

ABSTRACT
NATURE AWARENESS AND SCIENCE ACHIEVEMENT IN MIDDLE SCHOOL:
A CORRELATIONAL STUDY

An Action Research Project
Presented to
The Department of Teacher Education
Johnson University

In Partial Fulfillment
Of the Requirement for the Degree
Master of Arts
In Holistic Education

By
Maegan Freese & Andrew Fultz

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ABSTRACT

The researchers wanted to continue in their university's previous study of nature awareness and science achievement, specifically examining the effects of nature in the achievement of seventh-grade students. This further study offered valuable insight to the inconclusive findings of previous researchers of nature awareness and science achievement. Some studies found a significant correlation, while others found no significant correlation. The researchers tested for correlation between students' level of experience in nature and their science achievement scores on a standardized test.

Using research from Kellert (2005), Louv (2006), and Kolb (1984), the researchers believed the level of students' experience and contact with nature significantly correlate to their science test scores. The researchers tested direct, indirect, and vicarious experiences with nature that students might encounter. Using the instrument, with only a few modifications, from Chandler and Swartzentruber (2011), the researchers tested groups of seventh-grade students from two different schools. The survey was given twice, and the researchers determined its significant test-retest reliability.

One of the schools used the TCAP exam, and the other school used the SAT to measure students' knowledge in the area of science. In order to compare the scores from two different tests, the researchers standardized the raw scores by calculating z -scores. With the z -scores and the student scores from the Nature Awareness Survey, the researchers performed a Pearson correlation. The data revealed no significant correlation

between the students' nature awareness and the standardized science test scores. The researchers retained the null hypothesis.

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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS.....	iii
Chapter	
1. INTRODUCTION.....	1
Significance of the Problem.....	1
Research Problem.....	3
Purpose Statement of this Study.....	4
Definition of Terms.....	4
Previous Studies.....	5
Deficiencies of Previous Studies.....	6
Theoretical Foundations.....	7
Limitations.....	7
Assumptions.....	8
Hypothesis.....	8
2. REVIEW OF THE LITERATURE.....	9
Introduction.....	9
Nature of Middle School Students.....	9
Experienced Based Learning.....	13
Nature Deficit Disorder.....	17
Nature Awareness.....	18
Nature and Theology.....	25

Science Education and Achievement.....	27
Learning Environments.....	30
Summary.....	32
3. Methods and Procedures.....	34
Instrument Development.....	34
Instrumentation.....	34
Participants.....	35
Research Design.....	35
Data Analysis.....	35
4. Results.....	37
Analysis of Data.....	37
5. Discussion.....	39
Summary.....	39
Conclusions.....	40
Recommendations.....	41
REFERENCES.....	42
APPENDICES.....	49
A. Letter of Approval from Knox County Schools.....	50
B. Letter of Approval from The King’s Academy.....	51
C. Parental Permission Form.....	52
D. Nature Awareness Survey.....	53

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Chapter I

Introduction

Significance of the Problem

Within modern western culture, as Bob Dylan most famously wrote and sang, “the times they are a-changin.” This most certainly rings true with the experiences of children. With homes, classrooms, and churches filled with technological devices, children do not often spend extended periods of time outdoors. Unlike the previous generations of students, contemporary learners rely more on computers and other machines than all other generations combined. Video games, television, and high definition movies become more and more common in households across the United States. Within this context, Louv (2006) describes a concept known as “nature deficit disorder,” which means losing precious experience in nature for various reasons. This theory spurs many researchers, including this study, to examine the role of the environment specifically in education, looking for any points of concern within utter dependence upon technology.

The natural world becomes extremely important when educators, parents, and legislators consider the rise in obesity, the importance of an environmental experience, and the rapid depletion of the environment in the industrial world. Many contemporary scientists label the modern epidemic as obesity alone despite the obvious health risks involving large quantities of fat. Crosnoe (2007) labels obesity as not just a health issue, but also an educational one. He cites studies which reveal obese girls in high school as less likely to enter college than their peers. Obesity stems mainly from a lack of exercise,

which arguably connects a decrease in outdoor play with the rise in obesity across modern America.

