

EXPLORING THE RELATIONSHIP BETWEEN DIGITAL NATURE  
PHOTOGRAPHY AND CHILDREN'S CONNECTEDNESS TO NATURE

THESIS

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The Masters of Education in Environmental Education in the  
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By

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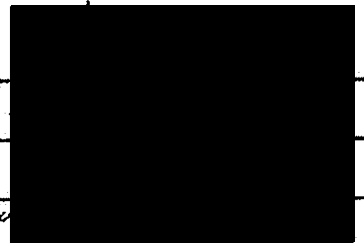
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## ABSTRACT

Digital photography can be an enjoyable and exciting activity for children. It may also increase connectedness to nature levels.

Questionnaires were sent to four different Duluth, MN area 4<sup>th</sup> grade classrooms. The questionnaire was comprised of the Connectedness to Nature Index (Cheng & Monroe, 2010) and one open-ended question. The questionnaire was given as a pretest and a posttest, after two of the schools participated in a program using digital cameras. Eight-five percent ( $n=99$ ) responded to the questionnaire. Findings of the study revealed that the respondents generally had a strong connectedness to nature before and after their use of digital cameras. While quantitative data showed no significant change between pretest and posttest connectedness to nature levels, qualitative and anecdotal data suggested that the use of digital cameras can influence connectedness to nature levels in children. The results may be used to emphasize the importance of finding new and creative ways to connect today's children with a sense of connectedness to nature.

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## CHAPTER 1-INTRODUCTION

### **Background and Setting**

American children are becoming increasingly disconnected from the natural world, which is a key aspect of disengagement with the outdoors (Louv, 2008). The consequences of this disconnection have been expressed as fear, avoiding direct experiences in nature and disassociating nature with any sense of happiness or wonder, and ultimately, what has been expressed as the idea of a ‘Nature Deficit Disorder’ (Louv, 2008). “Nature Deficit Disorder describes the human costs of alienation from nature, among them: diminished use of the senses, attention difficulties, and higher rates of physical and emotional illness” (Louv, 2008, p. 36).

In order to overcome the problems that Louv discusses, educational tools to connect people to nature have been sought. This discussion about nature connection is not a new phenomenon; it has been a part of America’s ‘relationship to nature’ for many decades. It has been brought into mainstream discussion several times, with one of the most recent and important surges in nature connectedness being led by scientists and writers such as Aldo Leopold and Rachel Carson (Carson, 1965; Leopold, 1949).

### **Relationship to Nature**

Aldo Leopold was one of the most important 20<sup>th</sup> century voices regarding a human-nature relationship. He believed in the importance of creating a connectedness to the land (nature) in order to understand it and ultimately protect it. Leopold writes “we abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect” (Leopold, 1949, p. xviii). Leopold argues that a sense of connectedness to nature is an important



component of resolving environmental problems. Connectedness is not simply a love of nature, it also focuses on a feeling of “resonance” to the natural world, and experiencing this sense of relatedness not as an organism that is somehow superior, but equal. Leopold emphasized a connectedness between people and the land, and sets the stage for future scholars to create what we now call *connectedness to nature*.

Kellert (2010) wrote how “Leopold’s land ethic advanced the idea that our conservation objectives must derive from a fundamental moral affinity based on understanding, appreciating, and recognizing the natural world’s beauty, on loving and even spiritually connecting with that world” (p. 374). Leopold believed that we can be “ethical only in relation to something we can see, feel, understand, love, or otherwise have faith in” (Leopold, 1949, p. 230). This ‘land ethic’ has endured for 60+ years and has been cited numerous times in present literature (Carson, 1965; Frantz, Mayer, Norton, & Rock, 2005; Kennedy & Stromme, 2008; Leopold, 1949; Schultz, Shriver, Tabanico, & Khasian, 2002).

The connectedness that Leopold emphasized in his work set the stage for education being an important factor in understanding a connection between humans and the natural world. Leopold understood that without education, we as a culture will have a difficult time having an ethical relationship to nature. This is particularly true for youth education, because allowing children to experience something when they are young enough to be open to new ideas is a part of the ethical understanding that Leopold described in his writings.

Connectedness to nature can be a large part of a young person’s life, and the impact that formal education has on children’s connectedness to nature levels is

important. In American education, “children actively learn to ‘not-think’ about the relationships between what goes on inside the school walls and outside in the social and nature communities” (Sobel, 2008, p. 2). Children are often not taught that there is any connection between them and the land, and hence, children tend to not think about that relationship (2008, p. 2). This is important because childhood is a developmentally important time for children and connections in their lives, and this lack of experience in nature is influential later in life. As children become more and more disconnected with nature, educators interested in recreating this connection will need to search for tools to engage and excite children to create a connection to the natural world. One way to reach children and engage them is through youth development, or more specifically, through positive youth development programs. Environmental education is also useful, in that it focuses on building awareness, knowledge, and relationships with the natural world through education (UNESCO, 1978, p. 14).

### **Youth Development**

Similar to connectedness to nature theory, youth development theory is an emerging field of research, with a growing emphasis on the theory of positive youth development. Youth Development can be an important factor in engaging children in nature, and having them understand why a connection to nature is important, and finding out effective ways to excite that engagement (Hamilton, Hamilton, & Pittman, 2004). The relationship between youth development and environmental education will be discussed in further detail in this section.

Youth development means purposefully seeking to meet children’s needs and build childhood competencies relevant to enabling them to become successful adults.

Rather than seeing children as problems, this positive youth development approach views them instead as resources and builds on their strengths and capabilities to develop within their own community. To succeed children must acquire adequate attitudes, behaviors, and skills. Youth development programs seek to build competencies in the following areas: physical, social, cognitive, vocation, and moral (National Collaboration for Youth, 1996). More specifically, positive youth development occurs from an intentional process that promotes positive outcomes for young people by providing opportunities, relationship and support to fully participate.

Youth development takes place in families, peer groups, schools, neighborhoods and communities (Hamilton et al., 2004; Heck & Subramaniam, 2009, p. 1). This positive youth development approach can be used to promote positive outcomes, such as a connectedness to nature, to engage children in their communities and peer relationships (Noam, 2010, p. 2).

With any large field of research, there are numerous models that researchers may use to base their ideas on. For the purpose of this paper, the Five Cs of youth development model will be used. The Five Cs model seeks to identify the characteristics necessary for children to thrive in today's society (Heck & Subramaniam, 2009, p. 15).

The five C's are:

Competence: success in the social, cognitive, and vocational arenas.

Confidence: self-esteem, identity, and belief in the future.

Connections: relationships with others and with schools and other institutions.

Character: self-control; positive behaviors; respect for rules and standards; morality; spirituality.

Caring and compassion: empathy and identification with others

(Carnegie Council on Adolescent Development, 1989; Heck & Subramaniam, 2009;

Lerner, 1995; Lerner, Dowling, & Anderson, 2003; Little, 1993; K. Pittman, Irby, &

Ferber, 2000).

Gestsdottir and Lerner stated that the The Five Cs were positively associated with levels of self-regulation, which were in turn negatively associated with measures of depression and risk behaviors (Gestsdottir & Lerner, 2007). This is an example of how the Five Cs are a model for positive youth development. The Five Cs may also be used as a model for organizations setting up programs that have a goal of positive youth development. These organizations may use multiple methods for achieving these goals, but it has been found that artistic activities are particularly valuable in allowing children to experience positive development (Kose, Beilin, & O'Connor, 1983; Beilin, 1991; Sharples, Davison, Thomas, & Rudman, 2003; MN DNR, 2011a).

Research has also found a link between the Five Cs and the extent to which children are engaged in their surroundings/communities. Hamilton, Hamilton and Pittman (2004, p. 3) claim that “*competence* includes knowledge and skills that enable a person to function more effectively and to understand and act on the environment... *Contribution* means that a person uses these other attributes not only for self-centered purposes but also to give to others.” While the researchers were not describing environment in an outdoors sense, it does describe how the Five Cs, and youth development in general are important in creating any physical or affective connection to the outdoors.

As described above, environmental education and a relationship to nature have an important commonality. They are in part based on creating connections between humans and the outdoors. This connection not only means something, but also has the individual want to take action in some way. This connection may be easy to create in some, but difficult in others. Positive Youth Development programming, based on the Five Cs, may

make it easier for educators to establish that connection in children, and is why youth development theory plays a vital role in any discussion on connectedness to nature theory.

Research supports that artistic childhood activities such as drama, painting and photography, are particularly valuable for supporting adolescents as they engage in the identity processes and have positive youth development experiences (Heath, 2001; Ball & Heath, 1993; McLaughlin, Irby, & Langman, 1994; Worthman, 2002). According to Hansen et al. (2003), “adolescents’ use of youth activities for identity work is widespread” (2003, p. 48). The use of artistic activities during adolescence allows children to define who they are, and what they will deem important for a large part of their lives.

These activities can be linked to any environment, but using drama, painting and photography in nature allows children to engage in a identity process that draws a connection with being outside and being physically and emotionally healthy (Sharples et al., 2003, p. 16). A connectedness to nature can bring youth development, artistic expression and the natural world together in a way that promotes positive youth development and a human relationship to the natural world (Noam, 2010, p. 2).

### **Photography**

Photography is one artistic approach that has been used to create a connection to the natural world in a variety of contexts, ranging from photo elicitation to nature photography (Kaplan, 1984; Sharples et al., 2003). Photo elicitation is based on the simple idea of inserting a photograph into a research interview. The difference between interviews using images and text, and interviews using words alone lies in the ways we

respond to these two forms of symbolic representation (Harper, 2002, p. 1).

Nature photography refers to a wide range of photography taken outdoors and devoted to displaying natural elements such as landscapes, wildlife, plants, and close-ups of natural scenes and textures. Nature photography tends to put a stronger emphasis on the aesthetic value of the photo than other genres (Oberbillig, 2009).

Kaplan's (1984) groundbreaking study on photo elicitation in nature was one of the first studies showing a link between nature photography and connectedness to nature in participants. This link has not been delved into in past research, but it opens the door for future researchers to explore the possible connection between actually taking a picture and an increase in connectedness to nature in participants.

Until the 21<sup>st</sup> century, photography was largely an adult activity. The cost, expertise and patience required to take pictures has changed dramatically since the invention of digital cameras. The way children use photography is different than adults in that children's "photographs are not just their 'view of the world', but are also a construction of their identity in relation to their parents and their peers" (Sharples et al., 2003, p. 23).

Using photography as a tool to develop connections with nature in childhood has been a challenging activity for researchers. On the one hand, a camera is a piece of technology with which children can capture their world and construct a social identity. On the other hand, photography, with a few exceptions, has been the province of adults, to pose children and construct an idealized representation of the 'happy family' and more broadly through a world of images that have been branded by adults as artistic or persuasive. Until recently, the costs of film and the delays between capturing and viewing

images have worked against photography being a free and spontaneous activity. With the advent of inexpensive digital cameras we may be entering an era when photography, like mobile communications, is fashioned by and for children (Sharples et al., 2003, p. 23).

One possible solution to nature disconnectedness is being proposed by the Minnesota Department of Natural Resources (MN DNR), which created The “Digital Photography Bridge to Nature” (2011). The goals of the Digital Photography Bridge to Nature project are to “stimulate a lifelong appreciation for wildlife and Minnesota’s outdoors for children by providing hands-on nature photography experiences and subsequent enjoyment that they can derive from using their own photos in an educational classroom context” (MN DNR, 2011b, para. 2)

Why is this important? In the State of Minnesota, with a wide variety of natural resources to experience and enjoy, there has been a continual decline in participation rates for many outdoor recreational activities over the past couple of decades (Henderson, 2010, p. 3). Hunters, anglers, and birders who have been among the leaders in conservation within Minnesota are now retiring and passing on. Since 2006, nationwide participation rates for children have declined in hunting by approximately three percent for hunting and eight percent for fishing (Outdoor Foundation, 2010, p. 60). Even bird watching groups and bird clubs are experiencing declines in membership, although the numbers of children participating in bird watching has increased (Cordell, Betz, & Green, 2008, p. 8; Henderson, 2010, p. 3).

Hunters and anglers seem to no longer be capturing the imagination and interest of young people to pursue an interest in birds, wildlife and Minnesota’s great outdoors. It seems a logical conclusion that an interest in nature can be passed on by creative and

enthusiastic mentoring and by mentors taking the time to share their skills and passion for the outdoors with young people. If we as a society want children to follow in the footsteps of John Muir, Aldo Leopold, or Rachel Carson, we need to take advantage of the things that get kids excited nowadays: like the “gee whiz, techy-based, instant gratification features of digital photography,” in an outdoor setting (Henderson, 2010, p. 3).

