data were collected over a 6-month period during the first half of 2017, from January through June. All participants attended the same program, followed the same

basic set of procedures, and had to complete a field journal. Teachers administered both the pre- and post-CNI and collected students' journals.

Students completed the CNIs shortly prior to the field study and after the field study. An article from National Geographic Kids' Magazine was assigned to use with students who did not want to participate in research. The article, however, was not used because all students participated.

While participating in the field study, students completed their field journals that were submitted to me. I scanned the journals and returned them to the schools. All field journals received were coded with new identification numbers to address the issue of confidentiality. Journals from School 1 were numbered from 1 to 79. Journals from School 2 were numbered from 80 to 139. Journals from School 3 were numbered from 140 to 159. These new numbers were used to report data collected from participants to address research question 3.

School 1 went to the outdoor-education center on a Monday and were forced back on Wednesday afternoon in February due to heavy rain storm, after which schools in the area were closed several days due to the unusual bad weather. Teachers had students complete the post-CNIs and parts of journals within 2 to 3 weeks after the trip when school routine was established. School 2 went to the outdoor-education center on a Tuesday and came back on a Friday afternoon in April, after which they immediately went on Spring break. Teachers had students complete the post-CNIs and parts of journals after Spring break. School 3 went to the outdoor-education center on a Tuesday and came back on a Friday afternoon in June, as planned. Teachers had students complete the post-CNIs the following week right before the end of the school year.

Because the week students returned was the last week of school, three teachers were unable to complete the post-CNIs with their classes and were not able to collect journals.

Data Collection

The data collection for the present study started from January 2017 to June 2017. Data were collected in two phases. In Phase I, quantitative data were gathered before students participated in the field study. In Phase II, quantitative data were collected after students participated in the field study, whereas qualitative data were generated during the field study and gathered after students returned from the field study.

Prefield Study

Teachers were provided with a copy of the CNI, as well as instructions on how to complete the CNI (Appendix A). Prior to administering the CNI, the teachers explained to their classes what CNI was and how important it was for the students to give their honest opinions. The CNI instrument and pencils were distributed to the students. Students were given 10 minutes to complete the CNI. This time limit was established by the pilot study. Students completed the first CNI prior to their participation in the field study. They also received instructions from their teachers and or the naturalists as to how to journal during the field study.

Postfield Study

After participating in the field study, students repeated the CNI at their schools. CNIs were matched by coding that was provided by the individual teachers. Upon receiving the data, I recoded all of the participants' in numerical sequence to ensure no numbers were duplicated. Students also completed their field journals that were collected by their teachers and submitted to me. Some were identified with names, some

were identified with numbers, some were identified with both, and some did not have any identification. Students' journals were coded with a new identification number to address the issue of confidentiality. I scanned the field journals for analysis. These journals contain the experiences and reflections of students during the multiday field study.

Data Analyses

This study employed both quantitative and qualitative data-analytic techniques to address the three research questions. The first two research questions evaluated data collected from the CNI instrument, whereas the last research question evaluated data collected from the students' field journals. An overview of the data analysis for each research question is reported in Table 6.

Table 6
Overview of Data Analysis for Each Research Question

Research Questions	Data Sources	Data Analysis
RQ1: To what extent does students' nature connectedness change after participation in the immersive-field-study program as measured by pre- and post-Connection to Nature Index?	CNIs	Dependent-sample *t* tests (to compare the pre- and postchange within each school).
RQ2: To what extent does the students' change in nature connectedness vary from school to school as measured by the difference in pre- and post-Connection to Nature Index values?	CNIs	One-Way ANOVA (to compare the differences between the three schools)
RQ3: How do students express their connection to nature in their journals?	Field Journals	Read all journals indepth for cues, repeated patterns, themes, and subthemes. Themes and subthemes were coded regardless of what the prompt was. The statements that students have made for each theme were classified as positive and negative when applicable. Frequencies and percentages of students' responses are reported. Analyzed students' responses on preferred activity through frequencies and percentages.

CNI Data Analysis

To assess the change from pretest and posttest on scores on the CNI within each school, the dependent-sample *t* tests were computed. Subsequently, one-way analysis of variances (ANOVAs) were conducted to compare the differences between the three schools on the change from pre- to post for the three scale scores. Descriptive statistics, including means and standard deviations for each score are reported in chapter IV. Because the results of the one-way ANOVAs were statistically significant, Tukey post-hoc comparisons were made. The level of significance for the hypothesis test was set at .05. Cohen's *d* was computed to measure the effect size to address the issue of practical significance.

Field Journals Data Analysis

Using Schultz's (2002) basic components of nature connectedness "cognitive (connectedness), affective (caring), and behavioral (commitment)" (p. 61), Cheng and Monroe (2012) developed a metric for evaluating nature connectedness among children, that contains four elements: Enjoyment of Nature, Empathy for Creatures, Sense of Oneness, and Sense of Responsibility. Because children's connection to nature is driven by these four elements, I selected them as the top-level themes for my coding.

I collected all journals and separated them by school. Each journal was scanned, and the written journal entries were transcribed into a computer database. Each journal was read to identify activities and experiences in which the students engaged and entered that data into individual files in the database. Following 2015 Creswell's guideline, I developed a qualitative codebook that contained a combination of predetermined and emerging codes.

After reviewing the files, I coded the relevant data into one of the four themes. All irrelevant data were stored in a data file but not used. From students' journal entries, I identified appropriate subthemes and components. I created columns for each of the three schools and, when applicable, created columns for their positive and negative responses. Then I clustered the data under the relevant columns. Themes and subthemes were coded regardless of the prompt. To enhance qualitative validity, while coding, I referred back to the codebook and refined the codes as needed, based on the information. To ensure qualitative reliability, I followed Patton's (2002) guideline and engaged two subject-matter experts to review themes, subthemes, and their components. Each rater (coder) was provided with a copy of themes and subthemes. I sat down with each one individually while he read a journal after reading the themes and subthemes. There was an 85% agreement between my coding and theirs for that journal. Thereafter, I provided both of them a random sample of 33 journals (11 from each of the three school) with instructions to review, analyze, and code. They both suggested that a component covering *Saving Plants and Animals* be added under the subtheme *Commitment to Future Environmental Actions* for Theme 4: Sense of Responsibility. I refined my initial coding as they suggested.

All coders had a defined protocol to follow based on the CNI instrument. Therefore, the influence of any possible coder bias was addressed and minimized through the use of these clearly-defined coding protocols.

An area where the study potentially could have been strengthened was the interrater coding process. Instead of having raters receive a randomly selected sample of journals and a defined protocol to follow, each rater could have been provided with full

sets of journals and been charged with separately developing components for each CNI category.

Qualifications of Raters

To ensure an objective analytical process and minimize bias, two faculty from a Northern California college assisted with the review, coding, and analysis of the study's qualitative data. One of the faculty has been teaching biology and related disciplines for 30 years and conducts day-long field classes. He also conducts research in ecology. The other faculty has been teaching biology and related disciplines including ecology and environmental sciences also for 30 years and conducts immersive-field studies of several days to several weeks. In addition, he is the chair of the Department of Life and Earth Sciences, where he developed the Natural History program.

Researcher Subjectivity

I have a positive bias toward immersive-field-studies programs, but because I had no contact with students before, during, and after their immersion-program experiences, I remain confident that my positive bias did not affect the results. The teachers collected the CNI data and the field journals. When analyzing qualitative data, I made every effort to keep my bias in mind as I analyzed the results and not let it influence my findings in any way.

Researcher's Background

In May 2008, I participated in a nature-based biology extended field studies to some of the last great remaining concentrations of wildlife in the Western Hemisphere. Our explorations included several biologically diverse wildlife refuges: Ruby Lake, Nevada; Bear Valley, Utah; Red Rock Lakes, Montana; the Greater Yellowstone

Ecosystem, Bruneau Dunes State Park, Idaho; Malheur, Oregon; Jackson Hole, Wyoming; and Mount Shasta, California. Experiencing nature in these places awakened in me a love of nature and a desire to take care of the natural environment.

While on this trip, I realized that not only humans, but also all creatures have the right to life and justice. This realization led me to pursue a certificate in Environmental Science followed by a master's degree with a focus in Human Rights where I acquired valuable tools to advocate social justice for both humans and the environment. I also learned that children have a legal right to experience nature, and thus, focused my master's thesis on the development of workshops for educators and influencers on the importance of developing programs to help young students to connect with nature.

I hypothesized that participation in immersive-field-study programs in nature is critical for children to build their knowledge of and commitment to the environment. While looking into research for my doctoral dissertation, I learned that California students are encouraged to participate in immersive-field-study programs. I believed it was important to assess the value of these programs and learn how to maximize their effectiveness in developing a sense of nature connectedness in young learners. Therefore, I focused my doctoral research on evaluating such a program.

CHAPTER IV

RESULTS AND ANALYSES

The purpose of this study was to evaluate the outcomes of an immersive-field-study program on fifth-grade students' connectedness with nature using a pre- and post-Connection to Nature Index (CNI) and students' field journals. The study was conducted with 317 fifth-grade students who spent 3 to 4 days in an outdoor-education center in a county in Northern California. This nature center offers a multiday field-study program where students stay overnight and participate in various nature activities such as nature hikes, wildlife observation, plant identification, pond study, creek study, and campfires that may have influenced students' connection to nature. This program is designed to create a learning experience that inculcates a deeper connection between children and nature and results in environmentally responsible behavior.

The present study was conducted with three different public schools at different times during the first half of 2017: February, April, and June. Quantitative data were analyzed using dependent-sample *t* tests between pre- and post-Connection to Nature Index (CNI) within each school to address research question 1. One-way analysis of variance (ANOVA) was conducted on the CNI change scores for the three schools with follow-up post-hoc Tukey tests to address research question 2.

For the CNI instrument, items had missing data. For the students with missing data, there were only a few items that had missing responds. For all students, there was less than one percent with missing data. Regardless of how many items a student missed or did not respond to, the mean was based on the number that the student did respond to. Qualitative data were coded and analyzed to address research question 3. This chapter contains the results of the study and the analyses for the three research questions.

Research Question 1

To what extent does students' nature connectedness change after participation in the immersive-field-study program as measured by pre- and post-Connection to Nature Index?

The first research question was designed to investigate whether there was a change in students' nature connectedness after participating in an immersive-field-study program. To address this question, dependent-sample *t* tests were computed to assess the change from pretest and posttest on the CNI scores for each school. Only the Total CNI and two of the subfactors with high reliability evidence were used in the data analysis.

Comparing the pretest means in Table 7 with the pilot means in Table 4, the means for Schools 1 and 3 were lower and School 2 was higher. The same pattern holds for the means for Enjoyment of Nature and Empathy for Creatures. An inspection of the means for pre-CNI Total score revealed very little difference between the schools (Table 7). For post-CNI means, School 1 decreased slightly, whereas Schools 2 and 3 increased (Table 7). On scale of 1 to 5, the means indicated that the students agreed with the CNI items especially Empathy for Creatures. The Boxplot for the Total CNI, Enjoyment of Nature, and Empathy for Creatures also revealed the differences between pretest and posttest and between schools (Figures 2 to 4). Statistically significant differences were found for all three schools when testing for change from pretest to posttest on the CNI Total score (Table 7), with small negative effect size for School 1 for all three measures, medium for School 2 for the Total CNI and Enjoyment of Nature, and large for School 3 for the Total CNI and medium for Enjoyment of Nature and Empathy for Creatures, based on Cohen's (1992) criteria.

Table 7
Pre- and Post-CNI Means, Standard Deviations, Dependent-Sample *t*-Test Results, and Effect Sizes for Total CNI and Two Subfactors (*N*=164)

		Pre-CNI		Post-CNI				
School	*n*	Mean	SD	Mean	SD	*t*	*df*	*d*
				Total CNI				
1	71	3.88	.52	3.78	.59	-2.21*	70	-0.26
2	74	4.24	.46	4.34	.43	4.34*	73	0.50
3	19	4.00	.42	4.28	.41	4.41*	18	1.01
				Enjoyment of Nature				
1	71	3.48	.71	3.31	.78	-2.76*	70	-0.33
2	74	4.01	.66	4.13	.59	4.06*	73	0.47
3	19	3.52	.54	3.82	.73	3.05*	18	0.70
				Empathy for Creatures				
1	71	4.26	.59	4.12	.65	-2.26*	70	-0.27
2	74	4.55	.48	4.58	.46	1.42	73	0.16
3	19	4.46	.49	4.70	.34	2.17*	18	0.50

* Statistically significant at the .05 level.