The importance of environmental experience thus becomes crucial for children to compete with students from other nations. Kahn (1995) believes even minimal experience in nature can reduce immediate and long term stress. Indeed, looking at nature even through a window increases productivity and health in a work place. With almost any other issue, researchers would have an abundance of time to adequately probe the connections between nature and education, especially science education. Considering nature depletion, however, time does not favor the researchers. Wilson (1993) clearly states, “our ignorance could be regarded as just one more blank space on the map of academic science, awaiting genius and initiative, except for one important circumstance: the natural environment is disappearing” (p. 35). We understand the importance of nature in education, but also as we lose the natural world, so researchers must act quickly in order to discover any connection and help save the environment.

Among previous research articles and journals, few studies address the relationship between experiences in nature and science achievement. An abundance of research exists in outdoor education, making a classroom or school garden, using gardening to make science more hands-on, the importance of prior knowledge in academics, and applying Dewey’s experiential education theory and Kolb’s experiential learning theory. However, few studies deal specifically with the role of nature awareness and attitude in shaping and impacting science scores. The research needs further development and exploration regarding the previous studies directly relating to nature awareness and science achievement. This concept, nature awareness and science

achievement, needs more data and research in order to shape current educational practices.

If researchers identify any significant connection between nature awareness and science scores, then teachers, parents, and administrators would perhaps take more seriously the role of the natural world in education. If a connection exists, parents would find encouragement to send their children outdoors instead of allowing them to sit on the couch playing video games. This would certainly help fight childhood obesity. If a connection exists, the depleting natural world would become crucial to the future of the human species, thus helping conservation and preservation efforts. If a connection exists, students will once again play outside and create positive experiences in nature. Research within this topic becomes a priority for teachers and parents.

In this research project, the researchers studied the relationship between students' experiences in nature and standardized science test scores. The researchers examined this relationship by using a Pearson correlation test to determine if any significant relation exists. Students who do not have opportunities to experience nature may have a disadvantage over their peers who possess multiple positive experiences in the natural world, as measured by a nature awareness survey.

Research Problem

This study sought to determine whether a significant relationship exists between middle school students' experiences in nature and their performance on the standardized science tests.

Purpose Statement of this Study

The purpose of this survey study was to test the theory of experiential education that relates nature awareness and attitudes to science achievement. This study took place in two East Tennessee middle school classrooms. Nature awareness was defined as a child's background experience and knowledge about the natural world. Science achievement was defined by the scoring system of Tennessee's standardized testing, formally known as Tennessee Comprehensive Assessment Program (TCAP) and a nationally-scaled SAT exam for middle school students.

Definition of Terms

Automaticity. Nettles (2006) describes automaticity as the automatic processing of information in response to stimuli that is involuntary and occurring without conscious control.

Biophilia Hypothesis. "Biophilia is the innately emotional affiliation of human beings to other living organisms" (Wilson, 1993, p. 31).

Environmental education. The National Environmental Education Advisory Council (2005) defines environmental education as taking learned content, skills, and expertise to address the challenges of real world issues and problems, encouraging personal and civic responsibility.

Environmental literacy. "Environmental literacy is the capacity to perceive and interpret the relative health of environmental systems and to take appropriate action to maintain, restore, or improve the health of those systems" (Roth, 1992, p. 17).

Informal learning. This refers to activities that occur outside the traditional school day. Informal learning is voluntary and not mandatory in nature. This type of

experience may seek to meet a set of objectives, convey information, change behavior, or spur one to action.

Nature awareness. Nature awareness is the level of experience and knowledge a student possesses about how the natural world operates. This includes, but is not limited to, flora, fauna, soil, water resources, rocks, etc.

Nature deficit disorder. Louv (2006) describes nature deficit disorder as children losing valuable experience in nature because they are not spending time outdoors, which will lead to a lack of problem-solving and an adventurous attitude.

Outdoor education. Knapp (2003) considers outdoor education the use of natural or built areas outside the conventional classroom building to accomplish student learning objectives in many disciplines through direct experience.

Schema. This is what children and adults use to represent the world around them (Duplass, 2006). Schema assimilates all areas of life into a meaningful whole.

Previous Studies

At Johnson University, four previous studies addressed the topic of nature awareness and science achievement. Blum, Call, and Lane (2010) found a positive correlation between the two areas in the lower elementary grade levels. These researchers recommended altering a few of the questions in their nature awareness survey as well as comparing a lower income school to a higher income school. The current study sought this alteration.

Mikels, Zink, and Zwakenberg (2010) found informal nature experiences and performance on science tests to be significantly related in lower elementary students.

They did not, however, find significant relations between attitudes and science achievement.

Chandler and Swartzentruber (2011) found significant relations between nature awareness and science achievement, and they used reliable tests to determine validity for their nature awareness instrument. Their study focused on upper elementary students in the fourth grade.