### **Conclusion**

While connectedness to nature has been researched, the tools to create or increase it have not been as thoroughly explored (Schultz, 2001; Mayer & Frantz, 2004; Cheng & Monroe, 2010). Using the action of taking digital nature photographs in support of environmental connectedness is a niche that has yet to be filled. The hope is that educators will be able to use this tool to engage students and achieve a stronger connection with the natural world. The purpose of this study is to determine to what extent digital nature photography can engage students to achieve a stronger connection with the natural world.

### **Research Question**

This project will investigate the influence of taking digital nature photographs as a means to connect children to nature. The research will directly relate to one central question: How does taking digital nature photographs influence children’s connectedness to nature?

### **Definitions of Terms**

#### *Environmental Education*

*Constitutive Definition:* Environmental Education is “learning that accrues, or is derived,



from an engagement with the environment or with environmental ideas” (Scott & Gough, 2003, p. 8). There are nine objectives that Environmental Educators should strive to connect with. They are:

1. Nature: Values and Feelings
2. Nature: Understanding
3. Nature: Skills
4. Conservation: Understanding
5. Conservation: Behaviors
6. Social Change: Social Justice
7. Social Change: Democratic Citizenship skills
8. Social Change: Values
9. Learning: Learning about learning (Scott & Gough, 2003, p. 8).

*Operational Definition-* Environmental Education is the act of teaching relationships and interactions between nature and humans using nature photography.

#### *Connectedness to Nature*

*Constitutive Definition:* One’s “experiential sense of oneness with the natural world” (Mayer & Frantz, 2004, p. 504) or “the extent to which people experientially view themselves as egalitarian members of the broader natural community; feel a sense of kinship with it; 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).

*Operational Definition-* The degree to which children view themselves as part of the natural world. This will be measured by using nature photography.

#### *Youth Development*

*Constitutive Definition-* Purposefully seeking to meet children’s needs and build childhood competencies relevant to enabling them to become successful adults. Rather than seeing young people as problems, this positive development approach views them instead as resources and builds on their strengths and capabilities to develop within their

own community. To succeed children must acquire adequate attitudes, behaviors, and skills. Youth development programs seek to build competencies in the following areas: physical, social, cognitive, vocational, and moral (National Collaboration for Youth, 1996, para. 4).

*Operational Definition-* The process which children experience to succeed physically, socially and cognitively within their own community.

#### *Child*

*Constitutive Definition-* Every human being below the age of 18 years unless under the law applicable under the child majority is attained earlier (UNICEF, 2011).

*Operational Definition-* For this study, a child will be defined as someone between 8-12 years old.

#### *Youth*

*Constitutive Definition-* Youth are defined as people ages 6-17 years old (Outdoor Foundation, 2010, p. 39).

*Operational Definition-* For this study youth will be used interchangeably with children in the context of Youth Development.

### **Limitations of the Study**

- The research will focus on a specific project. Because of the sampling methods being used, results cannot be generalized beyond the subjects and the project context that will be used in this study.
- The conclusions based on this study may only be based on the participants of the study, and not beyond the scope of the study.

- While this study is focusing on using digital photography as a tool to create a connection with nature, it is not the only tool that may create a connection to nature.
- Qualitative data was collected only from the Treatment group. It would have been useful to collect from the Control Group as well.

### **Basic Assumptions**

- It is assumed that having a connection with nature is a socially positive attitude.
- It is assumed that photography is an appropriate tool to use in nature.
- It is assumed that Positive Youth Development and Digital Photography can play a key role in Environmental Education.

## **CHAPTER 2- LITERATURE REVIEW**

### **Introduction**

The purpose of this study is to explore the relationship between digital nature photography and children's connectedness to nature. The topics covered are the purpose of Environmental Education, the human-nature relationship, youth development, and photography and children.

### **Environmental Education**

Environmental Education is becoming an increasingly important topic both in society and our education system. It is being integrated into public schools, used extensively at nature centers, and debated in the US Senate. In order to understand how Environmental Education plays a role in a study on connectedness to nature and digital photography, Environmental Educations' numerous definitions, history and relationship to connectedness will now be discussed.

#### **History of Environmental Education.**

The roots of the current environmental movement began with the ideas of the nature study movement of the late 19<sup>th</sup> century, and evolved into what we know as environmental education, under the leadership of people such as Bill Stapp and Gaylord Nelson. The nature study movement helped form the current backbone of today's environmental education, adventure education and interpretation (Sharp, 1947; Stapp, 1969).

The progression from the nature study movement continued into the 1930s, when the conservation-education movement began in response to the degradation of America's plains. Legislation, with the support of writers like Aldo Leopold, provided schools with

land designated for nature purposes. The purpose was to urge people (especially children) to reconnect with the land, and have some sort of understanding of natural relationships (Leopold, 1949; Sharp, 1947). This set the stage for a nationwide change of education about and in the environment, towards education for the environment, which L.B. Sharp originally started in the 1940s (Sharp, 1947).

John Dewey took another step towards what we currently call Environmental education with his “learning by doing” (or experiential) methods, incorporating learning about the environment while in the environment. The 1970 Earth Day events were “a landmark expression of public support for a realignment of values and a new respect for the environment” (Disinger & Monroe, 1994, p. 11).

Environmental Education is a term that is constantly evolving, and which one can find numerous definitions for. In 1977, nations from around the world gathered for the first intergovernmental conference on environment education, held in Tbilisi, Georgia. What came out of the conference was called the Tbilisi Declaration, which sought to identify what Environmental education was, and what the future goals of it should be.

The conference came up with the following objectives of Environmental education:

1. Awareness- to help social groups and individuals acquire an awareness and sensitivity to the total environmental and its allied problems.
2. Knowledge- to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems.
3. Attitude- to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating an environmental improvement or protection.
4. Skills- to help social groups and individuals acquire the skills for identifying and solving environmental problems.
5. Participating- to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems (UNESCO, 1978, para. 10).

These objectives are still the guiding principles for Environmental education, and

environmental education organizations and groups are striving to meet these goals in their programs and activities.

Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution (Stapp, 1969).

### **Environmental Literacy.**

A way to increase the environmental knowledge of a population is through environmental education, and as Roth (1992, p. 11) stated, “The development and fostering of environmental literacy needs to be a key objective of any general education program” (Roth, 1992, p. 11). Environmental Literacy draws upon six major areas: environmental sensitivity, knowledge, skills, attitudes and values, personal investment and responsibility, and active involvement (Roth, 1992, p. 18).

It was long thought that increasing knowledge can strengthen attitudes in addition to change behaviors; however Hungerford and Volk (1990) suggested that increasing environmental knowledge does not directly contribute to pro-environmental attitudes and, ultimately behaviors. Does this mean that environmental literacy is not necessary to obtain a sense of connection to nature? In the sense that environmental literacy is merely a set of facts that all students should know (which many state education boards use), probably not (Kennedy & Stromme, 2008).

### **Values and Feelings.**

Environmental Education has been dominated by two central models that control the way people think and act through the environment. Early studies of pro-environmental behaviors focused on the cognitive. In recent years, studies have focused

on the affective aspects of adults' environmental attitudes and behaviors (Kals, Schumacher, & Montada, 1999; Mayer & Frantz, 2004).

Cognitive theory posits that “the accumulation of knowledge about environmental issues will help foster concerned attitude among individuals and, this in turn will engender behavioral shifts which reflect these environmental concerns” (Chawla, 1998; Gurevitz, 2000, p. 2; Millar & Tesser, 1989). This theory is often connected to environmental literacy, and some see it as important for a citizenry to care about the environment (Kennedy & Stromme, 2008; Roth, 1992).

The second model is affective theory, which “seeks to tap into the ways that we come to ‘know’ our environment through our emotional responses to it, rather than our scientific understanding of how processes and systems in our environment work” (Gurevitz, 2000, p. 3). As stated above, this study will focus on the affective theory of environmental education, looking at how experiences in the environment let learners get to know the environment through emotional interaction.

Scott and Gough (2003) define environmental education as “learning that accrues, or is derived, from an engagement with the environment or with environmental ideas (2003, p. 8).” They claim that there are nine categories of interest that capture the wide scope of objectives of environmental educators. Briefly condensed, the objectives are:

1. Nature: Values and Feelings
2. Nature: Understanding
3. Nature: Skills
4. Conservation: Understanding
5. Conservation: Behaviors
6. Social Change: Social Justice
7. Social Change: Democratic Citizenship skills
8. Social Change: Values
9. Learning: Learning about learning (Scott & Gough, 2003, p. 8).

For the purpose of this study, the first objective will be focused upon, or that of nature: values and feelings. More specifically, this is for those “interested in sharing the joy and fulfillment derived from nature, in order to bring about significant life-enhancing and life-changing experiences for learners” (Scott & Gough, 2003, p. 8).

Ultimately, the purpose of both of these theories, and environmental education as a whole, is that people should be able to live sustainably within an environment, and be knowledgeable about facts and issues, and have the information necessary to take action that will have a positive impact on the natural world around them (Kennedy & Stromme, 2008). Whether the use of digital nature photography with children can be one tool to achieve the above mentioned environmentally literacy within Minnesota has yet to be fully explored.

### **Environmental Education and Connecting People to Nature.**

The importance in connecting people to nature is evident throughout field research. Numerous models suggest that attitude is a vital element of behavior (Ajzen, 1985; Stern & Deitz, 1994). Thus, an emotional connection needs to be made between an individual and nature in order for that individual to have any real desire to have a positive impact on nature. “Understanding young people’s environmental attitudes is important because in time they will face environmental problems and will need to have the skills and disposition to work on resolutions for these problems” (Bradley, Waliczek, & Zajicek, 1999, p5).

This theory is a vital backbone of any future research on environmental connectedness, because environmental protection depends on people caring about what happens to it. Research gives evidence that significant life experience can provide the



spark that people need to have any sense of a human-nature relationship, more commonly called, connectedness to nature (Ajzen, 1985; Chawla, 1998; Cachelin, Paisley, & Blanchard, 2009).

### **Human-Nature Relationship**

Understanding young people's environmental attitudes is becoming increasingly important because in time they will face environmental problems and will need to have the skills and disposition to work on resolutions for these problems (Bradley et al., 1999, p. 17). These 'environmental attitudes' have been called many things, but to get at the basis of understanding we must first look at the human-nature relationship.

In attempting to understand the human-nature relationship, one comes upon numerous terms attempting to describe an important relationship between humans and nature. Some of the terms that came up in research of the literature are affinity, connectedness to nature, environmental sensitivity, relatedness, and sense of place. While all are useful terms attempting to describe the broader idea of a human-nature relationship, connectedness to nature was chosen for this study.

The Tbilisi Declaration stated that "environmental education should relate environmental sensitivity... to every age, but with special emphasis on environmental sensitivity to the learner's own community in early years" (UNESCO, 1978, pp. 26–27). Reference to these early years shows that the writers of the document recognized that some kind of human-nature relationship was an important foundation for the goals of environmental education. Environmental sensitivity is more cognitive-based than connectedness to nature, but it is an important to understand where the field of research started in terms of a connectedness to nature. While this human-nature relationship was

mentioned in one of the most important documents in environmental education, it was often overlooked in other landmark studies in the field (P. Hungerford, Peyton, & Wilke, 1980).

### **Dimensions of Connectedness to Nature.**

Other authors have claimed that the human-nature relationship is multi-dimensional, consisting of dimensions of affective (feelings), cognition (knowledge/beliefs) and behavior (actions/experiences). Writing to develop a “psychological model for inclusion with nature,” Schultz presents inclusion as consisting of these same three broad dimensions which he calls caring (affective), connectedness (cognitive), and commitment (behavior) (Clayton, 2003; Schultz, 2000). For the purpose of this study, the dimension of affective (feelings or caring about the environment) will be the primary focus.

### **Cognitive Dimension.**

In relation to a connection to nature, the cognitive aspect seems to be closely linked to Environmental Literacy. This dimension is based upon the idea that it is understanding the complexity of natural and social systems and their interrelationships allows us to appreciate nature (Kennedy & Stromme, 2008; UNESCO, 1978).

Attention Restoration Theory argues that the benefits of nature are largely due to its ability to restore cognitive resources. The capacity for focusing our attention on relevant stimuli is limited, and when this mental resource is depleted, people then experience mental fatigue. Kaplan and Kaplan (1989) argued that many natural settings possess features that make it ideal for reducing mental fatigue and restoring attention capacity. There is also the theory of brain-based learning, which claims that in order to

reach the brain, one must teach to the whole body. In order to obtain cognitive information, the whole body must be stimulated, and this can be achieved in an outdoor environment that really does help restore attention and increase cognitive functioning (Schenck, 2009).

Kellert (2005, chap. 3) states that “play in nature, particularly during the critical period of middle childhood, appears to be an especially important time for developing the capacities for creativity, problem-solving, and emotional and intellectual development.” Without this direct experience between nature and child, research has shown that it is unlikely that the child will turn into adults whose connection to the natural world is an important part of their life (Chawla, 2006; Kellert, 2005).