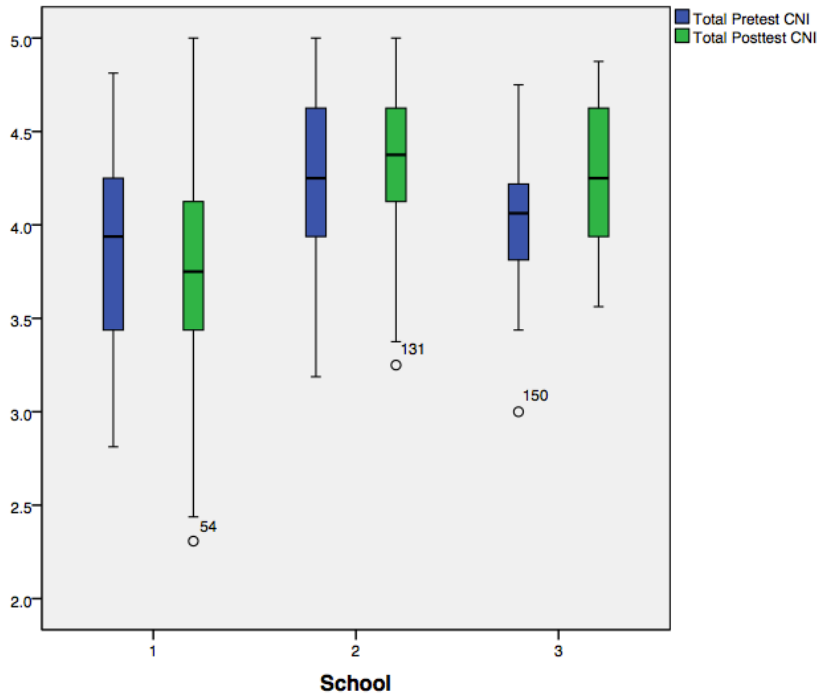

Figure 2. Boxplot comparing Total CNI pretest and posttest scores

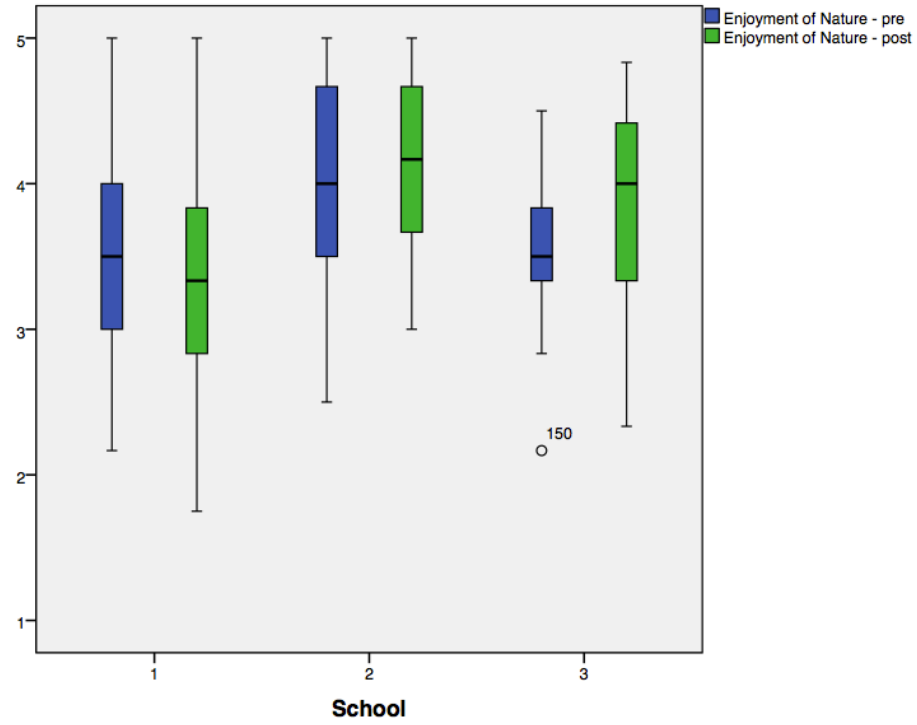

Figure 3. Boxplot comparing Enjoyment of Nature pretest and posttest scores

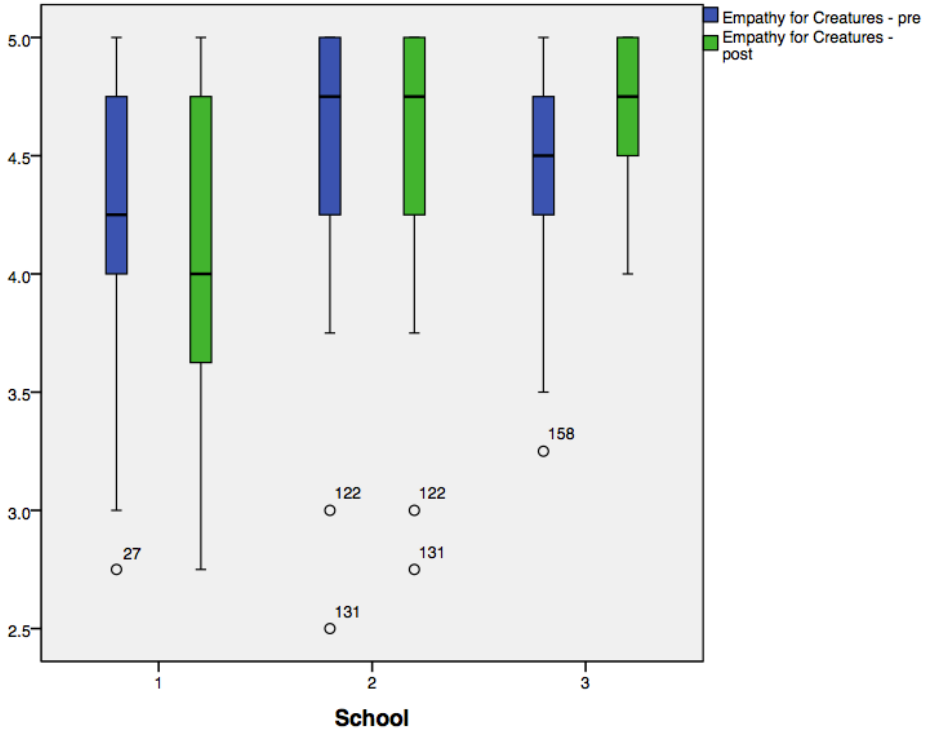

Figure 4. Boxplot comparing Empathy for Creatures pretest and posttest scores

Research Question 2

To what extent does the students' change in nature connectedness vary from school to school as measured by the difference in pre- and post-Connection to Nature Index values?

The second research question focused on how the changes in students' connection to nature varied from school to school as evident by the difference in the CNI pre- and posttest values. To address this question, one-way ANOVAs were conducted to compare the differences between the three schools on the change from pre to post for the Total CNI and two subfactors. Because the results of the one-way ANOVAs were statistically significant, Tukey post-hoc comparisons were made. Cohen's *d* was computed to measure practical importance as well as eta square.

Because three different schools were used in the study, one-way ANOVAs on the change scores were used to test difference between the schools in their change on the CNI from pretest to posttest. The three variables that had high reliability – Total CNI, Enjoyment of Nature, and Empathy for Creatures – were used for the analysis. The mean for the change scores for the Total CNI and two subfactors are positive for two of the three schools and one negative only for School 1 (Table 8). Statistically significant differences were found for the Total CNI and the two subfactors (Table 9). The measure of practical importance was medium for change in Empathy for Creatures and was large for the total change and Enjoyment of Nature.

The greatest difference in change scores from pretest to posttest was between School 1 and School 3 (Table 10). Post-hoc comparisons using the Tukey test indicated that the means were significantly different when each school was compared with the

Table 8
Means and Standard Deviations for CNI Change Values Broken Down by Schools for Total CNI and Two Subfactors

Variables	School	*n*	*M*	*SD*
Change in Total CNI	1	71	-.10	.38
	2	74	.10	.20
	3	19	.29	.28
Change in Enjoyment of Nature	1	71	-.17	.52
	2	74	.11	.24
	3	19	.31	.45
Change in Empathy for Creatures	1	71	-.14	.52
	2	74	.04	.26
	3	19	.24	.47

other schools (Table 10). The mean for School 1 decreased, whereas the mean for School 2 and School 3 increased. The effect sizes for the statistically significant post-hoc comparisons range from -0.63 to 1.30 for Total CNI Change, -0.49 to 1.17 for Enjoyment for Nature Change, and -0.49 to 0.93 for Empathy for Creatures Change. All the effect sizes are medium to large.

Table 9
Results of Three One-Way ANOVAs for Total CNI and Two Subfactors

Source	*df*	*SS*	*MS*	*F*	*Eta square*
		Change in Total CNI			
Between	2	2.78	1.40	15.84*	0.16
Within	161	14.13	0.09		
Total	163	16.91			
		Change in Enjoyment of Nature			
Between	2	4.85	2.43	14.60*	0.15
Within	161	26.71	0.17		
Total	163	31.57			
		Change in Empathy for Creatures			
Between	2	2.53	1.27	7.50*	0.08
Within	161	27.00	0.17		
Total	163	29.53			

* Statistically significant when the overall error rate was controlled at .05

Table 10
Results of Post-hoc Comparison on Mean Change Scores for Total CNI and Two Subfactors

	School 1		School 2		School 3	
	M Diff	*d*	*M Diff*	*d*	*M Diff*	*d*
			Change in Total CNI			
School 2	.20*	0.67	–		-.19*	-0.63
School 3	.39*	1.30	.19*	0.63	–	
			Change in Enjoyment of Nature			
School 2	.28*	0.68	–		-.20*	-0.49
School 3	.48*	1.17	.20*	0.49	–	
			Change in Empathy for Creatures			
School 2	.18*	0.44	–		-.20*	-0.49
School 3	.38*	0.93	.20*	0.49	–	

* Statistically significant at the .05 level.

Research Question 3

How do students express their connection to nature in their journals?

The third research question focused on how students expressed their connection to nature in their field journals. Qualitative data were coded using students' responses to the prompts in their field journals. In total, 159 field journals were submitted to me for research from all three schools: School 1 (n=79), School 2 (n=60), and School 3 (n=20).

All field journals were coded with new identification numbers. Journals from School 1 were numbered from 1 to 79. Journals from School 2 were numbered from 80 to 139. Journals from School 3 were numbered from 140 to 159. These new identification numbers were used to identify the participants when quoting from their journals.

I transcribed all students' responses from their journals, identifying and coding relevant words and drawings for each of the prompts. Themes and subthemes were coded regardless of what the prompt was. The statements that students made for each theme were classified as positive or negative.

The data were classified into four themes: Enjoyment of Nature, Empathy for Creatures, Sense of Oneness, and Sense of Responsibility, based on CNI categories. Each theme yielded various subthemes and components that are displayed in Table 11. All subthemes for Theme 1, Enjoyment of Nature, are related directly to the activities students experienced during the immersive-field-study program. For Theme 2, Empathy for Creatures, only one activity, Hug A Tree, is among the activities that students performed. The subthemes for Theme 3, Sense of Oneness, and the subthemes for Theme 4, Sense of Responsibility, are not based on the activities and are the categorizing aspects of the theme. Frequency information for each theme is presented in separate tables: Tables 12 to 15.

The subthemes as shown in Table 11 were built on a through reading of all students' journals. Based on their responses, subthemes were developed for each of the four major themes. Students' journal entries were then placed under the appropriate subthemes. For example, one student wrote, "I pledge to not hurt animals" and another wrote, "respect plants." Based on responses like these, the subtheme of *Watch Out For* was created and placed under Theme 2 "Empathy for Creatures."

Results, in each table, are presented in terms of the number and percentage of students' positive and negative responses. The percentage for each component is based on the total number of responses for that specific component. For example, under Theme 1: Enjoyment of Nature, the subtheme of Nature Observation, in component "Animals," 44 students from School 1 provided responses. Out of these responses, 40 expressed positive responses and 4 expressed negative responses, which gives a total number of 44 and the percentage of 90.91 positive and 9.09 negative.

Table 11
Summary of Themes, Subthemes, and Components

Theme 1: Enjoyment of Nature	Theme 2: Empathy for Creatures	Theme 3: Sense of Oneness	Theme 4: Sense of Responsibility
Subthemes	Subthemes	Subthemes	Subthemes
Nature Observations	**Empathy for Animals**	**Kinship With Nature**	**Practiced Environmentally Responsible Behaviors**
Animals	Love or Like Animals	Being Alone in Nature	Environmental Clean Up
Plants	Touch Animals (pet or kindly hold)	Being Out in Nature	*Compost*
Scenic Vistas	Feed Animals	Being Calm or Peaceful in Nature	*Not Litter*
Nature Sounds	Watch Out For (treat well, be kind, not hurt or disturb, respect, help)	Connecting With Animals	*Pick Up Trash*
Nonliving Ecosystems such as Mountains, Rocks, etc.	Save Animals (not kill, not step on, look out)	Connecting With Plants	*Recycle*
Hiking	Sad, if Hurt	**Equality Between Self and Nature**	Reduce Waste/Not Waste
Day Hike	**Empathy for Plants**	Importance of Animals	*Not Waste Food*
Night Hike	Love or Like Plants	Importance of Plants	*Reuse Water Bottles*
Solo Hike	Hug a Tree	**Noticing Nature**	*Save Energy*
Hiking on a Warm, Sunny Day	Water a Plant		*Save Water*
Hiking in Cold, Rain, & Strong Wind	Protect Plants (treat right, take care, plant a plant, respect, garden)		Leave No Trace
Getting Muddy, Dirty, & Wet	Save Trees or Forest (not pick, not pull)		**Commitment to Future Environmental Actions**
Additional Nature Activities	Sad, if Hurt		Environmental Clean Up
Visiting a Barn	**Empathy for Nature**		*Compost*
Visiting a Pond or a Creek	Love or Like Nature (empathy for, pledge to Earth)		*Not Litter*
Visiting a Garden & Sampling its Produce	Take Good Care of Nature or the natural Environment (protect, respect, help, kind)		*Not Pollute*
Singing Nature Songs	Sad, if Hurt		*Pick Up Trash*
			Recycle
			Reduce Waste/Not Waste
			Not Waste
			Not Waste Food
			Save Energy
			Save Water
			Communicate or Encourage Environmental Awareness
			Leave No Trace
			Saving (protecting the life of a living) Plants or Animals

Theme 1: Enjoyment of Nature

For this theme, there were three main subthemes, with the first subtheme having five components, the second subtheme having six components, and the third subtheme having four components.

Table 12
Frequency and Percentages of Positive and Negative Responses for Subthemes and Components Broken Down by School for Theme 1: Enjoyment of Nature

		School 1 (*n*=79)		School 2 (*n*=60)		School 3 (*n*=20)	
Subthemes		Positive	Negative	Positive	Negative	Positive	Negative
Nature Observations		**142**	**6**	**171**	**4**	**77**	**1**
Animals	*f*	40	4	43	3	20	0
	%	90.91	9.09	93.48	6.52	100.00	0.00
Plants	*f*	34	2	41	1	18	0
	%	94.44	5.56	97.62	2.38	100.00	0.00
Scenic Vistas	*f*	39	0	33	0	12	0
	%	100.00	0.00	100.00	0.00	100.00	0.00
Nature Sounds	*f*	17	0	14	0	13	1
	%	100.00	0.00	100.00	0.00	92.86	7.14
Nonliving Ecosystems	*f*	12	0	40	0	14	0
(Mountains, Rocks, etc.)	%	100.00	0.00	100.00	0.00	100.00	0.00
Hiking		**109**	**48**	**93**	**8**	**44**	**0**
Day Hike	*f*	30	15	44	1	15	0
	%	66.67	33.33	97.78	2.22	100.00	0.00
Night Hike	*f*	27	4	10	0	10	0
	%	87.10	12.90	100.00	0.00	100.00	0.00
Solo Hike	*f*	40	2	25	1	16	0
	%	95.94	4.76	96.15	3.85	100.00	0.00
Hiking on a Warm,	*f*	0	0	5	0	3	0
Sunny Day	%	0.00	0.00	100.00	0.00	100.00	0.00
Hiking in Cold, Rain, &	*f*	6	12	6	4	0	0
Strong Wind	%	33.33	66.67	60.00	40.00	0.00	0.00
Getting Muddy, Dirty,	*f*	6	15	3	2	0	0
& Wet	%	28.57	71.43	60.00	40.00	0.00	0.00
Additional Nature Activities		**81**	**1**	**63**	**0**	**33**	**0**
Visiting a Barn	*f*	15	1	0	0	0	0
	%	93.75	6.25	0.00	0.00	0.00	0.00
Visiting a Pond or	*f*	0	0	26	0.00	13	0
Creek	%	0.00	0.00	100.00	0.00	100.00	0.00
Visiting a Garden &	*f*	22	0	7	0	4	0
Sampling its Produce	%	100.00	0.00	100.00	0.00	100.00	0.00
Singing Nature Songs	*f*	44	0	30	0	16	0
	%	100.00	0.00	100.00	0.00	100.00	0.00

The majority of responses were made for the subtheme Nature Observations. Of these comments, students from School 3 had a greater percentage of responses than the students from the other two schools. Within the components for each subtheme, students' responses were classified into more than one component, resulting in larger totals for the subthemes than the number of students in a school.