From Johnson University, only Davenport and Sutherland (2011) have tested a correlation between nature awareness and science achievement in middle school students. Their results indicated no significant relation between these two areas.

Deficiencies of Previous Studies

Blum, Call, and Lane (2010) focused primarily on younger grades, and they did not take into account any parental involvement. In addition, the number of questions they used probably did not provide enough data for their level of research. Regarding Mikels, Zink, and Zwakenberg (2010), their attitudes portion of the survey needs further development because they did not find any significant correlation between attitudes and science achievement.

Chandler and Swartzentruber (2011) used science averages instead of a standardized test, but class averages often reflect a student's effort more than actual content knowledge. This study, however, focused on upper elementary students in the fourth grade and did not address middle school learners.

The small sample size used by Davenport and Sutherland (2011) likely did not accurately represent the population. In addition, this study was the first to include middle school students, and the present researchers believe a larger sample size will confirm or

reject their results. Also, this study only tested lower-income students. Research needs more study into a possible difference between lower and higher income schools in regards to nature awareness. Davenport and Sutherland did not test the reliability of their survey instrument, which might explain failing to reject the null hypothesis.

Theoretical Foundations

Kolb's theory of experiential learning, often abbreviated ELT, served as the foundation for this study. His theory, developed in the 1980s, combines crucial aspects from Dewey, Lewin, and Piaget to study the role of direct experience in relation to the pragmatic, sociological, and cognitive development of a child. This theory also assists researchers in studying prior knowledge and active learning in children. Experiential learning indicates that experience plays a central role in the learning process for all children. As applied to the current study, this theory lead the researchers to expect nature awareness and attitude to influence or explain science achievement scores on standardized tests because science in the classroom becomes more meaningful through the students' real-world experience with nature.

Limitations

The participants came from nonrandom seventh grade classrooms. Students attended a particular school due to zoning laws and the administration of a school. The sample, therefore, may not accurately represent the population. One must recognize, additionally, that the sample took students from two different schools. One school existed in a low-income community, and the government funded all the operations. The other school, however, operated within a private, Christian structure. These two different worldviews could have influenced the results of the study. Because the schools contained

two diverse student populations, the study did not take into account parental involvement, although this variable could explain any results found within this study. Finally, science achievement scores were not measured with the same instrument because the schools used different standardized testing materials, but this could alter the research findings.

Assumptions

The researchers assumed all student participants are qualified for seventh grade, and the ability levels of the subjects were normally distributed in the class. They assumed the students' previous science teachers taught the science content to the same extent, and the diverse reading ability of the subjects would not affect their comprehension of the survey. While completing the nature awareness survey, student honesty and accuracy were supported and encouraged, yet ultimately assumed.

Hypothesis

H_1 : A significant positive correlation exists between a student's awareness of nature and his or her performance on standardized science examinations.

Chapter II

Review of the Literature

Introduction

Nature and the natural world could serve students for their betterment. In this literature review, the researchers focused on the relationship between nature awareness and science achievement in the middle school grades. Unlike previous studies in the topic of nature awareness and science achievement, the researchers first provided a background of the nature of middle school students. Second, the researchers explored the concept of experience-based learning. Third, the term nature deficit disorder explained the need for such a study. Fourth, environmental education, including all of its aspects, provided a sufficient foundation for scientific background. Fifth, science education and achievement examined how they relate to nature awareness through prior knowledge and reflection. Sixth, different types of learning environments provided educators a solid distinction between the three areas. Seventh, the researchers provided a concise summary with all the essential information. Overall, this literature review sought to understand the phenomenon of nature awareness and its relationship with science achievement.

Nature of middle school students

Researchers cannot begin any study into areas of middle school life and learning without first understanding the nature of middle school students. During this time in a person's life, typically the ages of eleven to fourteen, tremendous change and growth occurs in the body and mind of adolescents. *Change* serves as the best description for this time period. These students experience cognitive, biological, and social change while transforming from childhood to adulthood. This section does not seek an exhaustive

understanding of these developments; rather it serves as a simple recognition and understanding of the complexities of the subjects.