There is evidence showing that a reduction in connection to nature has a direct and negative impact on children and their physical and mental well-being (Kellert, 2005; Louv, 2008, 2011; Schultz, 2000; Schultz, Shriver, Tabanico, & Khazian, 2002; Taylor & Kuo, 2006).

### **Behavioral Dimension.**

Schultz (2002) suggested that a sense of inclusion with nature is associated with understanding how an individual identifies his or her place in nature, the value that he or she places on nature, and how he or she can affect nature. He suggested that connectedness to nature, caring for nature, and a commitment to protect nature are core components of inclusion with nature (Schultz, 2002, p. 63). If a person experiences inclusion with nature, he or she should care about nature and be committed to protecting it. However, if an individual experiences exclusion from nature, that person will protect himself or herself over nature. Research in the field shows that more and more children

are experiencing exclusion from nature, and hence, are losing the desire to protect nature (Charles, 2007; Lim & Barton, 2010; Mayer & Frantz, 2004; Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009; Perrin & Benassi, 2009; Schultz et al., 2002).

### **Affective Dimension.**

While Aldo Leopold wrote of the importance of affective connections in nature, fifty years later there still exists a lack of understanding of what activities or experiences may lead to an increased connectedness to nature. Writing about Frantz and Mayer's (2004) "connectedness to nature" scale, Frantz, Mayer, Norton and Rock (2005) write "given the link between feeling connected to nature and pro-environmental actions, investigating factors that either promote or inhibit this sense of feeling connected to nature is critical" (Frantz et al., 2005, p. 428).

Clayton's (2003) work on environmental identity shows that when people extend their self-definitions to include nature, they are more likely to act in an eco-friendly way. Thus, when humans use their emotions to try to understand what nature is or how they feel about it, they will have a closer connection to nature, and thus might attempt to protect it.

In their study on self-awareness in connection to nature, Frantz, Mayer, Norton and Rock (2005) claim that their study "extends traditional social psychological theories to nature" (Frantz et al., 2005, p. 434). Research on helping behavior and empathy has focused on responses to other humans in need. New studies now show that these theories have important implications for how we relate to the environment as well. From an environmental educator's point of view, it is important for humans to include the natural world in their sense of self. Frantz et al.'s study showed that if people were made to feel

less self-aware, a greater connection to nature might be created.

In (2004), Mayer and Frantz created the Connectedness to Nature Scale (CNS). The CNS measures individuals' trait levels of feeling emotionally connected to the nature world (Mayer & Frantz, 2004, p. 503). They created the scale in order for empirical progress to be made on the theory that expanding one's sense of self does lead to more empathic and altruistic behavior. Five separate studies have assessed the validity and reliability of the CNS, and found that it has "good psychometric properties, correlates with related variables (the new environmental paradigm scale, identity as an environmentalist), and is uncorrelated with potential confounds (verbal ability, social desirability)" (Mayer & Frantz, 2004, p. 503).

Cheng and Monroe (2010, p. 3) also contributed a useful scale to measure children's affective attitudes towards nature. They wrote that conventional thinking was that increasing knowledge (cognitive) will lead to a change in behavior. Hungerford and Volk (1990) however, suggested that increasing environmental knowledge does not necessarily lead to pro-environmental behavior. While there are numerous studies that focus on affective aspects of adult environmental behaviors (Beery, 2011; Frantz et al., 2005; Kals et al., 1999; Mayer & Frantz, 2004; Mayer et al., 2009), there seem to be few on those of children. Cheng and Monroe claim that a different tool must be used to measure children's affective attitudes, and that this could help us explore the affective aspects of children's attitudes and link them to environmental behaviors (Cheng & Monroe, 2010, p. 2).

### **Benefits of a Human-Nature Relationship.**

In order to understand the benefits of a human-nature relationship, we must first

look at the problems we face in achieving any sense of that connection. In the past 20 to 30 years, lifestyle changes have accumulated with powerful detrimental effects on children. “Obesity, Attention Deficit Disorder, impaired social skills, and a culture of depression are adding to the stress levels and severely impacting our young” (Charles, 2007, p. 1). The above are the physical and psycho-social characteristics of the changes. There is also less time spent outdoors and more time spent with electronic technology with little free and unstructured time (Charles, 2007; Louv, 2008). Children don’t have the free time they used to. Their lives are structured and organized almost every minute of the day. When children do have free time, they are generally using technology. Time spent indoors has become out of balance, and spending more time outdoors and creating a connection to nature is one way to make healthier, happier, and smarter children (Charles, 2007).

Since the introduction of Richard Louv’s *Last Child in the Woods: Saving Our Children From Nature-Deficit Disorder* (2008), the term Nature Deficit Disorder has been used repeatedly in environmental education literature. Furthermore, it is the basis for numerous programs in the field. It has spurred on the idea that getting children outside is necessary for healthy children in America (Department of the Interior, 2011; MN DNR, 2011b).

While getting children outside does not necessarily equal a connection to nature, there is support showing that less outdoor time negatively impacts children’s lives, and that more time spent outside could benefit development. Taylor and Kuo (2006) found that children with outdoor classroom curricula scored higher on measures of knowledge transfer, performed better on standardized tests of academic achievement, earned higher

grade point averages and demonstrated greater knowledge gain than children with indoor curricula. They also found that children who spend more time outdoors have better attention spans, lower anxiety, lower levels of ADHD and other behavioral and social disorders.

All children deserve to grow up in an environment where they can flourish- “where they can develop physically, socially, emotionally, and cognitively to reach their full, unique potential” (Senauer, 2007, p. 1). Without a strong connectedness to nature, children, and humans in general, may lose this chance to develop in the above ways, and lose an understanding of how they fit into a grander scheme of the world, and lose out on the numerous benefits that nature can provide (Leopold, 1949). Some of these benefits include stress reduction, an increase in self-esteem, and an increase in cognitive functioning (Taylor & Kuo, 2006; Wells, 2000; Wells & Evans, 2003).

#### **Access to Nature.**

In a study done by Wells and Evans (2003), the results suggest that the presence of nearby nature can act as a buffer on stress in the life of a child. The psychological effects of stressful events such as family relocation, bullying in schools or peer pressure varied depending on the amount of nature nearby to which the children had access (Wells & Evans, 2003, p. 12).

Taylor and Kuo (2006) did research which suggests a link between near-home nature and concentration, impulse inhibition, and delay of gratification in children. It is often during childhood that many first experience a sense of connectedness to nature, and that through this experience or lack thereof, our feelings toward nature for the rest our lives are often defined (Chawla, 1998). The way people experience an event in their lives

is often determined by emotional conditions and developmental levels. The way children interact with nature is directly influenced by their cognitive and affective state, and hence, in order to understand children's connectedness to nature, the way children develop positivity must also be understood.

Many children in urban environments do not have access to nature (Center for City Park Excellence, 2010; The Nature Conservancy, 2011). More and more parents prohibit their children from exploring wild natural areas due to lower connection and to a sense of 'stranger danger,' which may lead to a loss of connection to nature in children. Parents have concerns about children's safety, and children experience academic pressures and other demands on their time (Louv, 2008, 2011; Sobel, 2008). This reduced contact with nature may influence children's development. Cheng and Monroe (2010) found that variables such as family values, previous experience in nature, and knowledge of the environment have a positive correlation to connection to nature. These variables are important in order to understand connection to nature in any person, but particularly when children are attempting to find themselves and create who they will be throughout adulthood.

Children who enjoy nature, have empathy for living creatures, a sense of oneness, and feel responsibility for nature are more likely to develop interest in spending more time in nature, which may benefit children's physical and psychological health (Cheng & Monroe, 2010, p. 15). Previous studies have shown that experiences in nature positively influence environmental attitudes and behavior (Chawla, 1998, 2006; Wells, 2000). The sense of connectedness to nature created in children can have a direct impact on what is important, what is valued, and overall, how children develop.



## **Youth Development**

Youth development is a diverse field with numerous definitions and frameworks. Development is a process, not a goal. People continue to develop throughout their lifetimes. Therefore, “promoting youth development is an enduring, overarching purpose, not a goal that is ever finally achieved” (Hamilton et al., 2004, p. 2). Dewey captured this by noting that the purpose of development is to enable a person to continue to develop (1938). Rather than setting out concise measurable behaviors, developmental goals identify demands for growth. Progress, opposed to attainment, is the key (Kohlberg & Mayer, 1972).

### **What is Youth Development?**

The term “youth development” can be seen in 3 different lights: as the natural process through which children grow into adults, as a set of principles underlying childhood programs that encourage thriving among children; or as a set of practices that foster the positive socio-behavioral development of young people (Hamilton et al., 2004, p. 1). For the purposes of this study, the area of a set of principles underlying childhood programs will be focused upon.

Within Youth Development, a “new, positive, and strength-based vision and vocabulary for discussing America’s young people has been gaining momentum and is beginning to replace long-held beliefs of the inevitable so called storm and stress of adolescence and the predictable engagement by youth in risky or destructive behaviors” (Lerner, Almerigi, Theokas, & Lerner, 2005, p. 10). This new approach is called Positive Youth Development, and views children as not broken, but as resources to be developed (J. Roth & Brooks-Gunn, 2003).

There are numerous approaches that organizations may choose from when attempting to achieve positive youth development. Three key sets of principles have been identified. These are: The Four Essential Elements, the Community Action Framework for Youth Development, and the Five C's framework of Youth Development.

The Four Essential Elements model, which focuses on belonging, mastery, generosity and independence, is the guiding framework used by 4-H youth development programs (Brendtro, Brokenleg, & Van Bockern, 1990). The framework is claimed to be a relatively simple and straightforward set of the four elements which children are believed to need in order to grow into a healthy adulthood. The model's limitations are that little research has been conducted relating to the validity of the model, as well as little evaluation of 4-H programs to see if the elements are the main components of a 4-H experience (Heck & Subramaniam, 2009, p. 17)

The Community Action Framework was created by James Connell and Michelle Gambone in 1998 with a goal of providing a measurable construct for use by youth development practitioners and theorists. The framework includes five components that build upon each other. They are:

1. Build community capacity for change
2. Implement community strategies to enhance opportunities for youth.
3. Increase supports and opportunities for youth.
4. Improve youth development outcomes.
5. Improve long-term outcomes in adulthood (Connell, Gambone, & Smith, 2000).

The main limitation of the framework is that it is relatively new, and as such, few studies supporting its theories have been done using it (Heck & Subramaniam, 2009, p. 19).

### **The Five Cs.**

The Five Cs model seeks to identify the characteristics necessary for children to thrive. It has been developed over the years by several researchers, but it began in 1989, when The Carnegie Council on Adolescent Development published a report on preparing healthy children for the 21st century. The five Cs of competence, confidence, connections, character, and caring were eventually identified (Lerner et al., 2003).

One of the major limitations of the model is that it does not itemize specific elements of youth programming, which may make it difficult to utilize the model in youth programming. The Five Cs model does however have substantially more empirical evidence in support of it than several of the other models. The constructs within the framework have been validated, and the importance of the Five Cs variables to both short-term and long-term outcomes for children has been tested using longitudinal research on a large national sample of young people (Heck & Subramaniam, 2009, p. 17).

The framework that was deemed most appropriate for a project focusing on nature photography and youth development was the Five Cs of Youth Development (Carnegie Council on Adolescent Development, 1989). As stated above, The Five Cs model seeks to identify the characteristics necessary for children to thrive (Carnegie Council on Adolescent Development, 1989) During the 1990s, the International Youth Foundation described the tasks of adolescence as four Cs (K. Pittman et al., 2000). The four Cs were originally laid out by Little (1993) and Pittman and Irby (K. J. Pittman, Irby, Tolman, & Yohalem, 2003). These four Cs, developmental characteristics which successful programs ought to encourage, included:

- a. competence (literacy, employment skills, ability to contribute)

- b. connection (caring human relationships, through mentoring, tutoring, counseling and similar experiences)
- c. character (values of responsibility, honesty, equity, etc.)
- d. confidence (self-esteem and hope) (K. Pittman et al., 2000).

Lerner (1995) added to this list by identifying caring communities as an additional fifth C that children need. The five Cs of competence, confidence, connections, character, and caring were identified in a 2000 article (K. Pittman et al., 2000). Further theoretical work suggested that the Five Cs affect youth development within a context involving the individual and his/her family and community. Development of the Five Cs, within a healthy context helps to enable the adolescent to thrive and to grow into positive adulthood (Lerner et al., 2003).

The Five Cs in positive youth development is increasingly being brought into related fields, such as its promotion for use in evaluation of community-based partnerships around adolescent health behaviors (Surko, Lawson, Gaffney, & Claiborne, 2006). How can we use the Five Cs of Positive Youth Development in a framework of children and art?