Within the subtheme of Nature Observations, most students journaled about observing animals. All students from School 3 reported that they enjoyed observing animals, whereas not all students from School 1 or School 2 provided comments about animals. As for the other subthemes, students from School 3 again had the greater percentage in Enjoyment of Nature responses than the other two schools.

Nature Observation

For all three schools, more than 90% of students liked seeing and interacting with animals. The weather did not appear to influence the students' enjoyment of experiencing animals, but it did affect how many types of animals they were able to see. The number of animals that were sighted varied by school: Students in School 1 reported 67, School 2 reported 134, and School 3 reported 59 animal sightings.

Several students wrote about how pleased they were to encounter animals: "I thought seeing newts was cool" (Student 16 from School 1); "I like the arduous all day hike because we made it to the top and saw a lot of cows" (Student 88 from School 2); "I felt happy because I saw animals" (Student 146 from School 3). A few students from School 1 expressed dislike of their experience with animals through statements such as, "[I felt] Fine but when I saw the spiders I freaked out" (Student 66), and "Why did I have to step in the cow dung. Flys [sic] in poop" (Student 38).

As with their animal interactions, more than 90% of students in all three schools reported they liked seeing, smelling, and interacting with plants. Student 7 from School 1 wrote, "I smelled bay trees. I heard branches rustle." This excitement also was evident in the writing of Student 12, who reported, "I saw a cool red mushroom that we named the fire mushroom. After that I found another pack of them. We did not know its actual name." Several other students also showed enthusiasm: "We found really cool plants" (Student 116 from School 2); "My favorite thing in nature is the beautiful plants" (Student 150 from School 3). The only negative statements came from School 1, where Student 55 wrote, "I notice it smells really bad, the inside looks like lemon heads …. I wonder where it came from. Why does it smell so bad, what type of flower is it." Student 12 also expressed, "It smell of roses gone bad …. It reminds me of rotten roses that are wet."

Several students from School 2 documented their careful observation of nature by making detailed drawings of plants and flowers that they saw (Figures 5 and 6).

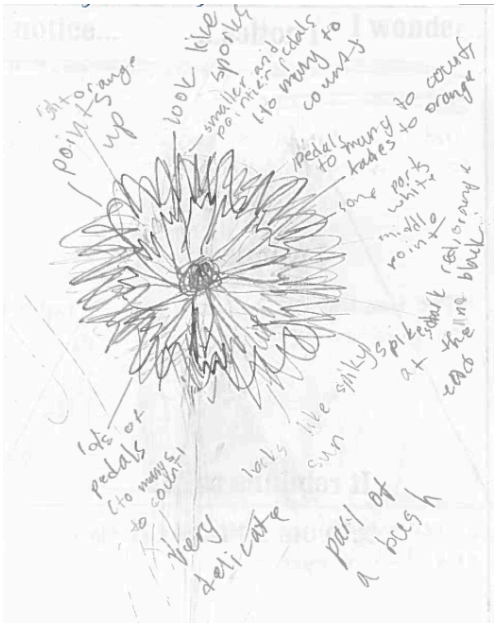

Figure 5. Student 120's drawing.

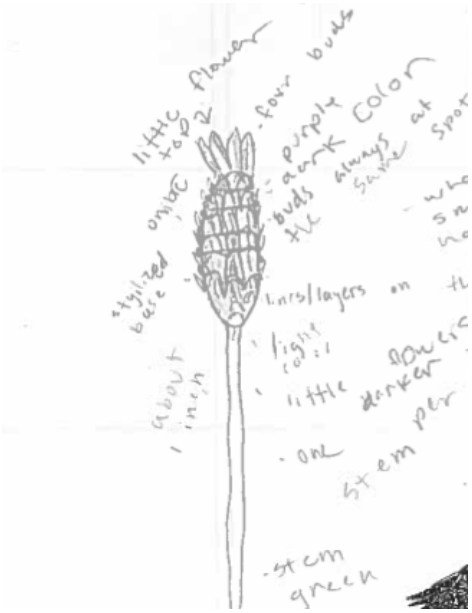

Figure 6. Student 124's drawing.

Students from all three schools expressed only positive comments on Scenic Vistas and Nonliving Ecosystems (Mountains, Rocks, Hills). Student 11 from School 1 used her senses to take in the whole vista and wrote, "I see the valleys and hear the wind in my ears. The fog surrounds me as the drizzle lightens. I can see on and on." Others also journaled about the whole landscape as a single experience: Student 81 from School 2 commented, "On the mountain across from me, there is a big rock ... there are tons of flowers and trees. In the distance I can also see other trail groups." Student 95 wrote, "It was fun finding very interesting rocks all around the place." Student 113 responded, "My favorite part was when we reached the top and saw the whole valley below us." Student 159 from School 3 commented, "It was really … beautiful to see the huge mountains!!" Another one wrote, "I saw … big trees, rocks, dirt, grass small on the trial; grass, thorns, thorn bushes, blue butterflies, dragonflies, little stones, big stones, big rocks, mini stones, mini fire stone." Some students showed interest in rocks. Student 50 expressed, "So far my feelings about the natural world is [sic] it's cool. It's cool because there's lots [sic] of cool things like rocks."

All the students from School 1 and School 2 had only positive comments on listening to the sounds of nature. For example, Student 148 from School 3 wrote, "I love listening to the birds chirp!" Student 89 from School 2 expressed, "I heard the water flowing down the creek." Student 5 from School 1 commented, "I heard owls and frogs." Student 78 from School 1 wrote, "I heard the river." The only negative response came from Student 148 in School 3, who wrote, "What really bugged me was when the bees and flys [sic] buzzed right past my ear and I heard a loud buzz."

Hiking

Students participated in three types of hikes: day, night, and solo. The data showed differences for the three schools. School 3 had the highest percentage of enjoyment with 100% positive references for all three hikes, whereas School 1 had the lowest percentage of enjoyment with 66.67% positive references for the day hike, 87.10% positive statements for the night hike, and 95.94% positive responses for the solo hike. All three schools had greater than 95% enjoyment for the solo hike, whereas School 2 and 3 had 100% enjoyment for the night hike, School 1 had the lowest with 87%. For School 1, the day hike was the least enjoyable. For School 2 and 3, the day hike had comparable responses.

From School 1, some of the students enjoyed the hike: Student 33 journaled, "I hugged a tree and I felt free! I was filled with joy. The hike was fun and sadly now its done." Student 39 wrote, "I want to do more hikes." Student 50 expressed, "I'm excited about hiking at night and in the rain. Also I'm excited about staying with my friends. So far my feelings about the natural world is [sic] it's cool. It's cool because there's lots of cool things like rocks and animals. Also I love hiking."

Other students did not enjoy the hike, possibly due to the cold and rainy weather: Student 38 recounted, "Today I went on a long hike and I was miserable because I'm sick also why is [sic] my shoes were so wet." Student 3 wrote, "All day hike (ugh). Today we went on a [sic] all day hike and it was pouring. … We made sandwiches and mine got soggy. We found 10 newts ... We also ate cookies. Overall it was not fun. I now have blisters." Student 1 commented, "The hike I went on was … really tiring when all of us were walking in the rain and walking in the mud. I didn't have any rain-boots so my

shoes were muddy and I didn't have fun."

Student 36 reflected on both the challenges and the beauties of the hike in a poem: "Knee hurting as I push through it, Little drizzles feel cool on my face, Howling at a wolf bush, Amazing waterfall, Calming river makes me feel, Relaxed at the end of the hike, Sitting on a rock." Two students recorded encounters with clouds on the mountain hike. Student 24 drew a picture, and wrote, "the part on [name of the mountain] peak, right below the clouds" (Figure 7). Student 79 described how "Hiking to [name of the mountain] peak, I went inside a cloud." She also said that the hike to the mountain was her best memory. In response to the question, "What has changed in you?" only three students out of 79 expressed their enjoyment in hiking. In response to the question about whether they learned anything that they can apply later, Student 11 answered: "Yes; Don't go back when it rains there."

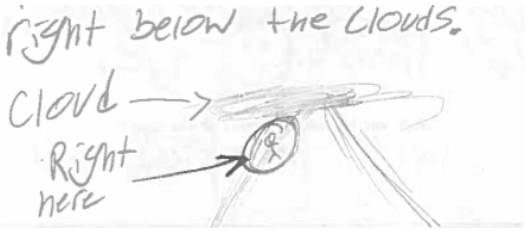

Figure 7. Student 24's drawing.

From School 2, most of the students enjoyed the hike. Two students had reservations about the experience. Student 107 commented that it was a "Too long all day hike," and Student 86 wrote, "We did a by-yourself-hike and it was scary." Examples of positive experiences follow: Student 126 wrote: "Today we went on a hike ... It was super fun." The same student remarked that "The solo hike was so fun. I enjoyed reading the facts and quotes on the papers. I enjoyed listening to the birds and trees." Student 110 journaled: "Today I went on a [sic] all day hike. It was tiring but fun.

The hike was windy and cold. We had lunch and it was windy. Then it was crazy windy when we walked up to the trail ... When we reached the top, it was so windy I thought I was going to go flying. We walked down the hill and it was, in all, very fun." Also in response to the all day hike, Student 111 wrote, "The walk was extraordinary!! … We were trying to fall but the wind did not let us…. I am in love with the outdoors." In a comment about the night hike experience, Student 90 wrote, "The night hike is exactly what it sounds [like], a hike in the night…. I really liked it and thought it was really cool hiking in the dark. I thought it would be really scary but it turned out very fun." Student 108 journaled that, "One of my favorite memories is when we went on the dark night hike, which was so very calming, relaxing, and elusive…. It was such an amazing trip with so many memories and I hope I can experience something like it again."

From School 3, all of the students enjoyed the hikes and only provided positive comments on all three hikes: Student 146 wrote, "We went on an all day hike and I learned what poison oak looked like…. I will most likely go on hikes more. … I learned that I really like hiking with my friends." Student 159 observed, "The hikes are so much fun and beautiful … I can really enjoy hikes … we went to [name of the mountain] peak and went through the enchanted forest… everything is perfect and everyone is happy." Additional quotes follow: "I loved being peaceful and calm on the night hike" (Student 153). "I … didn't think it would be as fun as it was" (Student 155). Student 158 wrote, "I felt happy and I was having fun when we did the … walk. I felt good when I walked in the dusk light." "We went on a solo hike and it was really cool to experience all the nature around me" (Student 159). "I really enjoyed the solo hike and would love to do it again" (Student 154).

The data displayed in Table 12 under the headings of "Hiking on a Warm, Sunny Day," "Hiking in Cold, Rain, & Strong Wind," and "Getting Muddy, Dirty, & Wet" help to clarify these results. School 3 had the greatest percentage of positive responses for all three hikes and also reported having warm, sunny weather. Fifteen percent of the students in School 3 commented positively that they liked the warm, sunny weather. Eight percent of the students in School 2 made similar comments, and none of the students in School 1 wrote comments. Two-thirds of the students in School 1 had negative responses about rain, wind, and cold weather, whereas no one wrote anything about warm, sunny weather. Of the 60 students in School 2, 8% commented positively about warm weather, and 40% commented negatively about cold windy weather. No one in School 3 commented negatively about the weather.

From School 1, Student 59 wrote the following narrative, "Dramatically, we were gonna go on a 6-mile hike. 10 people fell off of the cliff and everyone got muddy. Some people even got taken away by the current. I balanced on one of the rocks. I almost fell off and died but someone helped me up." Student 76 drew a large cloud with giant raindrops to illustrate the extreme weather (Figure 8).

Figure 8. Student 76's drawing of the weather conditions in February.

There were strong negative comments from School 1 about their experiences with the wet, icy wind, and cold weather. These included: "It sucked. I got so muddy, dirty,

and definitely wet. I didn't even eat the cookie I got. I dropped it in the mud" (Student 10). He further wrote, "I don't stay very happy in the cold." Other students wrote, "Today … It was ice cold" (Student 40). "I wonder what earth will look like in ice years" (Student 46). Student 28 wrote, "It was cold, wet, and muddy. I saw many different kinds of leaves, trees, sticks, and plants. I do not want to go outside tomorrow." "My hike was filled with water and mud. It also was rainy wet and mud [sic]. It has rain and mud. It was rainy wet and muddy" (Student 54). Student 77 wrote, "I don't like getting dirty." "I remember the clean feeling when I came and the dirty feeling as I came out" (Student 7). Student 47 drew several pictures showing how muddy she was, and her muddy clothes and boots after the hike (Figure 9).

Figure 9. Student 47's drawing of how muddy she was in February after a hike.

Several students, however, journaled about how they enjoyed nature even in the rain. The positive comments belonged to students who already had a strong connection to nature. Examples are as follows: "I felt great … because I am a person who likes outsides [sic] and mud and getting wet. And at the end I was completely covered ☺. Then I got to take a shower and that felt really good!" (Student 15). Because it was a muddy downhill slope, students could slide down the hill, trying to stay in their lane. A few students expressed enjoying "Lane slipping." Student 55 commented, "Today was amazing. I felt so great to be out in nature. I loved putting mud on my face. … It was really fun. I got to get dirty and have some fun." "I felt very cool to be outside in the

outdoors and to be getting all dirty in the mud. ... I am excited to go outside tomorrow. What I did that was interesting is rub mud on our [sic] face" (Student 60).

During School 2's immersive-field study, students experienced a range of weather, which was reflected in their observations. Student 86 journaled, "We are sitting in a flowery meadow. I see cows and horses and flowers. I found this really pretty yellow flower." In a more dramatic narrative, Student 108 recounted:

> One of my favorite memories is when we went on the dark night hike …. We were all running in the dark, rainy night to get out of the rain, … and when we went out and started walking, a humongous tree fell right, 10 feet in front of us. It was such an amazing trip with so many memories and I hope I can experience something like it again.

Student 92 drew a picture showing how cloudy and windy the weather was, and wrote, "The wind was really strong!" (Figure 10).

Figure 10. Student 92's drawing of the weather conditions in April.

Comments from School 2 showed that some students did not mind the rain and the wind. Student 114 journaled, "It is windy up here, lots of wildlife, [and] sound of the wind. I wonder how much water the water towers are collecting." Student 111 personified the wind by writing, "[one of the] memories … I will remember … is on the all day hike when we got to the top of [name of the mountain] peak when the wind was furious at us," whereas Student 122 found the wind to be the most memorable part of the trip and wrote, "I will also remember the wind blowing me from the windy all day hike. That's [among] what I will always remember." Examples of negative comments are as

follows: “The wind kept pushing me over…. It’s super windy at the top … It was raining … I really really hate water!!” (Student 131). Student 127 was concerned that “the rain may get me muddy.”

From School 3, Student 158 wrote the following narrative, “I smell the clean air. I hear the water rushing while the birds chirp calmly. I see the creek and the trees surrounding it. I feel calm when I look around me. I taste moistness in my mouth from the wet air.” Student 149 drew a picture of a giant sun, showing how sunny the weather was with two fluffy clouds over the mountains and mini waves from the breeze (Figure 11). Examples of positive comments are as follows: “I felt good in the breezy air. I saw the trees blowing through the wind. I tasted the sweet clean air. I smelt the fresh animal habitat” (Student 158). “I see … the water traveling lightly down the creek with the sun reflecting ... as I kept moving, the sun, birds, and [a light pleasant] wind made me feel calm” (Student 159). No negative comments on the weather were recorded in students’ journals.