Cognitive. The ability to reason, which develops around age eleven, allows students to move beyond concrete ideas into more conceptual and scattered ideas at a high level (Howard & Stoumbis, 1970). Middle school students develop at different rates, but in general, once these learners move into the adolescent years, they begin to develop the ability to think logically and critically (Keating, 1990; Piaget, 1965). Unlike most previous research concerning nature awareness and science achievement, researchers must recognize the cognitive development beginning in the middle school years, especially as late as seventh grade. Whether these cognitive developments relate to puberty, brain growth spurts, or some external influence remains a mystery. Another aspect of cognitive development occurs when the frontal lobes of the brain, which determine appropriate responses, mature during adolescence (Sylwester, 2007). Scholars and educators agree that major and significant cognitive development occurs during the middle school years.

Biological. These changes alter the body of the adolescent child, with puberty acting as the source of the main transformations to a child. One author describes the process by writing, “puberty represents a period of dramatic physiological change that is unparalleled in development” (Stice, 2003, p. 61). Another goes on to say “puberty is not a single event, but rather a complex metamorphosis” (Hayward, 2003, p. 1). In puberty, the body changes due to hormones releasing throughout the body. Adrenarche hormones allow the adrenal gland to produce androgen in both males and females. Gonadarche, also known as Gonads, release estrogen in females and testosterone in males during this age

period (Hayward, 2003). Middle school students experience many hormonal and other internal changes biologically.

During this time in children's lives, not only do they experience incalculable internal changes, but the middle school students transform externally as well. Females, usually developing before their male counterparts, undergo breast growth. Males, on the other hand, develop their penis and scrotum areas. Both sexes grow in height and weight, including weight in the brain. Pubic hair surfaces in both male and females. Males usually gain more muscle mass and height than their female peers (Brooks-Gunn & Reiter, 1990). Acne emerges in both males and females. With all of the changes occurring inside and outside of these students' bodies, students often experience stress and feelings of awkwardness. Understandably, these changes often affect learning at this age, and the researchers cannot ignore the biological development at this stage. This brief overview does not summarize the entirety of the biological process of adolescents but helped the researchers better understand their subjects.

Social. "Adolescents continuously search for and evaluate potential partners who will accompany them into adult life. Adolescents are reaching for personal autonomy, but they want friends to be with them when they attain it" (Sylwester, 2007, p. 11). With an understanding that middle school students develop both cognitively and biologically, researchers cannot ignore the social aspect to the middle school years. During the childhood years, forming relationships with parents and other adults becomes a central aspect of social development. During the adolescent years, however, creating friendships with peers becomes more important than adult relationships (Savin-Williams & Berndt, 1990). Social development during adolescence becomes a major facet of their overall

growth. “Youth seek the approval and guidance of parents in forming standards, values, and educational or occupational goals. With friends, they learn of an extrafamilial reality and experience a life that is uniquely their own” (Savin-Williams & Berndt, 1990, p. 278). The researchers understood their subjects’ constant seeking to build friendships with peers and their longing for acceptance by other students.

With the many social challenges of acceptance and building friendships already looming, stress can easily become a problem for these young people. “Adolescence can be disturbing for both the youth and his or her family, as new dialogues, tensions, and dilemmas surface, sometimes unexpectedly” (Hauser & Bowlds, 1990, p. 391).

Disturbing would indeed describe these years for many adolescents. Family values contrasting with the pressure to conform to peer activity can become stressful for any student, especially one already struggling with biological and cognitive changes. One must also consider single-parent families, or family financial concerns, which would lead to additional stress in children. Within this context of social struggle and anxiety, the researchers believed nature experience would help reduce stress.

Attitudes toward school. One might wonder about a student’s attitude toward school, learning, and authority with all of these changes: cognitive, biological, and social. Middle school students face a tremendous amount of pressure and stress in daily life. Moon and Callahan (1999) conducted four surveys examining student attitudes toward middle school and school in general. They found that, regardless of achievement level, students generally do not hold positive attitudes in regard to school and education, although not necessarily learning. In this study, not surprisingly, the high achievers held more positive attitudes than their non-high-achieving peers. The study recommends that

schools create more positive learning environments for their students. Researchers, educators, and parents need to investigate how to make school more enjoyable for these young people by finding ways to reduce stress and anxiety which surface during the day. A study concerning nature awareness and implementation into school life could drastically change these attitudes in a positive manner.

Experience based learning

Experience based learning and education finds many supporters throughout the educational world. This theory for learning developed throughout history, tracing back to Rousseau and Dewey. In addition to historical support for experiential learning, many contemporary education experts, including Kolb, believe children primarily learn by doing or through experience. This increases more so with the advocacy for outdoor education and nature awareness and, ironically, the availability of technology in the modern world. In this section of the literature review, the researchers explored the many studies supporting experiential learning.