As stated above, Stephen Kellert (2005) claimed that play in nature can be an immensely important time for emotional and intellectual development. While digital photography may not be considered play, the fact of being outside and having a connection with what is happening around them, can help children develop emotionally and intellectually.

### **How is Youth Development Tied to Environmental Education?**

Youth Development, as stated above, is based on theories of what experiences and

factors are necessary for a child to experience in order for their life to be organized and positive. As described in the section on the Five Cs; competence, confidence, connections, character, and caring can be influential characteristics of a program in order to make an experience positive for children (Lerner et al., 2003; K. Pittman et al., 2000). Connections are a key part of youth development, environmental education and a relationship to nature. This characteristic above all others is what ties positive youth development experiences to environmental education. Connections tie children to an experience, influencing their confidence, character and caring about something. In order to have a relationship to the environment/nature, any program must create a connection between a child and the goal.

Hamilton, Hamilton and Pittman (2004, p. 4) claim that psychological and emotional development play a key role in positive youth development. Part of this development focuses on confidence in one's personal efficacy, and a sense of spirituality, or feeling of being a part of something larger than themselves (Hamilton et al., 2004; K. J. Pittman et al., 2003). This connection to yourself and something larger may be a link to a connection to environmental education and a connection to nature in that a connection to nature can be a grounding force for some, and make it easier to have self-confidence and a sense of place in the world (Louv, 2008; Sobel, 2008).

Environmental education and a connection to nature in childhood are based partly on the idea that a connection to the natural world is important for yourself and for the environment itself (Kennedy & Stromme, 2008; Leopold, 1949). As shown above, the youth development framework that is being used for this research (the Five Cs) has connection being a key piece in creating positive youth development experiences.

Without the theories that positive youth development is based on, environmental educators would not have as much guidance in creating influential programs when working with youth groups (Hamilton et al., 2004; Kennedy & Stromme, 2008; K. J. Pittman et al., 2003).

### **Youth and Technology.**

A new influence on youth development that has come on to the scene in the past decade is the dramatic increase in the use of technology by children and the impact that has on the rest of their lives. Children are now spending over 6.5 hours a day (including school time) using some form of electronic technology (Senauer, 2007, p. 7). Since 1999, 8 to 18 year olds have packed more use of media into the same amount of time. When children use media, about 25% of the time they are using multiple forms of technology at the same time (2007, p. 7). This increase in the use of technology coincides with a decrease in the amount of time children are spending in nature (Charles, 2007, p. 6). The influence that technology is having on positive youth development has not been thoroughly researched, but when children spend more time outside, their physical, emotional and intellectual health increases, and over the past two decades, this time has been dramatically reduced (Charles, 2007; Senauer, 2007). Research in tools that can help children reconnect with nature exists, but is still not fully explored. One such tool that has come up is photography.

Rachel Kaplan claimed that photography can help people explore the themes of wholeness or connectedness to nature, which has a bearing on self discovery, and positive self-development (Kaplan, 1984, p. 9). She stated that photography helps meet “the challenges of the experience that necessarily provide one with information about oneself.

In an environment that is distinct from one's daily life and that demands that one heed it, one finds out things about oneself that are generally undisclosed. That such revelations should be quite different for young adults is hardly surprising" (Kaplan, 1984, p. 9).

Kaplan believed that photography helps connect users in a way that journals could not. Photography can help users (especially young users) connect to an experience in a way that will enhance their lives and have a greater sense of connectedness to nature, which can ultimately have an impact on positive youth development (Kaplan, 1984).

### **Photography and children**

Market research suggests that over three quarters of children aged 6 years and older living in economically developed countries own or have use of a camera (Sharples et al., 2003, p. 3). In other areas of development, such as writing and drawing, children develop their own distinctive content and styles of representation that are not simply immature adult forms, but are signs of their abilities, interests, concerns and perspectives. Photography is becoming a familiar and important activity in which children might use to express themselves in different ways than adults (Sharples et al., 2003, p. 3).

There is also a growing interest in native wildlife and bird-watching on public lands (e.g. photography and nature watching) (Cordell et al., 2008, p. 8). While the numbers of children doing 'traditional' outdoor activities such as hunting and fishing have decreased, the number of youth visiting public lands has increased and has reached over 13 million users in 2006 (Cordell et al., 2008, p. 8). This increase in children visiting public lands and an interest in technology such as digital photography gives environmental educators an opportunity to use photography as a tool to increase children's connectedness to nature.

### **Pictures.**

So why do children take pictures? Research has shown that two main reasons for children taking pictures prevail. They are: to capture an appearance/likeness, and to record an arrangement of people and/or objects set up especially for a photograph. With increasing age, children took photographs (a) to ‘capture a moment,’ (b) to serve as a reminder or memento of something that would not be available in the future; and (c) to create an interesting or aesthetic image (Sharples et al., 2003, p. 17).

The relatively few published studies of children and photography suggest several ways in which children might differ from adults in their use of cameras and understanding of photographs (Beilin, 1982, 1991; Klapper & Birch, 1969; Kose, 1985; Kose et al., 1983) . The studies suggest, for instance, that younger children may lack competence in aiming cameras and framing scenes. They may also have difficulty in thinking about a photograph as a pictorial image, with properties such as composition and focus, as opposed to the scene or subject that it represents.

### **Children and Art.**

Halverson (2010) states that that the dramaturgical process- which is the telling, adapting, and performing of narratives of personal experience-which includes photography, is a powerful learning environment for understanding positive youth development (Halverson & Wisconsin Center for Education Research, 2010, p. 4).

Arts organizations make space for multiple pathways toward positive development, opening up the possibility that adolescents can engage with their personal and cultural resources in constructing identity, rather than rejecting these resources in order to become successful adults (Halverson & Wisconsin Center for Education



Research, 2010, p. 6). The use of photography as an art form can allow children to engage in a developmental process that allows them to explore avenues that they were unaware of before they began the process.

Kaplan's works (1984) makes the argument that art and nature can be linked to help youth development in ways that the participant may not even be aware of. Kaplan argued that an intense nature experience can have a profound impact on people's lives. In her research, there was a consistent richness of the psychological benefits that participants in profound nature experiences obtained. "It appears that a great deal is going on in the minds and lives of these relatively ordinary individuals, exposed to what for them is a rather extraordinary environment (Kaplan, 1984, p. 9). This profound experience, what for children might simply be being outside using a camera in an environment that is foreign to them, can impact children in positive ways that the participants may not realize until much after the experience itself (Kaplan, 1984, p. 10).

### **Children and Cameras.**

In one of the few studies done on how children at different developmental stages use cameras, Sharples et. al (2003) looked at what children in three different age categories (7, 11, and 15 years old) were taking pictures of. The research found that of all the photographs being taken, the largest percentage was of the outdoors with no people. This peaked at 11 years, with 43 percent of pictures taken by the subjects studied were of the outdoors without people in them (Sharples et al., 2003, p. 13). This study gives evidence to the claim that children do see something of interest beyond their peers, and we must find more ways to give children the opportunity to experience and explore these interests.

Photography has several unique features. Photographs simultaneously depict actual persons, places, and things, and also the photographer's relationship to them. Because photographs are not mediated by language, they offer children the opportunity to represent their experience and perspective in a relatively immediate way (Rudkin & Davis, 2007, p. 3). In addition, the basic techniques of photography are easily mastered. Wendy Ewald (2001), an educator and photographer who has worked extensively with marginalized people, wrote:

Photography is democratic. The entire process, from using a camera to developing and printing, is easy to learn and accessible to almost anyone. Many of the children I've worked with are the lowest-ranking members of their community. Yet over and over they tell me that when they pick up a camera and decide what to photograph, they feel proud (Ewald & Lighfoot, 2001, p. 79).

The act of taking a digital photograph gives children a chance to express their emotions and thoughts in a simple and quick way. Letting children practice this freedom outdoors, giving them a chance to explore nature through a medium (technology) that is comfortable to them might be an affective way of creating a connection to nature in children (Rudkin & Davis, 2007, p. 13).

With the dramatic increase in the use of neuroenhancers and 'smart' pills of the 21<sup>st</sup> century, numerous children and young adults are taking drugs to control ADHD and have better focus. According to Stix, (2009, p.5) "on some campuses, one quarter of students have reported using the drugs" (i.e. Ritalin, Provigil, Adderall). While some people do need these drugs, for many others there is a cheaper, more available alternative that research has linked to an increase in mental acuity and creativity: nature. Research

suggests that exposure to the “living world can enhance intelligence in some people” (Louv, 2011, p. 27).

As previously cited in the benefits of a nature relationship section, a link between nature and better focus is an important one for those working with positive youth development. Findings from a nine-year study done by social-psychologists Rachel and Stephen Kaplan suggested that “direct and indirect contact with nature can help with recovery from mental fatigue and restoration of attention” (Kaplan & Kaplan, 1989, p.288). A more recent study done by the Human-Environment Research Laboratory discovered that children showed “a significant reduction in the symptoms of attention-deficit disorder when they engage in nature” (Louv, 2011, p. 27). These studies support a link between nature experiences and a calming, more focused child. Activities that engage children outside may have the same results, and could be a key tool in any positive youth development program that strives to engage and calm children.

## **Conclusion**

As the numbers of people experiencing outdoor activities are dropping, more research in the field is being done to understand if this may impact environmental connectedness. President Barack Obama has even weighed in on the importance of getting the American population back into the outdoors. While research has shown that there are many ways in which to get people to begin to have any sense of environmental connectivity, it is the hope of the author that the past and present research in the field has created a backbone for the future research he hopes to explore.

In terms of attempting to define the human-nature relationship, several studies have been done to attempt to define and quantify a connectedness to nature in people

(Beery, 2011; Cheng & Monroe, 2010; Mayer & Frantz, 2004; Nisbet, Zelenski, & Murphy, 2009; Perrin & Benassi, 2009). Schultz et al. (2004) used the Implicit Associations Test (IAT) to measure the degree to which people associate themselves with nature in their connectedness studies. Results provided a moderate positive relationship between biospheric concerns and implicit connections with nature, and evidence for the usefulness of implicit measures and of the importance of connectedness with nature for understanding environmental attitudes.

Mayer and Frantz (2004) defined connectedness to nature as one's "affective, experiential sense of oneness with the natural world" (p. 504). Mayer and Frantz noted that biospheric values and an empathetic response to the natural world are characteristics of this emotional or affective state. Following from the preceding definition, the connectedness to nature scale (CNS) was developed as a measure of an individual's feeling in community with nature (Frantz et al., 2005; Mayer & Frantz, 2004; Mayer et al., 2009). The CNS measures participant sense of oneness with the natural world, sense of kinship with animals and plants, and sense of equality between the self and nature. Mayer and Frantz (2004) reported that the scale was shown to have just one factor, possess high internal reliability ( $\alpha = 0.84$ ), and have a high test-retest reliability ( $r = .79$ ).

In relation to studying children, one influential study was done by Cheng and Monroe in 2010, wherein the Connection to Nature Index was created. (Cheng & Monroe, 2010, p. 1). The index was developed and tested to measure children's affective attitude toward the natural environment. The results suggested that there are four dimensions in a child's connection to nature index:

- a) enjoyment of nature
- b) empathy for creatures

- c) sense of oneness
- d) sense of responsibility (2010, p. 1).

**Summary of Supporting Research**

Theory	Author(s)
Connectedness to Nature Theory	Mayer and Frantz (2004) Louv (2005) Sobel (2008) Perrin and Benassi (2009) Cheng and Monroe (2010) Louv (2011)
Positive Youth Development Theory	Catalano et al. (2004) Lerner et al. (2005)
Five Cs of Youth Development Theory	Little (1993) Lerner (1995) Pittman (2003) Heck and Subramaniam (2009)
Youth Development Theory	Dewey (1938) Damon (2004) Hamilton et al. (2004)
Significant Life Experience Theory	Tanner (1980) Azjen (1985) Chawla (1998) Cachelin et al. (2009)
Photo Elicitation Theory	Kaplan (1984) Kaplan and Kaplan (1989) Harper (2002)
Environmental Education	Stapp (1969) Hungerford and Volk (1990) Chawla (1998) Athman and Monroe (2000) Scott and Gough (2003) Kennedy and Strom (2008)
Children and Art	Ball and Heath (1993) Heath (2001) Worthman (2002)

## **CHAPTER 3- METHODOLOGY**

### **Introduction**

The field of digital nature photography and children's connectedness to nature has been modestly explored. Studies that have been completed have used a wide variety of research designs to obtain data. The chapter will describe the methodology in detail, beginning with a short description of the study design. Discussion of subject selection, outcome measures, and conditions of testing follow. Finally, analysis and discussion are presented.