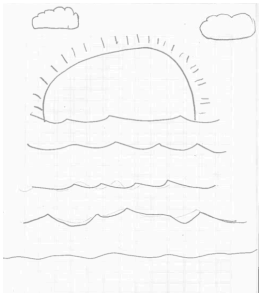

Figure 11. Student 149’s drawing of the weather conditions in June.

Additional Nature Activities

In addition to hiking, all three schools participated in different nature activities depending on the weather conditions. For example, only School 1 visited a barn, whereas School 2 and School 3 visited a pond or creek. Student 13 wrote, “We went to the barn.” “We saw the sheep and goat” (Student 47). “We pet the sheep” (Student 64). “We fed a

goat and sheep" (Student 52). Students also made observations on the animals' health and behavior as well as describing the texture and smells they experienced encountering these animals. Student 25 wrote, "I notice that the goat is bony. I wonder if he is not eating enough. It reminds me of Shrek" [the animated film from Pixar]. Student 26 observed, "I notice all the animals are really calm. I wonder why the goat leaves food. It reminds me of going to a ranch with my family." "I notice that my [mint] leaf is very green, lumpy, pretty, and soft. …It reminds me of a lamb's ear because it is shaped like one and is soft" (Student 41). All students' comments were positive about their experiences at the barn, except for one student who found that the barn "smelled bad" and wrote, "I don't like the feel of sheep hair."

All students' comments were positive about their experiences at the pond or creek: "My favorite thing yesterday was going to the creek to see spiders, small frogs, and [a] big frog it was playing dead" (Student 128, School 2). "I found my rock in the creek!" (Student 130, School 2). Student 131 drew what she saw under a magnifying lens and described what it looked like to her: "Some fish have spots, [and] … are transparent, [and] some … have stripes." She wondered, "Why are the fish transparent; Why do they all have different patterns; If any of them have babies." She also wrote that the creature reminded her of "An aquarium, Angels, Tiger" (Figure 12).

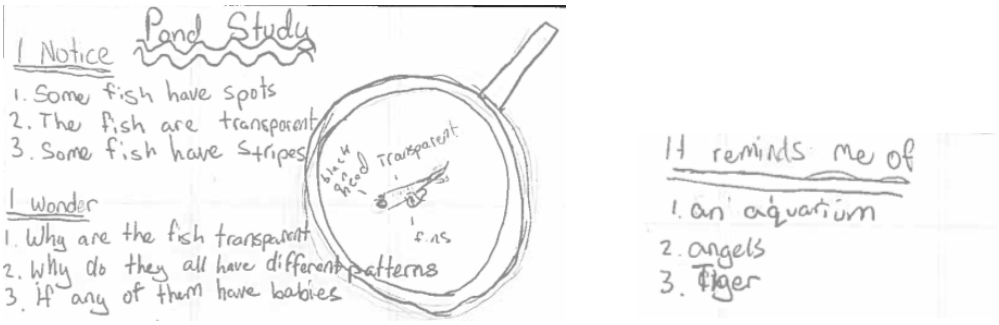

Figure 12. Student 131's drawing.

From School 3, Student 146 wrote, “It was really fun catching tadpoles.” Student 150 wrote that the most interesting experience he had on the trip was “catching the animals in the river,” and drew pictures of a “Mayfly nymph,” “crane fly larva,” and a “beetle larva.” (Figure 13).

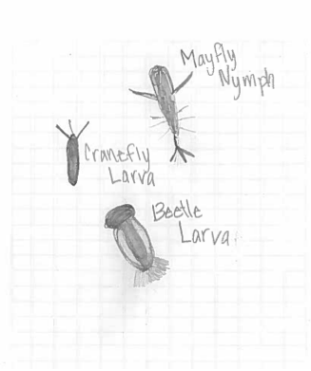

Figure 13. Student 150’s drawing.

Student 152 noticed two “superpower” adaptations that enable a creature to survive: walking on water and invisibility (the little beetle was this student’s idea of invisibility.) She drew a picture of a “water strider” with the comment “walking on water,” and a picture of a small bug with the words “invisibility,” “little beetle really small,” “too small to catch” (Figure 14).

Figure 14. Student 152’s drawing.

All three schools visited the garden and sampled the vegetables grown there. All comments from the three schools were positive. Student 63 from School 1 commented, “I really enjoyed eating all sorts of food in the garden.” Student 75 from School 1 drew a

picture of her experience in the garden (Figure 15). Student 129 from School 2 wrote that one of the memories he would always remember is when they went to "the garden when we tasted the garden food." Student 84 drew a picture of the garden and wrote, "Best friends help plants" (Figure 16). Student 154 from School 3 commented, "The most interesting thing was eating the plants." They were no negative comments.

Figure 15. Student 75's drawing.

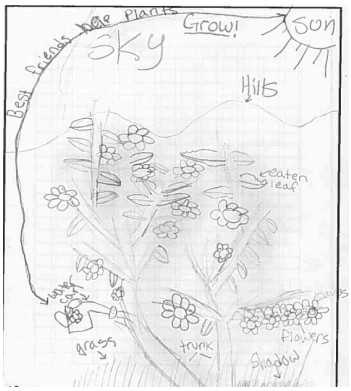

Figure 16. Student 84's drawing.

Students from all three schools enjoyed singing nature songs, especially the ones about animals such as the *Banana Slug* "which is about a guy who likes his banana slug," and the *Gusano*, which is "about this worm that wanted people to like him." "I like Banana Slug because of the movements" (Student 149, School 3). Student 159 liked the *FBI* song the best "because it was really funny and it told the cycle of decomposing." Student 28 from School 1 wrote that her favorite song, *On the Loose*, made her "feel love," whereas Student 71's opinion was that the song "was about following your dreams and you'll go far." And finally, Student 131 from School 2 wrote, "I loved them all."

Theme 2: Empathy for Creatures

For this theme, there were three main subthemes, with the first subtheme having six components, the second subtheme having six components, and the third subtheme having three components.

Table 13
Frequency and Percentages of Positive and Negative Responses for Subthemes and Components Broken Down by School for Theme 2: Empathy for Creatures

		School 1 (*n*=79)		School 2 (*n*=60)		School 3 (*n*=20)	
Subthemes		Positive	Negative	Positive	Negative	Positive	Negative
Empathy for Animals		**29**	**2**	**12**	**2**	**4**	**0**
Love or Like Animals	*f*	5	1	5	2	2	0
	%	83.33	16.67	71.43	28.57	100.00	0.00
Touch Animals	*f*	4	1	2	0	0	0
	%	80.00	20.00	100.00	0.00	0.00	0.00
Feed Animals	*f*	5	0	0	0	0	0
	%	100.00	0.00	0.00	0.00	0.00	0.00
Watch Out For	*f*	11	0	4	0	1	0
	%	100.00	0.00	100.00	0.00	100.00	0.00
Save Animals	*f*	4	0	1	0	1	0
	%	100.00	0.00	100.00	0.00	100.00	0.00
Sad, if Hurt	*f*	0	0	0	0	0	0
	%	0.00	0.00	0.00	0.00	0.00	0.00
Empathy for Plants		**14**	**2**	**11**	**1**	**10**	**0**
Love or Like Plants	*f*	1	2	5	1	1	0
	%	33.33	66.67	83.33	16.67	100.00	0.00
Hug a Tree	*f*	1	0	2	0	1	0
	%	100.00	0.00	100.00	0.00	100.00	0.00
Water a Plant	*f*	2	0	0	0	0	0
	%	100.00	0.00	0.00	0.00	0.00	0.00
Protect Plants	*f*	5	0	3	0	1	0
	%	100.00	0.00	100.00	0.00	100.00	0.00
Save Trees or Forest	*f*	5	0	0	0	4	0
	%	100.00	0.00	0.00	0.00	100.00	0.00
Sad, if Hurt	*f*	0	0	1	0	3	0
	%	0.00	0.00	100.00	0.00	100.00	0.00
Empathy for Nature		**13**	**0**	**25**	**0**	**6**	**0**
Love or Like Nature	*f*	6	0	17	0	5	0
	%	100.00	0.00	100.00	0.00	100.00	0.00
Take Good Care of	*f*	7	0	7	0	1	0
	%	100.00	0.00	100.00	0.00	100.00	0.00
Sad, if Hurt	*f*	0	0	1	0	0	0
	%	0.00	0.00	100.00	0.00	0.00	0.00

Students from School 1 and School 2 made negative responses regarding animals and plants, whereas School 3 had fewer responses but they were all positive. Students from all three schools expressed having empathy for nature, and School 2 had the largest number of positive responses for nature. School 1 had the highest number of positive responses for Watching Out For animals; however, it had one negative response to

touching animals. The majority of statements are about having Empathy for Animals followed closely by Empathy for Nature. The next greatest number is about having Empathy for Plants. Furthermore, when compared with Enjoyment of Nature, there was a much smaller number of responses regarding Empathy for Creatures.

Empathy for Animals

In expressing their empathy for animals, students across all three schools wrote about loving, petting, feeding, watching out for, and saving animals, as well as their feelings of sadness if they saw an animal hurt. Fifteen students from School 1 and three students from School 2 commented on how interesting it was for them to see newts. Five students from School 1 and one student from School 2 drew a picture of a newt. A number of students in School 1 expressed a desire to see animals before they went on the field study. For example, Student 8 wrote, "We saw no animals which I hope to see soon." She later drew a newt in her journal, but there was no mention of any other animal. Similarly, Student 73 expressed, "I hope to see … more animals," but did not mention any animal encounters in her journal except the following: "There was … a mouse in the roof of my cabin. It scared everyone." Student 57 from School 1 wrote, "I like the wild because of the rain" [which gave them the opportunity to see the newts], and Student 119 from School 2 wrote, "I like newts." Three students from School 1 and one student from School 2 reported that they "loved" animals, whereas one student from School 1 and three students from School 2 reported that they "liked" animals, which gives the total of eight who expressed positive emotions toward animals. Student 34 from School 1 journaled, "I love the goats," whereas Student 85 from School 2 wrote, "I love beetles."

Several students from School 1 wrote that they held a newt, petted sheep, and fed the goat and sheep. Student 76 mentioned that he "did not like the feel of sheep hair." Students also wrote that they would watch out for animals in various ways. To illustrate, Student 34 from School 1 promised to "be quiet around animals," whereas Student 96 from School 2 wrote, "I will not disturb the harmony of the animals." Students from School 3 also reported loving animals. Student 159 commented that "a dragonfly landed on my backpack" and drew three hearts. Student 151 recorded that "seeing the animals" was the best memory of the immersive-field-study program. Several students from School 2 commented that they liked to pick up the "salamander" and the "beetle." They also expressed that they would watch out for animals in various ways. Student 63 from School 1 promised to "not kill random bugs," whereas Student 105 from School 2 pledged to "not kill anything."

Empathy for Plants

In expressing their empathy for plants, students wrote about loving, hugging, watering, caring for, and saving plants, as well as their feelings of sadness when they see plants destroyed. For instance, Student 120 from School 2 wrote, "I loved how many types of plants there were." One or two students from each school reported that they hugged a tree. They also wrote that they would water the plants and care for them in various ways. Student 6 from School 1 journaled that during their Garden tour, she "liked weeding … plants," and Student 19 promised to "water the plants with care … and not pull flowers." Student 98 from School 2 pledged to "respect plants." Student 91 drew an imaginary species of a tree that has the ability to defend itself in case of danger. In her drawing, she named her species a "Treeth," a tree with teeth. Student 157 from

School 3 suggested that "We should keep the forest the way it is." Student 150 from School 3 wrote, "My favorite thing in nature is the beautiful plants." She expanded on this by empathizing with a plant that had no leaves, writing, "it reminds me of stems with no flowers, it's just empathy, it makes me feel like a part of it is missing." There was only one student from School 1 who provided a positive comment about loving or liking plants, whereas Student 90 from School 2 wrote:

> Honeysuckle is a flower and … I like it because it is a very beautiful flower. It is a light purple going into white at the middle. This represents to me to be kind and happy because of the soft colors it has. Another reason is that it has nectar at the middle that you can suck. This shows to me that not only are you beautiful on the outside, [but also] you are playful and funny on the inside.

Empathy for Nature

In expressing their empathy for nature, students across all three schools wrote about loving nature (more emotional) and caring for nature (more action) as well as their feelings of sadness if Mother Nature is hurt. Student 39 from School 1 wrote, "I love the nature," whereas Student 41 pledged to "give lots of love to the earth." Student 115 from School 2 wrote, "the most important thing I learned was I love nature," and Student 155 from School 3 wrote, "I learned that I really like nature." Students also wrote that they would take care of nature in various ways. Student 82 wrote, "I could pick up trash in my school and in my neighborhood so Mother Nature could not be hurt by our ways." Student 140 expressed, "I liked the card where it said how could you save the earth." Student 81 from School 2 drew an imaginary species that has the ability to hurt whoever hurts nature. The drawing is labeled as if "you hurt nature, I will hurt you."

Student 158 drew a picture of the planet and wrote, "Take a deep breath and think how this world needs help. And do just that!" In addition, she surrounded this sentence

with the words, "dog fighting, peace, lack of water, poaching, women rights, global warming, [and] wars." As the student appears to understand, "global warming" and "war" are among the forces most destructive to nature. Student 53 pledged to "be kind and respectful to nature," and Student 60 from School 1 pledged to "respect and take care of nature forever." Student 95 from School 2 pledged to "take care of the earth," whereas Student 87 pledged to "the Earth."

Theme 3: Sense of Oneness

For this theme, there were three main subthemes, with the first subtheme having five components, the second subtheme having two components, and the third subtheme without any component.

Table 14
Frequency and Percentages of Positive and Negative Responses for Subthemes and Components Broken Down by School for Theme 3: Sense of Oneness

		School 1 (*n*=79)		School 2 (*n*=60)		School 3 (*n*=20)	
Subthemes		Positive	Negative	Positive	Negative	Positive	Negative
Kinship With Nature		**72**	**10**	**81**	**2**	**41**	**1**
Being Alone in Nature	*f*	39	2	25	1	16	0
	%	95.12	4.88	96.15	3.85	100.00	0.00
Being Out in Nature	*f*	16	8	17	1	5	1
	%	66.67	33.33	94.44	5.56	83.33	16.67
Being Calm and Peaceful in Nature	*f*	11	0	12	0	10	0
	%						
Connecting With Animals	*f*	3	0	5	0	7	0
	%						
Connecting With Plants	*f*	2	0	10	0	3	0
	%						
Equality Between Self and Nature		**3**	**0**	**2**	**0**	**4**	**0**
Importance of Animals	*f*	1	0	1	0	1	0
	%						
Importance of Plants	*f*	2	0	1	0	3	0
	%						
Noticing Nature	*f*	**17**	**0**	**30**	**0**	**19**	**0**
	%						

Most students from all three schools responded positively to Kinship With Nature. The data showed that the participation in activities that allowed for Being Alone in

Nature was a strong driver for a positive response for Kinship With Nature. In addition, nine students reported that they experienced a sense of equality between self and nature. Out of those 9, three comments were about animals, and six were about plants. Of the six responses about the importance of plants, three of them came from School 3, one from School 2, and two from School 1. In total, 66 students from all three schools wrote about what they noticed in nature. In School 1, 21.52% of students, and in School 2, 50% of students wrote that they noticed nature around them, whereas students from School 3 had the greatest percentage of journal responses with 95% about noticing nature. One possible explanation for this difference may be the weather. The activities for School 1 were adapted because of severe weather that caused School 1 to leave after 3 days. School 3 had the highest percentage of noticing nature around them as well as experiencing warm, sunny weather that permitted them to engage in more outdoor activities. The students' responses were primarily influenced by the solo hikes they took during their immersive-field-study program, and their journals reflected this. As with Theme 1, Theme 3 also appeared to be influenced by the weather.