### **Research Design**

This study employed a non-equivalent control group design to explore the relationship between digital nature photography and children's connectedness to nature. This falls under a quasi-experimental design, described by Creswell as "the investigator uses control and experimental groups but does not randomly assign participants to groups" (Creswell, 2003, p. 167). In this design, the experimental group A and control group B are selected without random assignment. Both groups take a pretest and posttest. Only the experimental group receives the treatment.

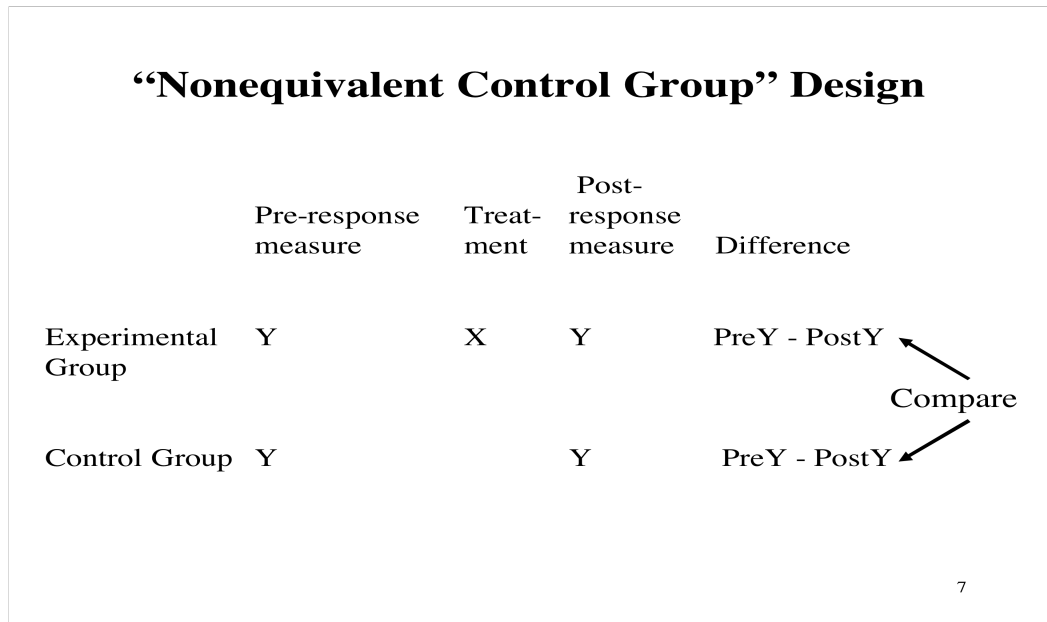


Figure 1: Non-equivalent control group design (Creswell, 2003, p. 169).

### Subject Selection

All subjects will be given the Connectedness to Nature Index as a pretest to explore their levels of connectedness to nature (Cheng & Monroe, 2010).

The “treatment” group will participate a 2-week treatment program designed by the MN DNR *Digital Bridge to Nature* program, using digital nature photography, while the control group will not (MN DNR, 2011b). Once the program is over, both the control and treatment groups will be given a posttest, using the same instrument as the pretest to see how their levels of connectedness to nature has changed. The treatment group will also be asked to write a reflection to see how their emotions have changed. They will be asked: By taking digital pictures, how do you feel about nature?

The population to be studied will be 4<sup>th</sup> grade students in Duluth, MN area schools. For the purpose of the study, schools that are chosen to go through the treatment

must meet the following criteria will be targeted for this study:

- 1) Are within 30 miles of Duluth, MN city limits.
- 2) Have 4<sup>th</sup> grade students
- 3) Have a teacher that has participated in the Minnesota Department of Natural Resources' Digital Bridge to Nature workshop.

Control-group schools must meet the following criteria to be targeted for this study:

- 1) Are within 30 miles of Duluth, MN city limits.
- 2) Have 4<sup>th</sup> grade students
- 3) Has a population of students that has a similar socio-economic status as one of the schools chosen for the treatment group.

Two schools will be chosen for the treatment group, as will two schools for the control group. With the average class size for 4<sup>th</sup> grade classrooms in Minnesota public schools being 27, (Education Minnesota, 2011) that equals approximately 54 students in the treatment group, and 54 students in the control group. The experimental unit is each student.

### **Outcome Measures**

For the purpose of this study, the instrument chosen to assess connectedness to nature will be Cheng and Monroe's Connectedness to Nature Index. The instrument is a 17-Item Index that assesses variables that influence affective attitudes. It is designed for 8-10 year olds, and has been tested for validity (pilot-tested with two 4<sup>th</sup> grade classes) and reliability ( $\alpha = 0.87$ ). The index uses 5-point scale to assess how students feel in response to questions such as:

- 1) I like to hear different sounds in nature
- 2) I like to see wild flowers in nature
- 3) When I feel sad, I like to go outside and enjoy nature
- 4) Being in the natural environment makes me feel peaceful (Cheng & Monroe, 2010, p. 11).

Classrooms that are chosen to go through the treatment must have teachers that have gone through Digital Bridge to Nature's 4-hour workshop. The workshop is directed



by trained facilitators hired by the Minnesota Department of Nature Resources that have experience with both photography and connectedness (MN DNR, 2011b).

### **Conditions of Testing**

#### **Informed Consent.**

Prior to beginning the study, the researcher will obtain permission to work with the schools by getting letters of support from both the principals and teachers of the classrooms to be studied. Once the classroom is determined, a letter of consent will be sent to each student's guardian. (or you can say, a reverse permission will be obtained by 1) sending consent letters home to each student. 2) signed and returned letters will indicate that permission is NOT given to participate. See *Appendix A* and *Appendix B* for letters of consent sent to children and their families.

#### **Delivery of the Instrument.**

The instrument will be given to all four classes one week prior to the program being delivered, and one week after the program was given, for a total of two times to all groups. The instrument will be administered to students, who will have approximately thirty minutes to complete the instrument.

#### **Educational program delivery (“Treatment”)**

The program will be presented over a two week period, with classrooms using digital cameras at least two times in an outdoor environment in conjunction with *Digital Bridge to Nature* curriculum as given by the teacher. Classrooms of 4<sup>th</sup> graders will use digital cameras in an outdoor-environment to take pictures of nature that have value and feeling to the student. Students will pair up in groups of two, and each group of two will

be given a digital camera to use during that class period.

### **Data Analysis**

Analysis will begin as soon as the posttest is collected from all research sites.

Step 1: Report response rate

Step 2: Provide a descriptive analysis of data

Step 3: I will use an ANCOVA, with the pretest being the covariate.

Step 4: SPSS 20.0 will be used to analyze the data

### **Conclusion**

The methods of this project were designed to focus on a specific project. Because of the sampling methods being used, results cannot be generalized beyond the subjects and the project context that will be used in this study. While this study is focusing on using digital photography as a tool to create a connection with nature, it is not the only tool that may create a connection to nature. The instrument and overall design of this project were constructed so that external variables would be at a minimum.

## CHAPTER 4- RESULTS

Digital photography has the potential to influence the connectedness to nature of children. The purpose of this study was to investigate what influence taking digital nature photographs has on children's connection to nature. The research is directly related to one central question: How does taking digital nature photographs influence children's connectedness to nature? This chapter reports the data collected from a questionnaire collecting quantitative data, including one posttest qualitative question.

### **Research Design**

This study employed a non-equivalent control group design to explore the relationship between digital nature photography and children's connectedness to nature. In this design, the control group (Schools A and B) and the experimental ('treatment') group (Schools C and D) were selected using purposeful sampling. Both groups took a pretest and posttest. Only the experimental group participated in the program. A questionnaire designed by Monroe and Cheng (2010) was used to test for students' connection to nature. The questionnaire was given both as a pretest and as a posttest. The use of digital cameras by the treatment schools was the independent variable and the dependent variable was the posttest mean, or the measured connectedness to nature of the participants.

### **Subject Selection**

Using the criteria explained in Chapter 3, two control group schools in Independent School District 709 were selected. Both schools have a semi-rural, semi-suburban population. Two treatment schools in Independent School District 709 were also selected using the criteria in Chapter 3. The socio-demographics in both control and

treatment groups were similar. Out of a possible 117 students, 99 participated in the program ( $n=85\%$ ).

Table 1

*Demographic information of students participating in questionnaires*

	Pretest n(%)	Posttest n(%)
School A (Control)	24 (24%)	23 (23%)
School B (Control)	22 (22%)	22 (22%)
School C (Treatment)	25 (25%)	23 (23%)
School D (Treatment)	28 (28%)	22 (22%)
Total	99 (85%)	90 (77%)

The difference between pretest and posttest total is explained by sickness and disciplinary issues.

### **Outcome Measures**

The design of the project consisted of two sections: The Connectedness to Nature Scale given in the pretest and posttest, and one open-ended question about digital photography and nature given at the posttest. The questionnaire used to test children's connectedness to nature included 17 variables rated on a 5-point Likert scale, from *strongly disagree*, to *strongly agree*. The 17 variables ranged in statements from "I like to hear different sounds in nature," to "My actions will make the natural world different" (Cheng & Monroe, 2010, p.11). The reliability coefficient was  $\alpha=.87$  (Cheng & Monroe, 2010). An open-ended question followed the posttest questionnaire, and intended to gain a better understanding of whether digital photography has an impact upon connectedness to nature.

### **Conditions of Testing**

The principals and teachers of all four classrooms were contacted to obtain permission to have students fill out all questionnaires (see Appendix A-D). On January 30<sup>th</sup>, 2012, all student and parent permission forms, as well as all questionnaires, were

dropped off at the individual classrooms. Pretests were implemented February 8<sup>th</sup>, 2012, and posttests implemented March 7<sup>th</sup>, 2012. The study lasted twenty-two days from start to finish.

### **Data Analysis**

The data collected was analyzed in two different ways. The data collected from the 17-item questionnaire given at both the pretest and posttest was analyzed as quantitative data. The SPSS 20 statistical analysis software package was used to run descriptive statistics (frequencies and means), as well as an ANCOVA. The data collected from the one open-ended question given during the posttest was analyzed and coded, and themes were found. All of the data was stored as confidential research material. Tables and figures were created to display the information acquired from the data analysis.

### **Results**

There were 99 ( $n=85\%$ ) completed questionnaires for the pretest, and 90 ( $n=77\%$ ) for the posttest. There were two sections to the posttest questionnaire, and the data is reported in the following sequence: Connectedness to Nature Index (Quantitative data), and the open-ended question (Qualitative data).

#### **Section One: Connectedness to Nature Index.**

Ninety-nine respondents filled out the pretest questionnaire. Students were asked to circle one answer for each item from the selection of the following: Strongly Disagree (1), Disagree (2), Not Sure (3), Agree (4), or Strongly Agree (5). The higher scale score indicated a stronger connection to nature.

The average of all 17 items was taken to have the highest possible mean per student be a

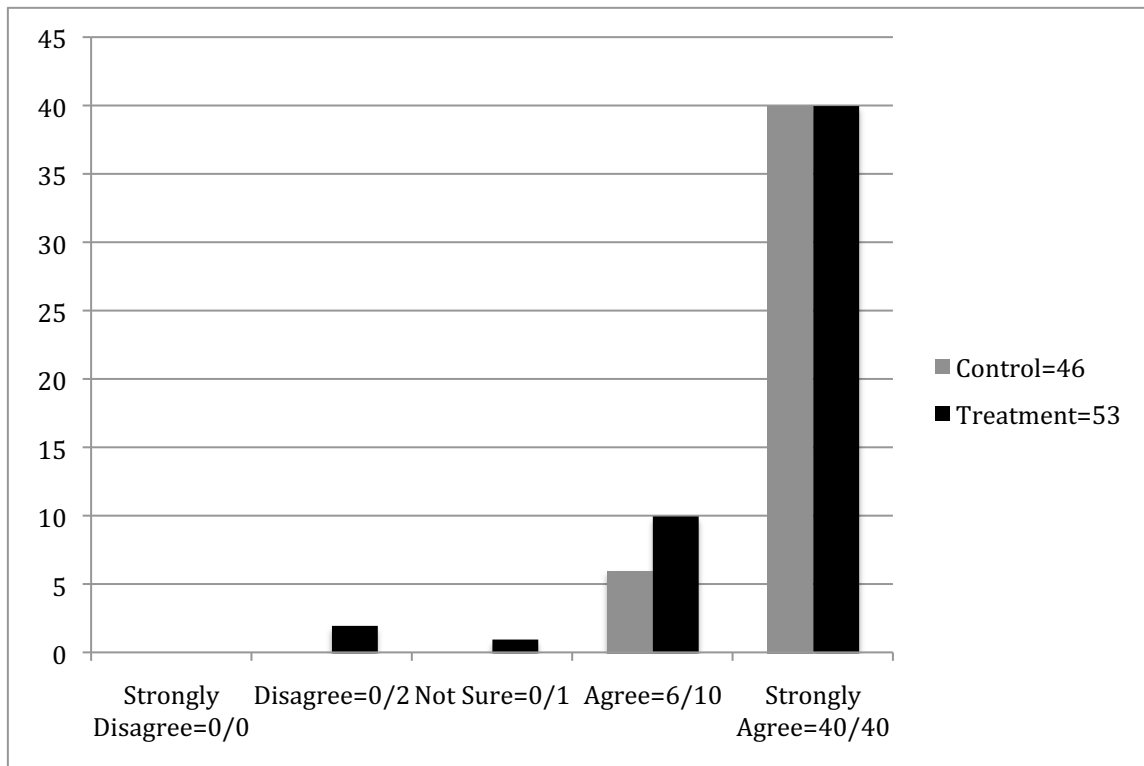
5. The range of the mean scores were:

Table 2

*Range of Means Scores (1=strongly disagree;5=strongly agree)*

	Control	Treatment
Range (Pretest)	3.24-5	2.41-5
Range (Posttest)	1.8-5	1.0-5

Table 2 shows the range of means from both control and treatment groups, in the pretest and posttest. Showing the range of means does not give a true understanding of where the average mean lay. *Figure 2* expresses the number of favorable, or pro-connectedness to nature responses in the pretest. *Figure 3* shows that in the posttest, the average mean was again predominantly positive, or strongly connected to nature in both the Control and Treatment Groups.



*Figure 2.* Average response of pretest. Similar results were seen in both the control and treatment groups

Table 3  
*Analysis of Covariance Summary*

Source	Sum of Squares	df	Mean Square	F	Sig.
Pretest	18.533	34	.545	1.397	.134
Method	18.834	35	.538	1.379	.141
Error	144.53	29	4.98		

$p < 0.05$

ANCOVA results show that there were not statistically significant differences in control and treatment groups either pretest or posttest. A preliminary analysis was conducted to evaluate homogeneity of slopes between the covariate and the dependent variable across groups, an assumption underlying ANCOVA. The interaction between the pretests showed no significant difference.  $F(34) = 1.397$ ,  $MSE = .545$ ,  $p = .134$ . The interaction effect between the pretest and posttest was also nonsignificant.  $F(34) = 1.379$ ,  $MSE = .538$ ,  $p = .141$ . The control and treatment groups did not show a significant difference in either pretest or posttest mean scores.

Table 4  
*Average Mean of Control and Treatment Schools*

	Pretest Mean	Posttest Mean
Control	4.35	4.28
Treatment	4.28	4.18

Table 4 expresses that students from both the Control and Treatment Schools started the project with a high Connectedness to Nature Score. 4.35 (Control) and 4.28 (Treatment) scores out of 5, which shows that the students from both groups already had a high measure of connectedness to nature before the project began. The table also shows that there was a slight decrease in the average mean in both control and treatment group posttests.

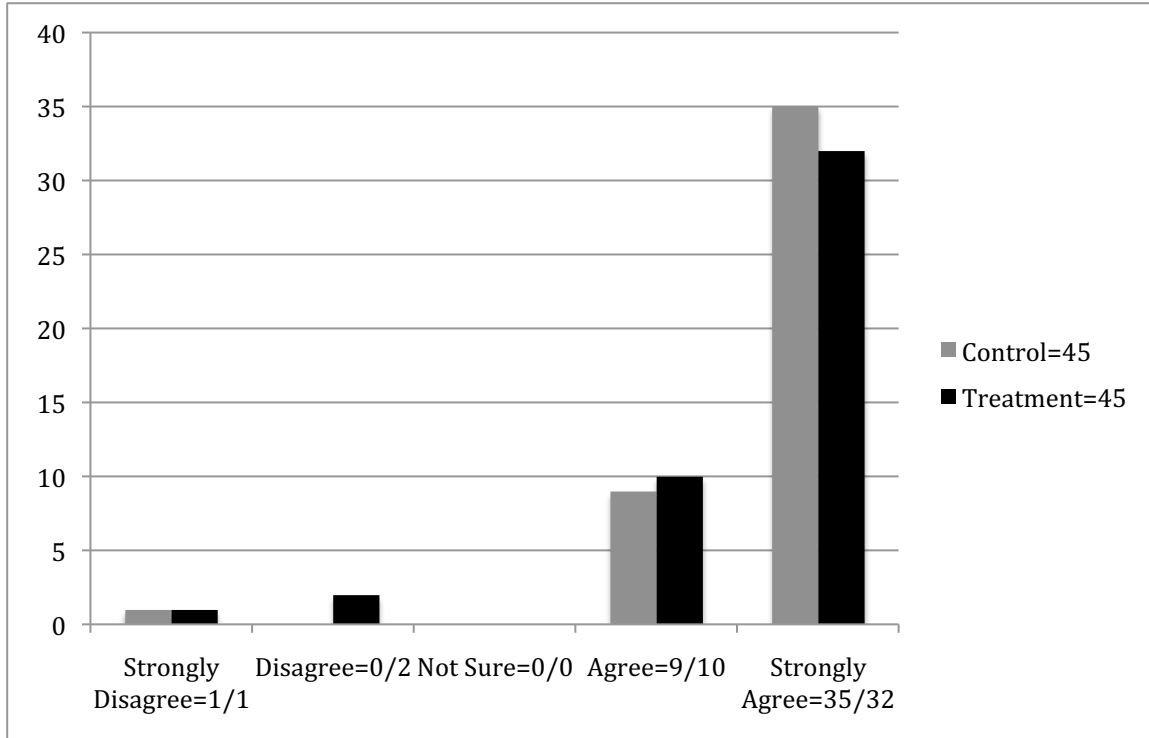


Figure 3. Average Response of posttest. Shows a slight increase in control group (no significant difference)

### Section Two: Open-ended question.

The students were asked a single open-ended question: *By taking digital pictures, how do you feel about nature?* The question was analyzed by identifying themes in respondents' answers and clustering them into similar categories. These categories were coded and analyzed for frequencies. The responses were also used to shed light on the results from the Connectedness to Nature Index. The excerpts were used to describe the respondents as a whole and were not linked to individual responses. Only the Treatment Group (Schools C and D) filled out the open-ended question. This resulted in forty-five respondents, with two of those choosing not to answer the question. Listed below are the frequency tables and verbatim responses for the open-ended question.



Table 5  
*Responses for Open-Ended Question (n=45)*

How does taking pictures make you feel about nature?	Frequency of Responses n(%)
Positive feelings about nature	26 (57.7%)
Connected to nature	11 (24.4%)
Connected through photos	8 (17.8%)
Positive feelings through photos	3 (6.7%)
No Change	2 (4.4%)
Don't Know	2 (4.4%)

*Note:* Each respondent was permitted to respond with more than one primary reason for how digital photography made them feel. Thus, percentages sum to more than 100%.

### **Example Responses:**

- **Positive feelings about Nature:**
  - “I fell happy about nature why because you can see flowers and the people their.”
  - “I like nature because you never know whats thell do next.”
  - “I feel good and happy. I love to see flowers and green grass. I like to see deer.”
- **Connected to Nature:**
  - “I feel connected to nature.”
  - “I feel like Im with nature. I feel like Im home.”
  - “ I feel that I should take care of nature.”
- **Connected through Photos:**
  - “Taking pictures make me feel close to nature”
  - “When I took pichers of nacher I loved it even more!”
- **Positive Feelings through Photos:**
  - “I feel that it is a good thing to take pictures outside.”
  - “It makes me feel happy about taking pictures of cool plans and animals of things you see.”
- **No Change:**
  - “I feel the same as I was before. I loved doing it but I feel the same as I was before.”
  - “I feel normal.”
- **Don't know:**
  - “I don't know.”

### **Chapter Summary**

There was no significant difference between the pretest and posttest scores of connectedness to nature in either the control or treatment groups. However, the majority

of the respondents scored high on the Connectedness to Nature Index for the pretest and posttest ( $M=4.31$  and  $M=4.24$ ), which indicates that they had a strong connectedness to nature before and after the project occurred.

Qualitative and anecdotal evidence indicated that there was a slight increase in the control group, but there was no significant difference overall. The results from the open-ended question suggested that 75% of the respondents had positive feelings about nature after the program, and just over 20% directly connected this to the use of digital cameras. These questions are addressed in great depth in Chapter Five by taking a closer look at the open-ended question and readdressing ideas from the literature. Chapter Five also continues a discussion about the results; provides recommendations for environmental education and digital photography programs; and offers ideas for future research.

## Chapter 5- Discussion

The influence of digital photography on children's connectedness to nature was unknown. This study explored the connectedness to nature levels in Duluth, MN public school 4<sup>th</sup> graders. Students in four different public schools during the 2011-2012 school year participated in the study. The participants in the project were from within 5 miles of Duluth, MN city limits. Many had experience being outdoors in nature through school or at home. Out of a possible 117 students, 90 completed both the pretest and posttest. While the results are not generalizable to other youth populations or digital photography programs, the recommendations may be relevant for youth groups and those planning on engaging children in nature through digital photography.

The instrument was measured using mean scores. Findings indicated that pretest groups were similar. The pretest-mean scores demonstrated a high connectedness to nature ( $M=4.28-4.35$ ). A look at mean scores showed there was no significant change between Control group pretest and posttest means (4.35-4.28) and Treatment group pretest and posttest means (4.28-4.18).

Results from the analysis of covariance (ANCOVA) using the Nature Connectedness Index showed that there was no significant difference in the control and treatment groups in either the pretest ( $p=.134$ ) or posttest ( $p=.141$ ). The lack of significant change in connectedness to nature may not mean that digital photography does not influence connectedness to nature levels. It may be that the items contained strong language or the pretest/posttest design made it difficult for recall.

It is important to note that research surrounding connectedness to nature suggests that connectedness is fairly stable. According to Schultz et al. (2002)

‘Our results show a moderate degree of stability in connectedness across time’ (2002, p. 41). Cheng and Monroe (2010) suggest that because attitudes change slowly, it is not reasonable to expect a significant difference between a pre and post measure of connection to nature’ (2010, p. 9). Due to this, the 4-week period that participants had between pretest and posttest may not have been long enough for any fluctuation in connectedness to nature to occur.

Another possible reason for no significant difference between pretest and posttest scores is the idea of a ‘ceiling effect’ (Ernst & Theimer, 2011). The mean pretest score on the Cheng and Monroe (2010) instrument was 4.35 for the control group and 4.28 for the treatment group. Pedhazur and Schmelkin (1991) claim that if most of the participants already have high scores in the pretest, that the instrument may not be sensitive enough to show a difference between pretest and posttest.

This high level of connectedness to nature at the start of the program is possibly connected to the location of the participant population. All four schools that participated in the study have nature areas close by that are accessible to students. Most participants also live in rural or suburban areas with access to nature areas.

The open-ended question was used to provide information about the respondents and their experience using digital cameras in nature. There is value in taking a closer look at the variety of responses to the question. The responses provided insight and allowed the possibility of capturing an influence that the Connectedness to Nature Index could not detect. The results are discussed by compiling the information to describe the participants and add insight to the Connectedness to Nature Index.

The results of the questionnaire revealed that the respondents generally had a

strong connectedness to nature. The open-ended question suggested that many of the respondents' connected to nature levels were influenced by their participation in the *Digital Bridge to Nature* program (see Chapter Four, Table 6). 58% of responses indicated that participants had positive feelings about nature after the program. 25% of responses stated that participants felt more connected to nature. Two of the responses are as follows: "I felt much more connected to nature" (Respondent A) and "I feel that some people don't see cool stuff you can do and see. And now I figured that out" (Respondent B).

Furthermore, 23% responses showed that participants felt connected to nature through the use of cameras. "And we showed people by taking pictures that nature can be wonderful in different ways" (Respondent C) and "taking pictures make me feel close to nature. So I can be close to animals" (Respondent D). The remaining 8% explained that they felt no change after finishing the program or that they didn't know how they felt. While the Connectedness to Nature Index did not show any significant increase in connectedness to nature index after student participation in the *Digital Bridge to Nature* program, the participants' answers to the open-ended question suggest that they both enjoyed using digital cameras to explore nature, and in some cases it even made them feel more connected to nature by using this tool.

### **Results Implications**

Did the use of digital photography influence participants to have a strong connectedness to nature? The answer to this question is complicated because results indicated that they were already there; however, some responded that they were connected to nature through the photography.

“Taking pictures make me feel close to nature” (School C respondent).

“When I took pictures of nature I loved it even more” (School D respondent).