The majority of the students' responses from all schools were more connected with nature than disconnected from nature. No negative comments were reported under "Being Calm and Peaceful in Nature." If the percentage of "connected" for this component was based on the total number of students in a school who found peace, only 13.92% in School 1 reported that they found calm and peace, compared with 20% in School 2 and 50% in School 3. Similarly, only 3.80% in School 1 connected with animals, compared with 8.33% in School 2 and 35% in School 3. Only 2.53% in School 1 connected with plants, compared with 16.67% in School 2 and 15% in School 3.

Kinship With Nature

More than 95% of students from all three schools journaled that they liked Being Alone in Nature. Student 88 from School 2 wrote, "I felt connected to the earth because I was alone and thought to myself!" Student 154 from School 3 wrote, "This afternoon I did a solo hike and loved it." Two students from School 1 and one student from School 2 expressed anxiety about their solo hike. Student 24 from School 1 journaled that "I felt kinda scared on the lone hike."

More than 65% of students who journaled about Being Out in Nature from School 1 liked the experience; however, more than 38% did not like the experience. Several students commented that they enjoyed Being Out in Nature because they were able to see animals and smell plants. For example, Student 31 from School 1 journaled, "I had a great time outside. I saw some woodpeckers that have the same color of the leaves behind it. I hope to see salamanders. I feel excited to go outside tomorrow because I might see some animals." Those who did not like Being Out in Nature commented on getting wet and muddy. Student 8 from School 1 wrote, "I liked being outside. It was just muddy and I didn't like that. We saw no animals … I am feeling eh\ . . about going outside tomorrow because I was wet and muddy and mud is gross."

One hundred percent of students who journaled about peace and calm expressed Being Calm and Peaceful in Nature. Student 54 from School 1 wrote, "We went on a solo hike and it was calming." Student 113 from School 2 wrote, "What I really liked about the solo hike was the peace so you could think…. I think it is important to be a part of nature because it is so peaceful and every being should experience peace." Student 81's statement mirrors the fact that spending time in nature helps put the world and

human beings in a proper perspective when she wrote, “It is important to have a connection with nature because it can help you stay humble and peaceful.” Student 153 from School 3 wrote, “I loved being peaceful and calm on the night hike.” Student 155 wrote, “The most interesting thing I experienced was listening to the quietness out there.”

On the afternoon of the day students arrived at the immersive-field-study program, and after a brief introductory hike, students selected *Nature Names* for themselves. This activity was used to help students decide the plants or animals with which they would identify themselves. These data were used to address the component of connecting with plants and animals under the subtheme of Kinship With Nature. For example, students from School 1 who experienced significant rain selected names such as Rain, Mud, Dirty Plant, and Lightning Bolt. Students from School 2 and School 3 experienced better weather, and their *Nature Names* selection included more plants and animals such as Woodpecker, Oak, Water Beetle, Owl, Deer, Fox, and Wild Berry.

Student 46 from School 1 picked *Dirty Plant* as a nature name. Student 87 from School 2 wrote, “*Oak*, that’s my name. That name means a lot to me…. To me it means nature. It means fun. It means stubborn.” Student 150 from School 3 wrote, “If I had to pick something for my nature name, I would choose *Flora* because my favorite thing in nature is the beautiful plants,” and Student 151 wrote, “If I had a nature name, I would want it to be *Fox*.”

In addition, students from School 3 were instructed to observe animals on their hikes, then pick one and journal its characteristics and what it meant to the student. For example, Student 147 drew a picture of himself and a hawk and labeled the bird with the words “Sight, power, and guardianship.” Student 144 drew a deer and wrote around it

the words fun, gentle, active, kind, outdoor, playful.

Equality Between Self and Nature

Several students journaled about the importance of plants and animals in nature. From School 1, Student 28 reinforced the critical role plants play in the environment with the following statement, "I pledge to take care of plantes [sic], care more about things that may not seem important." Student 49 wrote, "I can move animals that are in the road to save them … [because] they are doing something important."

Student 140 from School 3 drew an anthropomorphical picture of a tree including branches that look like hands and a face and asked the question, "How would you like to be treated if you were the forest?" Student 153 drew a planet and wrote: "Stop Polluting Earth! What Can You Do to Help?" Student 157 draw a tree with the question, "What Can You Do to Save Trees?" Student 120 from School 2 summarized much of the student-expressed sentiment with the quote, "It is important to know you are connected with nature because nature is a thing that we could not live without."

Noticing Nature

Students from all three schools journaled about what they noticed in nature and how they connected with it, often by drawing smiley faces. From School 1, Student 17 wrote, "I notice the fog is covering the top of the mountains. I wonder why its so foggy. It reminds me of melted marshmallows." Student 49 wrote, "I notice the raindrops falling. The water hitting the rocks, and the leaves hitting the tree. I wonder what kind of leaf it is. It reminds me of when the paint falls on the ground or when the raindrop hits the ground." Student 39 observed, "the leaves get smaller towards the top. There is only one purple flower. There are little drops of water on the leaves of the plant… It reminds

me of something a fairy would live in because it is really pretty." Student 44 expressed, "I notice that texture [of the soil] is very smooth. I wonder where this comes from. It reminds me of the time when I first touch[ed] dirt."

From School 2, Student 131 made connections between colors of the rainbow and those found in plants and wildlife when he wrote that "While hiking, I was trying to find all the colors of the rainbow in nature. I found all except purple and blue." Student 109 wrote that the most interesting experience was that "we went up to [name of the mountain] peak … [and saw] that crows glide in the wind." From School 3, Student 159 journaled, "I hear … the birds and water flowing. I smell … nothing just clean fresh air. It's very quiet and soothing to watch the water flow. I see … the water traveling lightly down the creek with the sun reflecting … everything is perfect and everyone is happy."

Student 111 from School 2 provided an excellent synopsis of her awareness of nature and the role nature plays supporting plants and animals when she wrote:

> When you look at this stream, you see wonder and excitement. Also the bugs that live in the stream find shelter in the nearby logs or in the rocks. There is also leafs [sic] in the stream. I wonder if nature made this stream for a reason. And if the logs in the water were for something as well or if the rocks were for shelter for animals. I think that we will never know if nature did all this for something but all we can do is wonder. It reminds me of when you are at home with your family, and everyone is silent and looking at each other and appreciating all that we have: food, water, shelter, love; and I think that love is one of the most important thing [sic] in the world.

Theme 4: Sense of Responsibility

For this theme, there were two main subthemes, with the first subtheme having three components, and several subcomponents for only two of these. The second subtheme has five components, with only two components with subcomponents.

Table 15
Frequency and Percentages of Responses for Subthemes and Components
Broken Down by School for Theme 4: Sense of Responsibility

		School 1 (*n*=79)	School 2 (*n*=60)	School 3 (*n*=20)
Subthemes		Positive	Positive	Positive
Practiced Environmentally Responsible Behaviors				
Environmental Clean Up		**12**	**13**	**1**
Compost	*f*	8	4	0
	%	100.00	100.00	0.00
Not Litter	*f*	1	0	0
	%	100.00	0.00	0.00
Pick Up Trash	*f*	0	3	1
	%	0.00	100.00	100.00
Recycle	*f*	3	6	0
	%	100.00	100.00	0.00
Reduce Waste/Not Waste		**2**	**3**	**0**
Not Waste Food	*f*	1	0	0
	%	100.00	0.00	0.00
Reuse Water Bottles	*f*	1	0	0
	%	100.00	0.00	0.00
Save Energy	*f*	0	1	0
	%	0.00	100.00	0.00
Save Water	*f*	0	2	0
	%	0.00	100.00	0.00
Leave No Trace	*f*	**2**	**0**	**0**
	%	100.00	0.00	0.00
Commitment to Future Environmental Actions				
Environmental Clean Up		**36**	**7**	**1**
Compost	*f*	7	3	0
	%	100.00	100.00	0.00
Not Litter	*f*	8	0	0
	%	100.00	0.00	0.00
Not Pollute	*f*	1	0	0
	%	100.00	0.00	0.00
Pick Up Trash	*f*	6	3	1
	%	100.00	100.00	100.00
Recycle	*f*	14	1	0
	%	100.00	100.00	0.00
Reduce Waste/Not Waste		**16**	**2**	**0**
Not Waste	*f*	3	0	0
	%	100.00	0.00	0.00
Not Waste Food	*f*	3	0	0
	%	100.00	0.00	0.00
Save Energy	*f*	3	1	0
	%	100.00	100.00	0.00
Save Water	*f*	7	1	0
	%	100.00	100.00	0.00
Communicate or Encourage Environmental Awareness	*f*	**3**	**3**	**3**
	%	100.00	100.00	100.00
Leave No Trace	*f*	**5**	**1**	**0**
	%	100.00	100.00	0.00
Saving Plants and Animals	*f*	**7**	**2**	**2**
	%	100.00	100.00	0.00

Students from School 1 and School 2 provided the most comments under currently *Practiced Environmentally Responsible Behaviors* with the largest number coming under the component Environmental Clean Up. Although students from all three schools were provided with information, as evidenced by students' journals (Figure 17), only one student from School 3 commented under currently *Practiced Environmentally Responsible Behaviors* and that was also under the component Environmental Clean Up. The next highest combined school response rate is for Reduced Waste. For the Leave No Trace component, only two students from School 1 had written comments.

Figure 17. Student 155's drawing.

Students from School 1 and School 2 provided the most comments under *Commitment to Future Environmental Actions* with the largest number coming under the component Environmental Clean Up, whereas students from School 3 provided the largest number of responses for Communicating or Encouraging Environmental Awareness. Five students from School 1 and one student from School 2 commented on Leave No Trace, whereas no students from School 3 provided any comment on that.

From School 3, one student wrote about both currently practiced and future commitment to picking up trash, whereas three students wrote about Communicating or Encouraging Environmental Awareness. There were also three students from School 1

and three students from School 2 who provided responses for Communicating or Encouraging Environmental Awareness.

Students from School 1 completed more journal entries about their commitment to environmentally responsible behaviors than students from School 2 and School 3.

Practiced Environmentally Responsible Behaviors

A total of 11 students from School 1, 13 students from School 2, and one student from School 3 reported that they practiced environmentally responsible behaviors during their immersive-field-study program, which contributed to the Environmental Clean up, Reducing Waste, and Leave No Trace categories. Students wrote that they took actions such as not wasting, not littering, saving water, saving energy, reusing water bottles (reducing trash), recycling, composting, picking up trash, and leaving no trace behind. From School 1, Student 4 wrote, "I learned to eat the whole apple," and Student 75, "didn't litter and composted an apple core." Student 27 journaled, "I threw the [things] in the correct garbage can/bin," and Student 10 "reused water bottle" to assure a sustainable lifestyle. Student 77 journaled "I left no trace and composted my food."

From School 2, Student 99 wrote, "I took only a 3 minute shower," and Student 124 wrote, "I turned off my cabin light before leaving." Student 87 wrote, "I picked up a plastic bag," and Student 85 wrote, "I put the rest of my dinner in the compost bin." One student from School 2 and one student from School 3 assured a sustainable lifestyle by "trash picking."

Commitment to Future Environmental Actions

Students committed to actions such as composting, not littering, not polluting, picking up trash, and recycling. Their comments included Student 146's, who wrote

"help animals by picking up … trash," Student 94's, who committed to "Pick up trash, recycle, and compost," Student 7's, who promised to "put trash not on the ground but in the trash can," and Student 30's, who committed to "not pollute."

In the area of Reducing Waste, Student 17 from School 1 committed to "take short showers …[and] save electricity," and Student 121 from School 2 promised to "turn off lights when leaving room, and in washing, [save] water." In the area of Environmental Communications, Student 7 from School 1 committed to tell others "not to litter," whereas students from School 2 would encourage others by actions such as "give them a high five," or words such as tell them "good job," and Student 149 from School 3 would "share ideas." In the area of Leave No Trace, Student 18 from School 1 committed to "leave nature as I found it."

Several students journaled about how they would like to save plants and or animals. Writing about bugs, students from School 1 penned, "I make sure that I'm not stepping on bugs" (Student 6), and [I] "will not kill random bugs" (Student 63). In addition, Student 55 pledged to "look out for newts and Banana Slug" when hiking. Several students pledged to "not pick plants" (Student 7; Student 12; Student 19). Student 91 from School 2 pledged to "protect the environment and all the animals in it," whereas Student 157 from School 3 posed the question, "What can you do to save trees?"

Additional Findings

A review of the journals for documentation of nature connectedness revealed additional information on other nature activities that students found interesting and connected them to nature. These data are provided in Table 16 along with a description of each activity.

Table 16
Other Nature Activities Students Reported

Activity	Description
Activities During Solo Hike	Nature-related cards with interesting facts about nature and activities for students to do during the hike were displayed along hiking trails. Students were then encouraged to create their own cards.
Campfire	Students participated in a campfire activity.
Creative Drawing of a Night Creature	After the night hike, students were asked to create an imaginary creature of the night and to give it whatever features they thought it needed to survive.
Predator-Prey Hide and Seek	A game in which one child, identified as the predator, was blindfolded while other students identified as the prey hid. The blindfold was then removed from the predator who looked for and identified the hidden students. This game is played to help students understand more about the ability of animals to blend into the environment to avoid predators.
Leaf Collecting	Students collected leaves to observe their features.
Polar-Bear Challenge	An activity in which students submerged themselves, to whatever depth they wanted, in a pond.
Rock-Face Painting	Students painted their faces and or hands with paint they made from crushed rocks.
Sensing Nature	Students went on a night hike where they were encouraged to use all of their senses not just sight to explore and understand the world around them.

Note: Names of activities have been changed from those used by the outdoor-education center.

The response frequencies of students' satisfaction of these nature activities are reported in Table 17.

Table 17
Response Frequencies of Students' Interest of Other Nature Activities (*N*=159)

	School 1 (*n*=79)		School 2 (*n*=60)		School 3 (*n*=20)	
Subthemes	*f*	%	*f*	%	*f*	%
Activity During Solo Hike	2	7.53	5	8.33	5	25.00
Activity After Solo Hike (creating cards)	0	0.00	0	0.00	5	25.00
Campfire	2	7.53	2	3.33	2	10.00
Creative Drawing of a Night Creature	39	49.37	47	78.33	11	55.00
Hide and Seek in Nature	6	7.59	0	0.00	2	10.00
Leaf Collecting	0	0.00	20	33.33	0	0.00
Polar-Bear Challenge	1	1.27	3	5.00	3	15.00
Rock-Face Painting	8	10.13	5	8.33	4	20.00
Sensing Nature	47	59.49	38	63.33	13	65.00

Activity During Solo Hike

Students went on a solo hike in which they followed a path that had nature-related cards for them to stop and read. The cards led them along the route. They each walked one and half minutes apart. A typical card might ask students to hug a tree and tell it a secret. The last card told students to look over the hills and see how the place makes them feel. Most reported activities during solo hike were by students in School 3.

From School 1, three students out of 79 reported that they saw the cards on the path. Two of them had no particular reaction to them, but one of them wrote, "It was fun going to the solo hike by yourself and see the notes on the road leading you to the end... It was fun reading the notes and doing what it says" (Student 1). From School 2, six students out of 60 had specific reactions to the cards. "I enjoyed reading the cards and seeing what they said. It made me feel good" (Student 121). "My favorite part about the hike was seeing all the nature and getting to read all the cards about being there" (Student 125). "The card told us to hug it [tree] and tell it a secret ☺. … The last card told us to look over the hills and see how they make you feel. They make me want to go on more hikes and be in nature more" (Student 130). From School 3, five students out of 20 had specific reactions to the cards: "I liked the card where it said how could you save the earth" (Student 140). "My favorite solo card was the card that said, plants thank you for your carbon dioxide" (Student 153). "My favorite card was: Tilt your face back and let the sun kiss your face" (Student 159).

Activity After Solo Hike (Creating A Nature Card)

Of all the naturalists, only one of them in School 3 asked the students to create their own cards, similar to those they saw on the solo hike. Five of them created their

own cards in their journals. This hands-on activity activated their empathy for nature. Student 140 drew an anthropomorphical picture of a tree including branches that look like hands and a face, and asked the question, "How would you like to be treated if you were the forest" (Figure 18).

Figure 18. Student 140's drawing.

Student 153 talked about one of the cards he saw during the solo hike and said, "My favorite solo card was the card that said, plants thank you for your carbon dioxide. He also drew his own card with a drawing of a planet and wrote: Stop Polluting Earth! What Can You Do to Help" (Figure 19). Student 158 drew a picture of the planet, and wrote, "Take a deep breath and think how this world needs help. And do just that! ☺" Student 157's card was a drawing of a tree with the question, "What Can You Do to Save Trees?" (Figure 20).

Figure 19. Student 153's drawing.

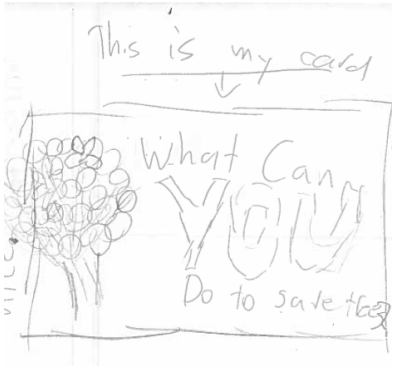

Figure 20. Student 157's drawing.

Campfire

In total, 10 students wrote about the campfire activity. Three students from School 1 did not enjoy this activity. "I didn't like the campfire at all" (Student 11); "too long, squished together" (Student 6). Due to heavy rain, the campfire was then held indoors using a wood fueled stove, therefore, not providing the expected experience. No student from School 2 had negative comments, but Student 104 wrote, "I don't love the campfire that much," whereas Student 85 wrote, "the campfire was also really fun. Our whole cabin sang … song during the campfire. It was hilarious because we were wearing our hats side-ways and sunglasses upside down." Two students from School 3 reported that they did enjoy the activity and recorded it to be one of their best memories.

Creative Drawing of A Night Creature

After the night hike, students were asked to create an imaginary creature of the night including their special adaptations. This activity, along with Sensing Nature, has the most responses of all the activities for each of the three schools. In total, 97 students from all three schools provided a Creative Drawing of A Night Creature. Examples from School 1 follow: Student 6 created what she called an "Owl penguin" and explained, "It can be in freezing cold temperatures." Student 24 drew a creature with big eyes to see and warm fur (Figure 21). Student 70 drew a creature with a flashlight in its hand, a hat with stars, and maybe a wing (Figure 22).

Figure 21. Student 24's drawing.

Figure 22. Student 70's drawing.

From School 2, Student 117 drew a picture of a bird with interesting combinations. He surrounded the bird with boxes containing the following: "owls eyes to see in deep," "tazer [sic] claws to stun animals," "fat body to kill prey with its weight," "talons to grab prey," "metal feathers to stab into prey like a knife," and a "face to make people laugh." Student 90 drew an Elk-like creature with "spikes to defend," "sharp antlers to defend," "cupped ears to hear well," "big eyes to see in the dark," "nose to smell predators," and "tail to defend." Student 84 called the creature "Dragon/Pegasus" and described it as having "great hearing, spikes to scare predators, wings to fly, glowing tail to see where its walking, claws to kill" (Figure 23).

Figure 23. Student 84's drawing.

Students from School 3 had the next most repertory of the creative drawing of a night creature: Student 145's drawing of a bat with a 12-foot long tail. The tail looks very snake-like and predatory, with a hand at the tip of the tail. Other imaginary night creatures included Student 152's drawing of a flying porcupine with a wing on the top and a wing on the bottom and labeled it "Turbpikipine" (Figure 24).

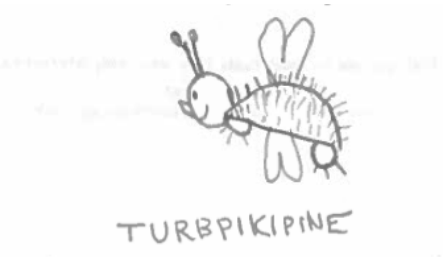

Figure 24. Student 152's drawing.

Predator-Prey Hide and Seek

This activity was performed by students in School 1 and School 3. A total of eight students reported that they enjoyed playing this game. Student 154 from School 3 wrote, "One of my favorite things we have already done is … Predator-Prey." Student 58 commented, "I liked" Predator-Prey "the best." Student 75 from School 1 wrote, "We played camouflage. It was like hike and seek." Student 18 recorded that this activity, "secret hideout," was one of their best memories.

Leaf Collecting

Nature journaling is the process of recording one's observations and perceptions about the natural world through writing, drawing, photography, and other visual arts. It is a way of capturing what is seen, sensed, or understood about educational experiences in nature. Only School 2 participated in the Leaf Collecting activity. Of the 60 students, 20 of them included leaves, flowers, or both that were pressed in their journals. Out of 20 students, 14 of them labeled and or wrote about their leaves or flowers. This activity is meant to bring attention to what plants, especially native plants, students are seeing in the area and help them learn different shapes, colors, and plant taxonomies. Student 131 drew a picture of a leaf and labeled its markings, such as holes and colors. He also included a real leaf on the opposite page and wrote descriptive notes: flower, leaf, stem. He wrote, "While hiking, I was trying to find all the colors of the rainbow in nature. I found all except purple and blue." Student 118 drew a leaf, labeled all its colors in detail, and included a real leaf on the opposite page. This student also asked: "I wonder how did it develop black dots? Why did it inherit so many colors?" (Figure 25). Student 109 drew both the front and the back of a leaf and labeled them in detail (Figure 26).

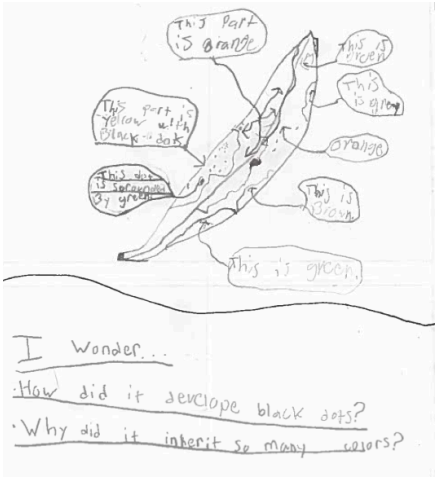

Figure 25. Student 118's drawing.

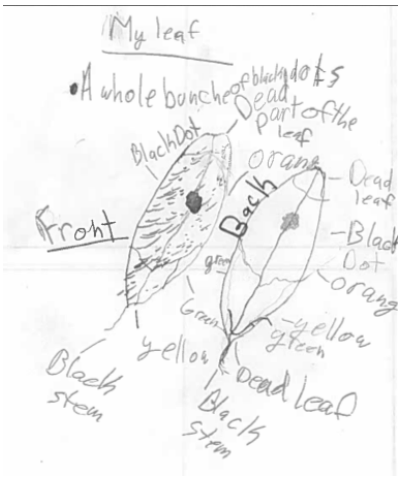

Figure 26. Student 109's drawing.

Polar-Bear Challenge

This is an activity in which students submerged themselves, to whatever depth they wanted, in a pond. Only one student from School 1 mentioned "doing the polar bear challenge and dunking my head in the creek" as a memory. In School 2, three students mentioned participating in this activity, and one student wrote, "Polar bear challenge was fun" (Student 137). In School 3, three students reported the polar-bear challenge as their favorite activity. One of them wrote, "One of my memories was doing the polar bear plunge. I enjoyed this because it was a hot day and the lake water was really cold and refreshing" (Student 142).

Rock-Face Painting

A total of 17 students found "Rock-Face Painting" to be the most interesting activity of the day. In their journal, they wrote about painting their faces or hands with rock paint that they made themselves. From School 1, Student 59 reported, "We made paint out of rock." "I liked when we painted our hands with rock-paint" (Student 3). From School 2, Student 86 wrote, "It's the first day ... I am having lots of fun. We just painted our faces with rocks." "One thing we did was make our own face paint. We used

something most people would not believe: rocks" (Student 95). "We did rock face paint which was super fun and interesting and so cool to learn and know how to do [it]" (Student 89). From School 3, three students recorded that this activity was one of their best memories. Student 140 reported this activity as one of the best memories and wrote, "You can make homemade paint," and Student 159 stated, "We did rock face painting … by the creek!"

This activity connects children with nature. Children often think that paint is something that you buy in a store. They do not understand that the color in paints comes from minerals and vegetables as well as chemical sources. With the rock-face-painting activity, students experienced first-hand the grinding of rock to make paint just like their ancient ancestors did (National Geographic News, 2012).

Sensing Nature

Through a simple exercise in describing things they experienced with all their senses other than vision on a night hike, students were able to use their senses of touch, smell, taste, and hearing to extend their personal discoveries of nature. In total, 97 students from all three schools described things they experienced on the night hike, an activity that is as popular as the Creative Drawing of A Night Creature. The frequency of responses is almost proportionally equal across the three schools. They recorded sensory experiences such as the following examples from each school.

Out of 47 responses from School 1, students reported their experiences of touch (3), smell (17), taste (3), and hearing (16). Students' writings on the sense of smell included, "I smelled bay leaves," "cow poop," "the … wood," and "I smelled the earth around me." Student 41 remarked on the sense of taste, writing, "When we ate the mint

with our eyes closed I could sense what it was by the taste." Other students' examples of multiple sensory experiences included Student 23's "I could smell cow poop, hear stomping and feel rain." Student 29 noted, "Hearing the mushiness of cow poop, feeling it." Student 36 recorded, "Hearing the river, feeling where I am, smelling different plants." Student 5 wrote, "I smelled bay leaves. I felt mud. I heard owls and frogs." Student 63 recorded, "The smell of wood, the sound of frogs, the stamping of deer." Some students simply listed that they sensed the wind and the mud without tying it to any of the five senses. For instance, Student 18 "sensed there was mud in my boots," and Student 47 noted, "The mud … and the wind."

Out of 39 responses from School 2, students reported their experiences of touch (2), smell (15), taste (1), and hearing (22). Examples of sense of touch included Student 98's "feeling the ground with my feet," and Student 116's "I could sense when I was walking on sand and/or rocks." Examples of sense of smell included, "I smelled bay leaves" (Students 108), and "skunks" (Students 98). Examples of sense of hearing included Students 89's "I heard the water flowing down the creek," Students 99's "A tree falling and a lot of talking," and Students 95's "a nearby owl … and crunching noises." Other examples of multiple sensory experiences included Student 95's "mint (taste), and crunching noises." Student 124 wrote, "I sensed the rain, the lightning, and the other people."

Out of 11 responses from students in School 3, the frequency experiences of touch (1), smell (6), taste (1), and hearing (6) are reported. Examples of sense of smell included Student 155's, who "could smell the leaves," and Student 156's "nice smell." Examples of sense of hearing included Student 155's "I heard a lot of birds." Student

141 heard “people, animals, bats,” and Student 151 heard “water” from the creek. Other students’ examples of multiple sensory experiences included “I heard a lot of birds, I could smell the leaves, and I could feel the wind blow” (Student 155). Although examples of taste were not specified, students did report that they used their sense of taste.

Summary

This study used a pre- and post-Connection to Nature Index (CNI) and students’ field journals to gain an understanding of how students connected with nature during their multiday immersive-field-study program. Findings of the study were organized by the research questions. Statements from students’ field journals were included to support the findings.

To address the first research question, the difference in scores between the pre- and post-CNI were investigated. Results of the analysis of change from pre-CNI to post-CNI were statistically significant for all three schools. Post-CNIs results for School 1 were lower than its pre-CNIs results. Post-CNIs results for School 2 and School 3 were higher than their pre-CNIs results.

For the second research question, statistically significant differences were found between the three schools for the Total CNI change and the two subfactors change, with School 1 having negative change and School 2 and School 3 having positive change. There were statistically significant post-hoc differences between all three schools, with the greatest difference between Schools 1 and 3.

The third research question involved how children expressed their connectivity with nature as evidenced in their journals. The analysis of 159 field journals revealed

that the results were influenced mainly by the weather. Students from School 1 who attended the field-study program in February and experienced cold, wet, and rainy weather did not enjoy nature as much as students from School 2 who attended in April and experienced intermittent rain and sunshine, and students from School 3 who attended in June and experienced warm, sunny weather. In addition, students from School 1 did not have the opportunity to do all the outdoor activities, and were forced to leave a day early due to flooding. Students from Schools 2 and 3 were able to stay the full length of the program. Students from School 2 were able to experience the majority of the outdoor activities, whereas students from School 3 were able to experience all the outdoor activities. They also were the group who expressed the most positive connection to nature.

The third research question revealed that, of all the activities students journaled, they enjoyed solo hiking the best because they had tasks to complete and were able to overcome their anxiety at being alone in nature.