While many of the respondents indicated that they had positive connectedness to nature and felt connected through nature and photography, some did not. Using digital photography may not potentially influence everyone’s connectedness to nature. Some respondents saw using cameras as simply a fun activity outside the classroom. “Also outdoors you can have fun like riding bikes” (School C respondent).

From the data collected, no significant change was seen between connectedness to nature levels before and after the use of digital cameras. Does that mean that photography is an inappropriate tool to create a connection to nature in children? Not necessarily. Research has found that using photography and other technology pieces can create an excitement for being outdoors in a population that has recently shown less and less interest in spending time outside (Kaplan, 1984; Sharples et al., 2003). Digital photography can still be used in classrooms, nature centers, etc. to create excitement and enhance an experience in nature, that while it may not create a connection to nature, it can be an avenue towards further knowledge and interest.

One implication possibly suggested by this study and supported by the research literature is time. Kals, Schumacher, and Montada (1999) found the two most significant predictors of affinity toward nature are frequency of time in nature and frequency of childhood time in nature. Studies indicate that connectedness is a malleable construct, but that change requires long-term or repeated experience (Schultz & Tabanico, 2007).

It is important to note that time is not the cure all for connectedness to nature. It is rather one variable that might influence the very complex attribute that is connectedness

to nature. As discussed previously, connectedness to nature is multi-dimensional (Clayton, 2003; Schultz, 2000), and thus, will not change dramatically due to one single tool, or one single activity. The use of digital cameras by children can give us information about what makes connectedness to nature such a complex attribute, one which many studies have discussed, yet we still have much to learn. There is still room for research on what makes up the phenomenon of connectedness to nature, which will be beneficial to studies on both adults and children's connectedness to nature attitudes.

### **Future Research**

More research in this area is necessary to determine whether the use of digital cameras by children may influence their connectedness to nature attitudes, or whether by having a strong connectedness to nature children look for new ways of exploring it. It may be beneficial to learn what characteristics of an education program are necessary to create a connectedness to nature, and whether digital photography meets any of these requirements.

As explained, the use of digital photography, no matter how long the time frame, will not likely be the cure for connectedness to nature in children, but it may be a catalyst. More research is needed to explore the complexity of connectedness to nature, and when feelings of affective attitudes about connectedness begin. Research has shown that affective attitudes are acquired and subject to 'fairly predictable changes,' (Miller, 2005, p. 3), but can the same be said for connectedness? There may also be value in looking at whether there are ways other than direct experiences in nature that may foster connectedness to nature (Millar & Millar, 1996). It may be of interest to look at how technology is being used in the environmental education field as a whole, and whether it

is fostering connectedness or hindering it.

Further research is also required to address whether connectedness to nature levels are impacted by children being from rural vs. urban vs. suburban areas.

Finally, it may be appropriate to study participating teachers attitudes and responses to digital nature photography. During the research, teachers responded positively to the study, and further research of teachers' perception on connectedness to nature and digital photography would be valuable.

### **Summary of Discussion**

The findings in this study shed light on the influence of digital photography on children's connectedness to nature. While the results of the questionnaire indicated that respondents had a strong connectedness to nature both before and after their use of digital cameras, respondents differed in their reflection of how the program made them feel about nature and digital cameras. Over half of the respondents felt happy or in some way connected to nature through the program. Others felt that digital cameras increased their connection to nature, and still others felt no different after the program ended. There is value in learning that the students all seemed to be engaged both in educational exploration and nature study through the cameras, and that the teachers can not wait to use cameras with a whole new group of students. Digital cameras have the ability to engage and excite children. They have the potential to impact a dimension of connectedness to nature, and the pieces that makes up connectedness needs to be explored further.



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## Appendix A

### Principal Consent Form-Treatment group

Dear Principal \_\_\_\_\_

My name is Seth Spencer and I am writing to ask for your permission to allow one of your 4<sup>th</sup> grade teachers and their classroom to participate in a research study to explore the relationship between using digital nature photography and developing a connection to nature.

#### **Background Information:**

The purpose of this study is to explore the relationship between taking nature photographs and children's connection to nature.

If you are willing to allow a teacher and their 4<sup>th</sup> grade class to participate in this study, you will be asked to do the following things.

- A) Select a teacher that is willing to participate in the project.
- B) Select a teacher that is able to follow through on the project and will be able to dedicate 2 hours of class time in late February and early March.
- C) Select a teacher who will be available to attend a Minnesota Department of Natural Resources workshop on December 16<sup>th</sup>, 2011.

#### **Risks and Benefits of Being in the Study:**

There are no significant risks associated with this study. All questionnaires are submitted anonymously, and will only be identified by the school attended. Names will not be connected with this survey in any way. In addition, there are no questions asking for sensitive or potentially harmful information.

The benefit to participation is the ability to help evaluate if tools like digital cameras can impact 8-10 year old children's connection to nature.

Nobody will receive payment, reimbursements, or rewards for participating in this study.

#### **Confidentiality:**

The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Completed questionnaires and any other information obtained during this research will be stored in a locked file in my residence. Only myself and my advisor will have access to completed questionnaires. Upon completion of the research, all questionnaires will be destroyed.

The same is true of any pictures taking during the study. **NO STUDENTS will be identified by their pictures, and pictures will only be seen by myself and my advisor.**

#### **Voluntary Nature of the Study:**

Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota Duluth. If you decided to participate, you are free to

withdraw at any time without affecting those relationships.

**Contacts and Questions:**

The researcher conducting this study is Seth Spencer. If you have any questions, you may contact Seth at 2516 Livingston Ave. Duluth, MN; Phone: (218) 409-9079. If you have further questions, you can contact my advisor, Ken Gilbertson, Ph.D. at 218-726-6258.

**Statement of Consent**

I have read the above information. I have asked questions and have received answers. I give my consent for participation in this project.

Signature \_\_\_\_\_

Signature of Investigator \_\_\_\_\_

Date \_\_\_\_\_

Date \_\_\_\_\_

## Appendix B

### Principal Consent Form: Control Group

Dear Principal \_\_\_\_\_

My name is Seth Spencer and I am writing to ask for your permission to allow one of your 4<sup>th</sup> grade teachers and their classroom to participate in a research study to explore the relationship between using digital nature photography and developing a connection to nature.

#### **Background Information:**

The purpose of this study is to explore the relationship between taking nature photographs and children's connection to nature.

If you are willing to allow a teacher and their 4<sup>th</sup> grade class to participate in this study, you will be asked to do the following things.

- A) Select a teacher that is willing to participate in the project.
- B) Select a teacher that is able to follow through on the project and will be able to dedicate 2 class periods in late February.

#### **Risks and Benefits of Being in the Study:**

There are no significant risks associated with this study. All questionnaires are submitted anonymously, and will only be identified by the school attended. Names will not be connected with this survey in any way. In addition, there are no questions asking for sensitive or potentially harmful information.

The benefit to participation is the ability to help evaluate if tools like digital cameras can impact 8-10 year old children's connection to nature.

Nobody will receive payment, reimbursements, or rewards for participating in this study.

#### **Confidentiality:**

The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Completed questionnaires and any other information obtained during this research will be stored in a locked file in my residence. Only myself and my advisor will have access to completed questionnaires. Upon completion of the research, all questionnaires will be destroyed.

The same is true of any pictures taking during the study.

#### **Voluntary Nature of the Study:**

Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota Duluth. If you decided to participate, you are free to withdraw at any time without affecting those relationships.

**Contacts and Questions:**

The researcher conducting this study is Seth Spencer. If you have any questions, you may contact Seth at 2516 Livingston Ave. Duluth, MN; Phone: (218) 409-9079. If you have further questions, you can contact my advisor, Ken Gilbertson, Ph.D. at 218-726-6258.

**Statement of Consent**

I have read the above information. I have asked questions and have received answers. I give my consent for participation in this project.

Signature \_\_\_\_\_

Signature of Investigator \_\_\_\_\_

Date \_\_\_\_\_

Date \_\_\_\_\_

## Appendix C

### Teacher consent form: Treatment Group

Dear 4<sup>th</sup> grade teacher:

My name is Seth Spencer and I am writing to ask for your permission to use your 4<sup>th</sup> grade students as research participants to explore the relationship between using digital nature photography and developing a connection to nature.

#### **Background Information:**

The purpose of this study is to explore the relationship between taking nature photographs and children's connection to nature.

If you are willing to participate in this study, you will be asked to do the following things:

- A) Participate in a 4-hour workshop about the Digital Bridge to Nature Program on December 16<sup>th</sup>, 2011.
- B) Dedicate at least four class periods (2 hours of total time) over a four-week period in late February/March, towards participating in the pretest/posttest, and the instrument. The pretest will occur one week prior to the program being delivered, and the posttest will occur one week after the program was delivered. During the two-week period, you will be asked to take your students outside twice and allow them to use the digital cameras provided to take pictures of what interests them in nature.

#### **Risks and Benefits of Being in the Study:**

There are no significant risks associated with this study. All questionnaires are submitted anonymously, and will only be identified by the school attended. Names will not be connected with this survey in any way. In addition, there are no questions asking for sensitive or potentially harmful information.

The benefit to participation is the ability to help evaluate if tools like digital cameras can impact 8-10 year old children's connection to nature.

Nobody will receive payment, reimbursements, or rewards for participating in this study.

#### **Confidentiality:**

The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Completed questionnaires and any other information obtained during this research will be stored in a locked file in my residence. Only myself and my advisor will have access to completed questionnaires. Upon completion of the research, all questionnaires will be destroyed.

The same is true of any pictures taking during the study. **NO STUDENTS will be identified by their pictures, and pictures will only be seen by myself and my advisor.**

#### **Voluntary Nature of the Study:**

Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota Duluth, or your school, or anyone in the school. If you decided to participate, you are free to withdraw at any time without affecting those relationships.

**Contacts and Questions:**

The researcher conducting this study is Seth Spencer. If you have any questions, you may contact Seth at 2516 Livingston Ave. Duluth, MN; Phone: (218) 409-9079. If you have further questions, you can contact my advisor, Ken Gilbertson, Ph.D. at 218-726-6258.

**Statement of Consent**

I have read the above information. I have asked questions and have received answers. I give my consent for participation in this project.

Signature \_\_\_\_\_  
Signature of Investigator \_\_\_\_\_

Date \_\_\_\_\_  
Date \_\_\_\_\_

## Appendix D

### Teacher Consent Form: Control Group Schools

Dear 4<sup>th</sup> grade teacher:

My name is Seth Spencer and I am writing to ask for your permission to use your 4<sup>th</sup> grade students as research participants to explore the relationship between using digital nature photography and developing a connection to nature.

#### **Background Information:**

The purpose of this study is to explore the relationship between taking nature photographs and children's connection to nature.

If you are willing to participate in this study, you will be asked to do the following things:

- A) Dedicate at least 2 class periods (1 hour of total time) over a four-week period in late February/March, towards participating in the pretest and posttest. The pretest will occur at a time designated by the teacher and researcher, and the posttest will occur three weeks later.

#### **Risks and Benefits of Being in the Study:**

There are no significant risks associated with this study. All questionnaires are submitted anonymously, and will only be identified by the school attended. Names will not be connected with this survey in any way. In addition, there are no questions asking for sensitive or potentially harmful information.

The benefit to participation is the ability to help evaluate if tools like digital cameras can impact 8-10 year old children's connection to nature.

Nobody will receive payment, reimbursements, or rewards for participating in this study.

#### **Confidentiality:**

The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Completed questionnaires and any other information obtained during this research will be stored in a locked file in my residence. Only myself and my advisor will have access to completed questionnaires. Upon completion of the research, all questionnaires will be destroyed.

#### **Voluntary Nature of the Study:**

Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota Duluth, or your school, or anyone in the school. If you decided to participate, you are free to withdraw at any time without affecting those relationships.

#### **Contacts and Questions:**

The researcher conducting this study is Seth Spencer. If you have any questions, you may

contact Seth at 2516 Livingston Ave. Duluth, MN; Phone: (218) 409-9079. If you have further questions, you can contact my advisor, Ken Gilbertson, Ph.D. at 218-726-6258.

**Statement of Consent**

I have read the above information. I have asked questions and have received answers. I give my consent for participation in this project.

Signature \_\_\_\_\_

Date \_\_\_\_\_

Signature of Investigator \_\_\_\_\_

Date \_\_\_\_\_



## Appendix E

### Form of Parental Permission: Treatment Group

#### **Dear Parent,**

Your child, who is a student in \_\_\_\_\_ classroom, is invited to be in a research study to explore the relationship between using digital nature photography and developing a connection to nature. Your child was selected as a possible participant because they are a student at (PUT NAMES OF SCHOOLS). I am asking that you read this form. Please fill out this form and send it back to your child's teacher by STATE THE DATE if you do NOT give consent for your child to participate in this study,

This study is being conducted by: Seth Spencer, Graduate Student, University of Minnesota Duluth.