CHAPTER V

SUMMARY, LIMITATIONS, DISCUSSION, IMPLICATIONS, RECOMMENDATIONS, AND CONCLUSIONS

The purpose of this study was to evaluate the outcomes of an immersive-field-study program on fifth-grade students' connectedness with nature using a pre- and post-Connection to Nature Index (CNI) and students' field journals. This chapter opens with a summary of the study and major findings. The limitations of this research are presented. The discussion of the results of data analysis is followed by the implications for education practice and future research. This chapter closes with conclusions.

Summary of the Study

The purpose of this study was to evaluate the outcomes of an immersive-field-study program on fifth-grade students' connectedness with nature by asking three research questions:

1. To what extent does students' nature connectedness change after participation in the immersive-field-study program as measured by pre- and post-Connection to Nature Index?
2. To what extent does the students' change in nature connectedness vary from school to school as measured by the difference in pre- and post-Connection to Nature Index values?
3. How do students express their connection to nature in their journals?

This study was conducted with 317 fifth-grade students from three public schools who spent 3 to 4 days in an outdoor-education center in Northern California during the first six months of 2017. School 1 attended in February, School 2 in April, and School 3 in June. This outdoor-school's program is designed to create a learning experience that

inculcates a deeper connection between children and nature that should result in environmental stewardship.

The outcomes of the program were assessed using two instruments: a pre- and post-Connection to Nature Index (CNI) and students' field journals. For analysis of the quantitative data, the CNI was used to investigate whether there were changes in nature connectedness in students who participated in the field-study program. The dependent-sample *t* tests were computed, followed by one-way analysis of variances (ANOVAs) and Tukey post-hoc comparisons. For analysis of the qualitative data, students' field journals (N=159) were coded using students' responses to the prompts in their journals. Themes and subthemes were coded regardless of the prompt. The statements that students made for each theme were classified as positive or negative when applicable. The data were classified into four themes: Enjoyment of Nature, Empathy for Creatures, Sense of Oneness, and Sense of Responsibility, based on CNI categories. Each theme yielded various subthemes and components that are displayed in Table 11 in chapter IV.

Summary of the Results

The results of the study in response to the first research question were statistically significant for all three schools, with small negative effect size for School 1 for all three measures, medium positive for School 2 for the Total CNI and Enjoyment of Nature, and large positive for School 3 for the Total CNI and medium positive for Enjoyment of Nature and Empathy for Creatures, based on Cohen's (1992) criteria.

The results of the study in response to the second research question were statistically significant for all three schools. The greatest difference in change scores from pretest to posttest was between Schools 1 and 3. The results of one-way ANOVAs

with post-hoc comparisons using the Tukey test indicated that the CNI means were statistically significantly different when each school was compared with each of the other schools. The mean for School 1 decreased, whereas the mean change score for School 2 and School 3 increased. Overall, students in School 3 experienced the largest positive change in their connection with nature.

In response to the third research question, the data were classified into four themes: Enjoyment of Nature, Empathy for Creatures, Sense of Oneness, and Sense of Responsibility, based on the CNI instrument. Each theme yielded various subthemes and components that are displayed in Table 11. The results largely were influenced by the weather. During the visit of School 1, torrential rains and cold weather restricted the number of outdoor activities that were held and forced the group to leave after 3 days. Students in School 1 also expressed the least positive connection to nature. During the visit of School 2, the weather was a mix of wind, rain showers, and sun. Students were able to experience the majority of the outdoor activities and stayed the full length of the program (4 days). They expressed a positive connection to nature. During the visit of School 3, the weather was sunny and warm with a mild breeze. The students stayed the full length of the program and were able to experience all the outdoor activities. They expressed the most positive connection to nature. Students' comments and drawings show the influence of the weather on what they remembered and how they remembered it. Not withstanding the weather, all three schools conducted some form of solo hike. Students from all three schools journaled that they enjoyed solo hiking the best of all the activities; they were able to complete simple tasks and overcame their anxiety at being alone in nature.

In addition to the solo hike, students journaled about other activities they enjoyed, including camp activities such as rock painting, gardening, and spending time with friends in nature. Students also mentioned factors such as rain, wind, and mud that had a negative influence on their enjoyment of and connection to nature. The journaling of the participants demonstrated that when external factors do not have a negative influence, fifth-grade students can become more connected to and identified with nature through leisure activities.

Overall, students had a basic level of enjoyment for most of the nature activities as long as the weather was not inclement. Of all the activities, the solo hike was the most popular. Several students from School 1 expressed dissatisfaction with the campfire. These negative responses may be due to the fact that the campfire was held indoors because of the heavy rain, thereby not providing the expected experience.

In summary, results of this study revealed that connectivity with nature can be influenced by providing children the opportunity to interact directly with nature for the duration of the program. Although the scope of the study was to explore to what extent an immersive-field-study program increased children's connection to nature and whether nature activities played a role in this process, an outcome of this study was the influence of the weather on the development of nature connectedness in fifth-grade students.

Limitations of the Study

The aim of this research was to investigate the outcomes of an immersive-field-study program on students' connection to nature with three different public schools during the first half of 2017: February, April, and June. The most germane limitations of the present study are as follows: This study was conducted with fifth-grade students

whose ability to express their thoughts coherently in a field journal through words and drawings may be limited due to their age. In addition, matching the journals with the CNIs was not possible.

One limitation of this study was the sample size from School 3. Students from School 3 went to the field study on a Tuesday and came back on a Friday afternoon and were able to participate in outdoor activities as planned. Teachers had students complete the post-CNIs the following week, which was the last week of the school year. Because the week students returned was the last week of school, some teachers administered the CNI on Monday, and other teachers were unable to complete the post-CNIs with their classes and were not able to collect all of the journals, even though they were completed at the outdoor-education center. As a result, only 19 pre- and post-CNIs were matched and 20 journals were submitted to me. With this small sample size, results of the quantitative and qualitative analysis were the most positive of the three schools, which may not be representative of all the students who attended the immersive-field-study program.

Another limitation was the population from which the sample was drawn. The three schools involved were located in a high-socioeconomic county where people have the opportunity and the means to experience and enjoy many nature activities including parks, sea shores, and open space. I did not have the opportunity to assess the level of prior exposure and experience the participating children had had with nature.

An area where the study potentially could have been strengthened was the interrater coding process. Both faculty who assisted with the review, coding, and analysis of the data received a randomly selected sample of journals and a defined

protocol to follow based on the CNI instrument, which was designed to minimize any potential coder bias. Another approach could have been to provide both raters with a full set of journals and separately develop a series of components for each CNI category. This approach was not selected because of the significant resource drain it would have imposed on the raters with little likelihood of improved results. Both raters were encouraged to add or modify categories as they thought appropriate and they did so.

Discussion of Results

This study used Kolb's (1984) Model of Experiential Learning that delineates the importance of concrete experiences and which is applicable to experiential learning in the outdoor education setting. This study aimed to assess the outcomes of an immersive-field-study program on fifth-grade students' connectedness with nature. The weather and the activities in which they participated all contributed to the results of the four themes discussed in this study: Enjoyment of Nature, Empathy for Creatures, Sense of Oneness, and Sense of Responsibility. During the visit of School 1, torrential rains and cold weather restricted the number of outdoor activities that were held and forced the group to leave after 3 days. During the visit of School 2, the weather was a mix of wind, rain showers, and sun. They were able to experience the majority of the outdoor activities and stayed the full length of the program (4 days). During the visit of School 3, the weather was sunny and warm with a mild breeze. They stayed the full length of the program.

Due to torrential downpours and imminent flooding, the session for students from School 1 was ended a day early, and the children were evacuated. The weather significantly influenced the breadth and depth of outdoor activities in which students were able to participate. They were unable to spend a great deal of time outdoors, and

activities such as pond and creek visits, sit spot, and outdoor campfire were canceled due to this severely inclement weather. Instead, students did activities inside, such as visiting a barn or a Natural History Museum. Therefore, children were not able to enjoy nature because they spent a great deal of time inside, and when they went outside, they complained about the fact that they were squishing in the mud, getting dirty and wet, and eating soggy food. In addition, they complained about being squeezed together during an indoor campfire. Dependent-sample *t* tests revealed that these children had a more positive perception about nature in all three areas assessed, before they went to the field study. Hence the experience had a negative effect on nature connectedness. Students from School 1 had the lowest average for nature connectedness pre-CNI and demonstrated a decrease in their post-CNI scores.

In contrast with School 1, students from School 2 had the highest average of nature connectedness pre-CNI and demonstrated an improvement in their post-CNI scores, which may be explained by the fact that students experienced intermittent rain and sunshine that allowed them to participate in numerous outdoor activities including individual and group hikes, although they had to make some adjustments. Their increase in Enjoyment of Nature was statistically significant with medium practical importance except for Empathy for Creatures.

One of the activities that the students journaled about was the sighting of wild animals. They wrote about their expectations of seeing animals that commonly would be sighted in that area at that time of year. Students from School 3 who experienced warm, sunny weather, had the opportunity to participate in a full range of outdoor activities, but similar to School 2, they were not able to see or interact with a wide variety of wild

animals, although they reported more wild animal sightings than students in School 2. Students from School 3 improved the most on Enjoyment of Nature and the Total CNI but did not improve as much in Empathy for Creatures. The animal sighting expectations expressed in students' journal entries appeared reasonable considering the time of the year and the place they were visiting.

Enjoyment of Nature

Hiking was the activity that had the greatest influence on enjoyment of nature and overall connection with nature. Students' enjoyment was driven by what they experienced with the activities, the sense of accomplishment after they had completed given tasks, and the opportunity to share their experiences with others.

Students experienced a sense of accomplishment after participating in several group or individual activities. For instance, students in Schools 2 and 3 journaled about what they saw and experienced after hiking to the summit of a local mountain. Due to the weather, students from School 1 were not able to hike to the top but commented positively about being able to make it halfway up and negatively about not being able to climb to the summit. Another activity, the Solo hike, gave students the opportunity to overcome their fear of hiking alone by giving them small challenges to complete while hiking, which gave them a sense of fulfillment and reduced concerns they might have had about being on their own. Having a sense of empowerment in nature can help individuals be on a more equal footing with nature and, therefore, enjoy nature more, and by doing so, connect better with nature. This study findings confirmed that Enjoyment of Nature and, therefore, connection with nature, was influenced by a number of emotional and physical factors. Activities such as listening to the sounds of nature and using all their

senses to learn about nature, as well as learning and singing nature songs, reinforce positive ideas about nature, as well as positive images in children's minds. The fact that students in School 1 spent more time inside journaling and less time outside interacting with animals may explain their low scores on enjoyment of nature. Chawla (2009) stated that when children engage in behaviors that give them "a sense of power and maturity," they are not only building their own competencies but also building positive memories of their time in nature (p. 16).

One area where weather did not appear to negatively influence the students' Enjoyment of Nature was seeing and interacting with animals, although the weather did limit the number of animals students were able to see. Several students from School 1 journaled about their desire to see animals. Their words conveyed that those students were sad because they did not see certain animals that they expected to see, which affected their connection with nature, because the more animals a person can see and interact with, the more that person can connect with nature. Students in School 2 and School 3 had an additional opportunity to interact with nature when they visited a pond and examined creatures from the pond or creek. Students wrote about interacting with and identifying invertebrates and exploring their habitats. They expressed their enjoyment of nature through their descriptions of how they captured and studied these creatures. As the results of the CNI showed, scores for students in School 2 and 3 increased for Enjoyment of Nature, whereas scores for students in School 1 decreased.

Nature connectedness can also be encouraged and supported by providing children the opportunity to interact directly with nature through the activity of gardening. This finding is congruent with the research of Laaksoharju et al. (2012), who reported

that a garden affords an additional opportunity for children to experience and interact with plants and nature. Similarly, students who attended this immersive-field-study program journaled positive responses to the gardening activities in which they participated.

Food is very important to fifth-grade students, and satisfaction with food affected their satisfaction with the whole experience. Students from all three schools who wrote about food gave positive feedback about harvesting and eating the vegetables from the garden. Whereas all students from School 2 and School 3 enjoyed the snacks they had during their hikes, some students from School 1 expressed dislike when those snacks became soggy due to the rain. In addition, children from School 1 did not enjoy this experience because they were not comfortable being out in the cold rainy weather, which may in part have been caused by their not having appropriate gear.

Empathy for Creatures

Patrick and Tumnicliffe (2011) found that a child's "rich experiences can greatly contribute to their knowledge about plants and animals" (p. 630). One cannot love something one does not know anything about, and knowledge is an important step to understanding (Otto & Pensini, 2017), as understanding is an important step to caring. Bell's (1993) study postulated that children aged 9 to 10 are less likely to view non-mammals as animals. Because of the weather, students from School 1 who wanted to see animals, saw primarily non-mammals, whereas students from School 3 saw the most mammals.

A number of students in School 1 expressed a desire to see animals before they went on the field study. Although a number of them did see animals, as evidenced by

what they wrote in their journals, the animals they saw were primarily insects and amphibians, with only a few birds and mammals to which they could relate. This experience influenced their low scores for Empathy for Creatures. The effect size that resulted from the dependent-sample *t* tests for Empathy for Creatures was a medium positive for School 3 based on Cohen's (1992) criteria.

The students' journal responses were influenced by the animal and plant species that they saw during their field trip, which depended on the weather. Students from School 1 who attended during the rainy season saw a number of newts and slugs as well as farm animals. Because newts and slugs are slow moving, it was easy for the children to observe them, and a number of them journaled about how they enjoyed seeing them. Students from School 1 also participated in activities such as Predator-Prey that encouraged them to empathize with animals by experiencing what the animals experience. They had largely indoor activities such as visiting the barn. Students from School 2 attended during the transitional season from rainy to dry days and visited the pond, where they reported seeing tadpoles, birds, and cows. Students from School 3 visited both the creek and the pond and saw animals such as nymphs of a dragonfly and water striders as well as birds, bats, and foxes. Activities and animal sightings such as these can help children understand animals and may increase their desire to care for them.

The research of Palmberg and Kuru (2000) showed that children in their study who had the greatest level of experience with nature also had the greatest level of empathy for nature. Some participants in their study even expressed the need to address the unjust actions of humans towards nature and animals.

Sense of Oneness

In his research, Schultz (2002) referred to Kals, Schumacher, and Montada (1999), when he stated that those authors introduced the construct of emotional affinity that he defined as being reflective of a person's "emotional bond with nature" (p. 68). Just as a relationship between people becomes more powerful and complex as they spend time together, so does a person's relationship with nature. From that, Schultz (2002) inferred that people can have a feeling of intimacy or caring for animals or places. Although fifth-grade students cannot clearly internalize and explain this concept, their journal entries about the role of humans in nature and being humble shows that they were developing an understanding of the concept of oneness with nature.

Schultz (2002) wrote, "Connectedness refers to the extent to which an individual includes nature within his/her cognitive representation of self" (p. 67). He further stated that an important part of interdependence involves the cognitive recognition of self and the belief that individuals who define themselves through nature have cognitive representation of themselves as a part of nature.

Through the activities students completed such as solo hiking or sitting and noticing nature around them, students were immersed in nature, giving them an opportunity to think about nature, and, through thought and physical immersion, to develop an understanding of their place in nature or a sense of oneness with nature. Their selection of *nature names* for themselves showed how they had developed a sense of kinship with the natural world. These names also demonstrated the effects of the weather, as students from School 1 selected names such as Rain, Mud, Dirty Plant, and Lightning Bolt, whereas students from School 2's and School 3's selection included more

plant and animal names such as Woodpecker, Oak, Water Beetle, Owl, Deer, Fox, and Wild Berry. The selection of names demonstrated both the relationship that the children had developed with nature and the influence that nature had on them and their experiences.

In order to develop a sense of oneness with nature, an individual must first notice nature. As the Lindemann-Matthies' (2005) study demonstrated, the more wild plants a child noticed, the greater was his or her appreciation of those species. Although students from all three schools journaled about what they noticed in nature and how they felt a sense of oneness with it, students from School 3 displayed the strongest demonstration of a sense of oneness with nature, whereas students from School 1 displayed the weakest demonstration of a sense of oneness with nature due to the extreme weather conditions.

In Western cultures, "the focus is on the individual" (Schultz, 2002, p. 67). In contrast, "the self in many other cultures is interdependent" (Schultz, 2002, p. 67). Through their journaling, students revealed both their enjoyment of their individuality (enjoying the solo hike) and the fun of identifying with a group through games such as Predator-Prey. By taking the role of a predator searching for prey or the role of prey hiding from its predator, students can connect and empathize with wild creatures and have a sense of oneness with those animals whose experience in nature is not a game, but a matter of life and death.

This outdoor-education center conducts activities to help children realize that humans are a part of nature and not separate from it. For example, *Sit Spot* is an activity in which students spread out and sit quietly in a spot, just observing their surroundings, which enables them to find their own space in nature. This activity can inspire a sense of

oneness and an understanding that they are part of nature. Another activity in which students participated after their night hike was to create an imaginary creature of the night. Using the knowledge they gained from observation coupled with their creativity and understanding of the needs and challenges of night creatures, students had to design what they envisioned as a well-prepared night creature, including their special adaptations. For example, one child (Student 6) who experienced very cold weather drew what she called an "Owl penguin" who is able to tolerate the "freezing cold temperatures."

Sense of Responsibility

Ajzen's (1991) Theory of Planned Behavior argued how an individual's journey from intention to behavior is influenced by attitudes, norms, and intentions (Ajzen, 2002; Heimlich & Ardoin, 2008). According to this theory, the individual will only be able to act a certain way if he or she first possesses an attitude about the value of that action. Schultz's (2002) dimension of inclusion is behavioral. If a person has a sense of connection to nature and cares about it, he or she will be motivated to take care of and protect it.

In reviewing student journal entries, many students wrote about actions and behaviors they planned to take upon returning, such as recycling, going for hikes, and talking with others about nature and the importance of taking care of the natural environment. Many students expressed their sense of responsibility by journaling about actions such as recycling, saving energy, and supporting animals and plants. This finding supports Fancovicova and Pavol's (2011) conclusion that outdoor-environmental-education programs positively influence learners' attitudes about plants.

For this theme, students from School 1 completed more journal entries about their commitment to environmentally responsible behaviors than did students from School 2 and School 3. A likely explanation for this difference is that consistent inclement weather in February forced students in School 1 to spend more time inside focusing on activities that could be completed indoors, such as journal writing. In contrast, School 3's students experienced warm, sunny weather that allowed them to spend most of their time in outdoor activities, giving them less time to write in their journals. School 2's students experienced a mixture of sunny and rainy weather, allowing them to spend time in activities outdoors, as well as indoors for journal writing.

Other Nature Activities

Schultz (2002) stated that people define themselves through the lenses of "physical characteristics," "social identities," and "leisure activities" (p. 67). Students journaled that the activities they performed during the solo hike were the most interesting because these engaged them and helped dispel anxiety while hiking on their own. In their journaling, students mentioned activities that they enjoyed, including the solo hike as well as camp activities such as rock painting, gardening, and spending time with friends in nature.

Another frequently journaled activity was describing what senses other than vision they used during the night hike. Individuals predominantly use their senses of sight and hearing during nature hikes. When humans use all of their senses, they achieve a much more indepth experience of the world around them and can better develop a sense of oneness and a positive connection with what they are experiencing (Gooley, 2017), which also can help build a stronger sense of awareness of what is around them. This

experience makes them more aware of the connections within nature. In asking the question, "What does it mean to read nature?" Gooley (2017) replied that

> It means gaining an insight into the most important network there ever has been and ever will be. It means becoming aware of our relationship with this network. It means expecting a fascinating and enriching experience each time we step outside. And it means embarking on a journey that leads toward the realization that every single thing that we have found interesting up to this point in our lives has its roots in this network we call nature. (p. 7)

Gooley (2017) drew on Maslow's (1954) hierarchy of needs to discuss humans' relationship with nature. Just as Maslow's (1954) hierarchy starts with satisfying basic needs for food and shelter, Gooley (2017) proposed that knowledge of nature begins the same way, especially for children. In this immersive-field study, students were encouraged to experience nature by touching fuzzy leaves and tasting vegetables grown in the garden, as well as edible plants they found on their nature walks. At night, they were taught how to use their senses of hearing, smell, and touch to observe and experience the world around them. Gooley's (2017) remark reflects Clayton's (2003) constructs of environmental identity that she defined as "a sense of connection to some part of the nonhuman natural environment, … and/or similarity, that affects the ways in which we perceive and act toward the world" (pp. 45-46). Clayton's (2003) conclusion is reinforced also by the study of Schultz and Tabanico (2007) who stated, "in essence, environmental identity is the belief that the natural environment is an important part of who we are" (p. 1220). For example, the weather was cold when students from School 1 attended the field-study program. They were cold so they assumed their night creatures also would be cold and gave them attributes such as warm fur (Student 24). Students also transferred the tools they used to their night creatures, demonstrating a sense of oneness

with them. For example, Student 70 drew a flashlight as a tool for that night creature.

Implications

The implications of this study are that weather conditions and their influence on a learner's ability to experience and interact directly with nature can have a profoundly positive or negative effect on that learner's connection with nature. Therefore, developers of outdoor-education programs need to take these factors into account when scheduling program elements.

Providing students with writing prompts is important in focusing their thoughts and attention in completing their field journals. The complexity and number of prompts should in part be driven by the age and the experience of students. For example, students in my study were just given a general prompt for the Pledge page, which was too undefined for fifth-grade students and led them to write pledges that were irrelevant to the goal of the program. A possible solution to this problem is to provide a list of future pro-environmental behaviors appropriate for children of that age and ask them to check those that they plan to accomplish, as well as several blank lines to include their own additional actions that are not listed.

In the event that inclement weather is unavoidable, educators must have a contingency plan for indoor activities that make use of the weather, even if species of plants and animals are not accessible. There are a number of games that children can play when it is raining. For example, they can play a Species Charades game to investigate how different species react to the rain. A naturalist would act out a species of plant's or animal's reaction to wet weather, and the groups of students would try to identify the plants and animals. For instance, among plant species, the Woodland sorrel

closes up at the first hint of moisture, whereas radishes open themselves to receive rain. Among animals, ducks go swimming in the rain, whereas lizards find shelter to avoid the rain. Children also can be instructed to draw their chosen species of plant or animal and how that creature reacts in the rain by drawing a happy face or sad face next to it.

Recommendations for Educational Practice

In designing activities to introduce nature in a positive way, it is critical to consider factors such as weather, equipment, and the development of activities that create a sense of accomplishment in fifth-grade students. Because weather is beyond the control of the planners of any field-study program, the curriculum needs to include opportunities to interact with animals and plants and to complete activities that give the student a sense of personal growth and accomplishment. For example, working with a local wildlife center, naturalists can provide students with the opportunity to interact with animals such as frogs, nonpoisonous snakes, small wild animals, or birds. Another potential indoor activity is a treasure hunt, which would function similar to the solo hike. Individually or in small groups, they would stop at various stations, perform activities, and receive a token. Once they completed all their activities, they would hand in their tokens and receive a prize. The token might be a stamp, a shell, or a marble at each station. Another possible indoor activity is for children to use the produce they picked from the garden to make a salad.

To present the concept of nature connectedness to children in a tangible way that they can understand and relate to, I suggest that educators develop a list that spells out specific actions they can accomplish during their field study. These activities could include watching and identifying birds at birdfeeders, identifying edible plants and

nonedible plants, and picking and tasting plants from the garden. At the end of the program, each student could give a 5-minute speech to talk about the best animal experience they had during this week or about the activity and experience that they want to share with their family.

Maintaining a journal allows students to remember their thoughts, experiences, and emotions in a more permanent manner. Journals can be either prompted or unprompted. What is most important is to provide children before the trip with guidelines on the purpose of a journal and how to journal. If possible, teachers should conduct a workshop or class activities on journaling prior to the field trip. In addition to journaling, Ardoin et al. (2014) discussed students' preference for taking photos over journal entries in creating connection with nature. In order to accommodate students' different preferences, nature centers could encourage students to bring their cameras or iPads.

Although the best nature experience a child can have is one that is outdoors, it is not realistic to expect that the weather conditions always will allow this experience. Because future weather conditions are often unpredictable and schedules must be set far in advance, outdoor-education centers could develop programs that would enhance a student's experience by providing both indoor and outdoor nature activities that would improve their understanding and appreciation of nature regardless of the weather. The following are several possibilities: an outdoor-education center could work with a wildlife conservation center or zoo to supply a docent along with several wild animals that would be of interest to the students. Animals might include nonpoisonous snakes, birds of prey, and small animals such as bobcats or beavers. For children, the experience

of seeing wild animals is very different than seeing farm animals like sheep and goats in a barn or cows in the field. In addition, students might participate in indoor activities such as a nature scavenger hunt for tracking weather with instruments such as a rain gauge or an anemometer.

Outdoor-education centers routinely provide equipment and clothing lists to participating schools and organizations. To enhance their experience, students and parents or caregivers should review these lists and provide adequate gear so that children can participate fully in all the activities. The centers might keep a selection of items such as mud boats in various children sizes. Students without the appropriate gear could borrow and return them.

Recommendations for Further Research

The findings of this study demonstrated the importance of several factors in influencing the development of a child's level of nature connectedness. These include the weather and a sense of accomplishment that children achieve during their experience in the immersive-field-study program. This study used two instruments to collect and evaluate the data. The qualitative instrument was a field journal completed by the students. The quantitative instrument was the CNI. The challenge with the quantitative instrument was that there were not sufficient items to measure reliability of the Sense of Oneness and the Sense of Responsibility. Additional research could focus on constructing a new Nature Connectedness Index that addresses the need for an adequate number of items for each theme that would yield a reliable measure.

Face-to-face interaction with wildlife can help develop a connection to nature. If there is little or no face-to-face experience with nature, then children's connection with

nature may not increase. Additional research needs to be conducted on developing skills, techniques, and programs to provide children with positive opportunities to interact with wildlife especially in inclement weather.

A long-term follow-up study could be conducted to identify what students' strongest memories were from their field-study experience. Furthermore, if I could have interviewed the students, then I would have had the opportunity to obtain indepth information about their experiences. Future research should consider conducting postfield program interviews with students.

Conclusions

The findings of this study add to the information regarding meaningful approaches to developing a sense of nature connectedness for fifth-grade students. Results revealed that students who participated in this immersive-field-study program connected with nature as long as the weather was not inclement and participants were able to interact directly with nature for the duration of the field study (4 days). Students who had established a prior positive connection to nature enjoyed their experience regardless of the weather and did not express a negative reaction to the inclement weather, whereas for students who had not journaled about past enjoyable experiences in nature, weather was a factor in developing a positive or negative connection to nature.

Humans evolved in nature, and many find peace and inspiration in the natural world. Climate change, habitat destruction, species extinction, and the appearance and success of destructive invasive species are all looming threats to the natural environment. As the environment goes, so goes the future. Children are society's best hope for protecting and saving the environment. They will care more about a matter that they

understand and love than about a matter of which they know little. Therefore, the importance of providing opportunities for children from an early age to experience nature and make positive connections with nature cannot be overstated (Chawla, 1988, 1999; Wells & Lekies, 2006). Educators can facilitate this experience by combining the teaching of core subjects with suggestions or explanation of how they can be used to protect nature. Education in the 21st century is an indoor one and needs a balance between the inside classroom and the natural world as learning sites. Because the first impression can never be changed, it is of paramount importance for naturalists and educators to take the necessary steps to ensure that the child's first exposure to nature is a positive one.

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APPENDIX

APPENDIX A

Spoken Instructions for the Students

Prior to Administering the Connection to Nature Index (CNI)

Spoken Instructions for the Students

I will start with: "Hi. My name is Laleh. Like you, I am a student. I need your help with my research study. I will ask you to fill out a survey questionnaire about how you feel about nature. You will complete one survey before you start your field trip, and another one after the field trip is over. When I hand out the survey, I would like you to answer it as honestly as you can. There are no wrong answers but the answers you give me are very important for the research I am doing about our planet. I want to know what you think."

Then, I will hold up a survey and explain: "On the left of the paper, there are 16 sentences. What I want you to do is to read each one, and decide: do you strongly disagree with it, do you disagree with it, do you have no opinion (neutral), do you agree with it, or do you strongly agree with it. This can be confusing. So let's do an easy example together before we do the survey."

I will write the five column headings on the board: *Strongly Disagree, Disagree, Neutral, Agree,* and *Strongly Agree*. Above that, I will write the sentence "I like chocolate ice cream." Then I will explain to the class, "I read the sentence 'I love chocolate ice cream.' If I really hate chocolate ice cream, I put an x under *Strongly Disagree.* If I just don't like chocolate ice cream, I put an x under *Disagree.* If I can take or leave chocolate ice cream, I put an x under *Neutral.* If I like chocolate ice cream, I put an x under *Agree.* If I love chocolate ice cream, I put an x under *Strongly Agree.*"

Then, I will call on a couple of children and say to them, if you see the sentence, "I love chocolate ice cream," where would you put the x? This is to give them practice in evaluating statements against the scale I use in the CNI.

I will also tell them "If you don't understand a word or a sentence, raise your hand and let the teacher or me know. What you are saying is anonymous. This means nobody will ever know what you wrote. The only thing I need to know is if you are a boy or a girl. At the top are two choices: "I am a Boy," and "I am a Girl." Please put a check next to the one that is right."

"Once you are done with the survey, put down your pen and turn over your survey. The teacher or I will collect them when everybody is done."

I will distribute the surveys and pens to the students. After all the surveys are completed and handed in, I will then say: "Thank you. We have one more thing we need to do. I am going to give you a questionnaire that I would like you to complete." I will distribute the questionnaire, and say, "Please answer these questions. If you have any questions or words you don't understand, please ask your teacher or me and we will explain them to you."

After consulting with the teachers, we will agree upon the appropriate benefit or token of thanks for the students.

Fin.