Contact: 218-409-9079

E-mail: spenc353@d.umn.edu

#### **Background Information:**

The purpose of this study is to explore the relationship between taking nature photographs and children's connection to nature. Your daughter or son will be asked to answer a short questionnaire (16-questions) about their own feelings about nature before and after the program

#### **Procedures:**

If you agree to be in this study, your daughter/son will do the following things:

One week prior to the program, during your son's or daughter's normally scheduled class, they will complete a sixteen (16) item questionnaire about how they feel about nature. This questionnaire will take approximately twenty minutes to complete. They will then participate in the Minnesota Department of Natural Resources "Digital Bridge to Nature Program", which involves going outside twice in a 2-week time-period and they will use digital cameras to photograph things that are of interest to them in nature. One week after the program they will take the sixteen (16) item questionnaire again.

If you or your son/daughter choose **not** to participate in this study, they will remain in the classroom and spend the time silently reading a book of their choice. It will have no effect on their progress in school if they choose to not participate.

Your son or daughter will remain completely anonymous in this study and the questionnaire will not ask any questions that might be perceived as a threat or ask for sensitive information. **NO STUDENTS will be identified by their pictures, and pictures will only be seen by myself and my advisor.** There will also be no direct benefit to participants of the study.

Please contact your child's 4<sup>th</sup> grade teacher if there are any specific questions.

*If you have any questions or concerns regarding the study and would like to talk to someone other than the researcher(s), you are encouraged to contact the Fairview Research Helpline at telephone number [612-672-7692](tel:612-672-7692) or toll free at [866-508-6961](tel:866-508-6961). You may also contact this office in writing or in person at Fairview Research Administration, 2433 Energy Park Drive, St. Paul 55108.*

Again, only submit this form if you do **NOT** approve your son or daughter to participate in this study.

Your name: \_\_\_\_\_ Date: \_\_\_\_\_

Your signature: \_\_\_\_\_

## Appendix F

### Form of Parental Permission: Control Group

#### **Dear Parent,**

Your child, who is a student in \_\_\_\_\_ classroom, is invited to be in a research study to explore the relationship between using digital nature photography and developing a connection to nature. Your child was selected as a possible participant because they are a student at (PUT NAMES OF SCHOOLS). I am asking that you read this form. Please fill out this form and send it back to your child's teacher by STATE THE DATE if you do NOT give consent for your child to participate in this study.

This study is being conducted by: Seth Spencer, Graduate Student, University of Minnesota Duluth.

Contact: 218-409-9079

E-mail: spenc353@d.umn.edu

#### **Background Information:**

The purpose of this study is to explore the relationship between taking nature photographs and children's connection to nature. Your daughter or son will be asked to answer a short questionnaire (16-questions) about their own feelings about nature before and after the program

#### **Procedures:**

If you agree to be in this study, your daughter/son will do the following things:

Sometime during late February, during your son's or daughter's normally scheduled class, they will complete a sixteen (16) item questionnaire about how they feel about nature. This questionnaire will take approximately twenty minutes to complete. Three weeks later they will take the sixteen (16) item questionnaire again to see if their feelings about nature have changed.

If you or your son/daughter choose **not** to participate in this study, they will remain in the classroom and spend the time silently reading a book of their choice. It will have no effect on their progress in school if they choose to not participate.

Your son or daughter will remain completely anonymous in this study and the questionnaire will not ask any questions that might be perceived as a threat or ask for sensitive information. There will also be no direct benefit to participants of the study.

Please contact your child's 4<sup>th</sup> grade teacher if there are any specific questions.

*If you have any questions or concerns regarding the study and would like to talk to someone other than the researcher(s), you are encouraged to contact the Fairview Research Helpline at telephone number [612-672-7692](tel:612-672-7692) or toll free at [866-508-6961](tel:866-508-6961). You may also contact this office in writing or in person at Fairview Research Administration, 2433 Energy Park Drive, St. Paul 55108.*

Again, only submit this form if you do ***NOT*** approve your son or daughter to participate in this study.

Your name: \_\_\_\_\_ Date: \_\_\_\_\_

Your signature: \_\_\_\_\_

## Appendix G

### Teacher Solicitation Script

This script is to be given to all teachers administering the student questionnaire to students who agree to participate in this study.

Dear Teachers,

Thank you again for agreeing to participate in this study. I am very grateful. The following information should help you as we all move forward in the project. If at any time you have questions,

please feel free to contact me:

Seth Spencer

[sfspencer@gmail.com](mailto:sfspencer@gmail.com)

218-409-9079

I will drop off all questionnaires and other necessary materials prior to the study beginning.

All students must participate in this study voluntarily, and their guardian must not have returned the parent permission form, which is a form of Non-Consent (meaning that forms should only be returned if the child's parents/guardian does NOT want their child to participate in the study). These forms will be given to teachers two weeks prior to the study starting. Teachers will send the forms home with the children to give the parents/guardians information about the study. They should be returned by Monday, February 6<sup>th</sup> to you, the teacher.

All students opting not to participate should be kept in the classroom and allowed to engage in sustained silent reading of their choice while the rest of the class completes the questionnaire.

Student assent forms must also be signed by the students to participate in this study. They should read through the assent forms and if they feel comfortable, sign their names, followed by you, the teacher's signature. All student assent forms should be signed by Monday, February 6<sup>th</sup>.

The first round of questionnaires should be given (if at all possible) sometime during Wednesday, February 8<sup>th</sup>. The questionnaire should take approximately 20 minutes, but please do not rush students who are taking longer.

What to say to your students about this Questionnaire:

*We have an opportunity to participate in a study about the environment. Each of you will receive a questionnaire asking you questions about the environment. This is not a test. It is important that you write how YOU feel about the question. You will not be timed on this, so take time to think carefully about each question.*

Once all the students are done the teacher will collect the questionnaires and put them in an envelope and seal it. I will pick them up the following day.

**For teachers going through the program:**

One week following the questionnaires being handed out, (sometime during the week of February 13<sup>th</sup>, you will take your students outside for 35-45 minutes and allow them to take pictures of whatever they want. Two weeks after this, sometime during the week of February 27<sup>th</sup>, you will repeat the process and take your students out side again. *When you return from being outside, please have the pairs of students choose their top 10 pictures, and upload them onto a computer, flash drive, etc. This is an important step because the pictures will be used as data during the research process*

On Tuesday, March 6<sup>th</sup> (if at all possible), you will give your students the same questionnaire as before, with one question added asking about their feelings about taking pictures of nature. As before, I will drop the questionnaires off beforehand and pick them up the day after being filled out by the students.

**For teachers in the “control group”:**

Four weeks after the first questionnaire, on Tuesday, March 6<sup>th</sup>, your students will be asked to fill out the same questionnaire as before, with one question added asking about their feelings about taking pictures of nature. As before, I will drop the questionnaires off beforehand and pick them up the day after being filled out by the students.

Again,

Thank you for all your time and help, I appreciate it more than you know.

Sincerely,

Seth Spencer

Graduate Student

University of Minnesota Duluth

218-409-9079

## Appendix H

### Student Assent Forms: Treatment Group

#### Cameras and Nature Study

We are asking if you are willing to fill out two questionnaires about how you feel about nature, and use cameras at least twice in class, because we are trying to learn more about what how children feel about being outside.

Because you are a 4<sup>th</sup> grade student in a Duluth public school, we are asking if you want to be in this study. We want to learn why some children like being outside and some don't. We also want to learn what makes children excited about going outside.

If you agree to be in this study, we will ask you to fill out two questionnaires, one in mid-February, and one in mid-March. We also will ask you to use cameras in your classroom under the supervision of your teachers at least twice in late February.

*If* you change your mind during the study, you can always back out and do silent reading while other students participate. Being in this study is totally up to you, and no one will be mad at you if you don't want to do it.

You can ask any questions that you have about this study. If you have a question later that you didn't think of now, you can ask us next time.

Signing here means that you have read this paper or had it read to you and that you are willing to be in this study. If you don't want to be in this study, don't sign. There will be no harm to you by being a part of this study. Remember, being in this study is up to you, and no one will be mad at you if you don't sign this or even if you change your mind later.

Signature of participant \_\_\_\_\_

Signature of person explaining study \_\_\_\_\_

Date \_\_\_\_\_

## Appendix I

### Student Assent Forms: Control Group

#### Cameras and Nature Study

We are asking if you are willing to fill out two questionnaires about how you feel about nature, because we are trying to learn more about what how children feel about being outside.

Because you are a 4<sup>th</sup> grade student in a Duluth public school, we are asking if you want to be in this study. We want to learn why some children like being outside and some don't. We also want to learn what makes children excited about going outside.

If you agree to be in this study, we will ask you to fill out two questionnaires, one in mid-February, and one in mid-March.

*If you change your mind during the study, you can always back out and do silent reading while other students participate. Being in this study is totally up to you, and no one will be mad at you if you don't want to do it.*

You can ask any questions that you have about this study. If you have a question later that you didn't think of now, you can ask us next time.

Signing here means that you have read this paper or had it read to you and that you are willing to be in this study. If you don't want to be in this study, don't sign. There will be no harm to you by being a part of this study. Remember, being in this study is up to you, and no one will be mad at you if you don't sign this or even if you change your mind later.

Signature of participant \_\_\_\_\_

Signature of person explaining study \_\_\_\_\_

Date \_\_\_\_\_



## Appendix J

### Qualitative Responses

#### By taking digital pictures, how do you feel about nature?

##### Treatment School C

- 1) I fell happy about nature why because you can see flowers and the people their. You can clean up the environment (sic).
- 2) I like nature because you never know whats thell do next (sic).
- 3) I feel good about nature. I feel very lucky that there aren't many tall buildings and smoke for pollution, and that I get to see the stars every night out my window, and get to make a wish.
- 4) I feel much more connected with nature. I have not noticed a lot of things out side intill we took pictures (sic).
- 5) Takeing pictures out side make me feel happy ant peaceful. I like how nature is so cool kow looks cool (sic).
- 6) I feel good and happy. I love to see flowers and green grass. I like to see deer (sic).
- 7) I like being outdoors because I like the smell of nature. I love garding because it's fun and I love it (sic).
- 8) I make me feel happy nature. I like going outside (sic).
- 9) I feel like people can save the world. And we showed people by taking pictures that nature can be wonderful in different ways.
- 10) I feel good when I take pictures of nataur. I like it it is nice to go injoy the inviermint (sic).
- 11) It makes me feel happy. Also outdoors you can have fun like riding bikes.
- 12) I feel grateful that I have a chance to do this. Seeing nature makes me happy and we need to keep our planet safe.
- 13) I feel like Im with nature. I feel like Im home (sic).
- 14) I feel good because it might inspier people to like natuer (sic).
- 15) I feel very excited when I take pictures. I also feel very happy to be outside.
- 16) I feel happy because nature is clean. Its good to see the envierment is clean and clear (sic).
- 17) Taking pictures make me feel close to nature. So I can be close to animals. (sic).
- 18) I feel that taking pictures in nature was awesome and fun. I feel that it is a good thing to take pictures outside.
- 19) It makes me feel good. I get to show my artistic vision.
- 20) I feel about nature. Nature makes me happy about the world. If we did not have natuare I would be mad (sic).
- 21) I feel bad about nicer. I feel happy when I tack pikers (sic).
- 22) I feel the same as I was before. I loved doing it but I feel the same as I was before.
- 23) I feel happy about nature because I take care of them when I garden. I love plants. We wouldn't live without plants (sic).

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- 24) I feel that plants and animals are just like we are it has its needs and we have ours. So really we don't have the right to destroy the natural environment. Because it's really not ours to destroy! (sic)
- 25) Nature is cool, neat and neat. I love nature (sic).
- 26) I really like it!! It's fun and really pretty on the nature trail.
- 27) I feel happy. I feel happy because it is protected.
- 28) Nature is cool. There are all these neat things.
- 29) I feel that some people don't see cool stuff you can do + see. And now I figured that out.
- 30) I feel that it's special.
- 31) It felt to me like I got a better understanding of nature and animals.
- 32) That is awesomely awesome (sic).
- 33) I felt normal.
- 34) I felt great. Because I like to what nature has to offer. And the scenes of art (sic).
- 35) I felt very happy and I felt special.
- 36) How I feel about nature is that people should not be throwing trash on the ground and I think that we should keep it clean.
- 37) No Answer
- 38) Great, good
- 39) I don't know
- 40) It made me feel like I should take care of nature.
- 41) I feel that nature is important (sic).
- 42) It makes me feel happy about taking pictures of cool plants and animals of things you see.
- 43) Fun play full lot of animals around me I feel happy when I am in nature and I feel free (sic).
- 44) When I took pictures of nature I loved it even more! (sic).
- 45) I feel good because I like to build forts and hunt (sic).