Historical support. Learning by doing does not originate in American culture and society. The researchers traced its roots to a few centuries before the birth of the United States. Rousseau (1979) believed students should rely on the tutor's supervision; however, the supervision does not mean a passive role in acquiring knowledge. Not only did Rousseau (1979) praise nature and its importance toward humanity, but he believed education should further develop a sense of self-worth and morality. Technique does not necessarily ensure that the pupil will absorb information and concepts (Rousseau, 1979). Furthermore, the learner must take an active role in education to guarantee genuine learning.

A century ago, Dewey (1963) believed experience lies at the heart of education. “No point in the philosophy of Progressive education which is sounder than its emphasis upon the importance of the participation of the learner in the formation of the purposes which direct his activities in the learning process” (p. 67). A caution emerges, however, toward experience in education. Obviously not all experiences would serve for a positive educational impact. Dewey (1963) also states “the belief that all genuine education comes about through experience does not mean that all experiences are genuinely or equally educative” (p. 25). One of the most impactful motives for advocating experience based learning comes from studying nature awareness. Students could learn a plethora of concepts, facts, or ideas through an experience in nature. Rather than teaching each objective in isolation, direct contact with nature allows students to integrate various concepts at once. Dewey (1963) agrees, writing “perhaps the greatest of all pedagogical fallacies is the notion that a person learns only the particular thing he is studying at the time” (p. 48). Nature would provide an opportunity to learn many facts in one experience.

Further support for experiential learning comes from Piaget, a Swiss educational developmental psychologist who died several decades ago. His ideas, more than anyone else’s, have shaped current educational practice and procedures. One younger child he studied stated that thinking “is with the mouth” (Piaget, 1965, p. 42). This leads educators to conclude that sense experience becomes the most important avenue for children to grasp material. Piaget (1965) certainly expressed the importance of experience and empirical investigation for children, even at a young age. Nature becomes a crucial way for children to have experience in school, and this French researcher’s position would support that type of adventure in school.

Contemporary support. Experiential learning did not end a few decades ago with Piaget and Dewey, but this theory continues into contemporary educational practice. Kolb (1984) believes “learning is the process whereby knowledge is created through the transformation of experience” (p. 38). This leading supporter for experiential learning documents the stages a child goes through in the acquisition of new knowledge. Immediate or concrete experiences serve as the basis for observations and reflections. These reflections turn into abstract concepts, and new implications emerge from them. The newly acquired implications can then endure testing, and they will serve as guides in creating new experiences (Kolb, 1984). This summarizes the theory of experiential learning through the eyes of Kolb.

With such a popular theory as experiential learning, many more people advocate for its implementation than Kolb alone. Kraft and Kielsmeier (1995), in reference and association with experience, state five principles for a society that lacks experience: place, wholeness, identity, integrity, and wildness. A place involves a connection to a specific region where people experience both the benefits and drawbacks. Wholeness implies a healthy balance of many life factors for a person. Identity lets a person know he or she shares commonality with others, but each person holds unique and special qualities to make up their integrity. Finally, wildness refers to freeing oneself from anything which hinders them to express their qualities openly. Viewing experiential learning in this regard helps educators compartmentalize experience in a meaningful and manageable way.

Vadeboncoeur (2003) describes experiential learning as learning by doing, which means the learner or learners can explore the phenomenon under study. In this regard,

students form a direct relationship with the subject matter rather than merely reading about it or encountering it indirectly. In experiential learning, as Higgins (2009) describes, the teacher and the student engage in the same process of learning. This creates community and oneness in the classroom. Creating a reflective, critically aware, and ambitious student becomes the goal of experiential learning (Higgins, 2009). Reflection and review become essential parts of this process. Environmental and ecological processes are ubiquitous, thus making knowledge and understanding through experience rather easily transferable (Higgins, 2009).

Experiential learning permeates elementary, middle, and high school levels because it universally helps students learn the subject-matter in school. Duplass (2006) says students should participate in activities which interest them, thus providing intrinsic motivation. He also believes past experience helps students construct future knowledge. Frazel (2010) suggests the integration of technology use with nature, because “students benefit from the experience of exploring the world around their school with the help of a digital or video camera” (p. 132). Students must develop a personal connection to the material; otherwise they will not genuinely believe it is important. They need to feel a real-world purpose to learning- something easily created through personal experience in nature (Frazel, 2010). Experiential education, or active learning, “is when students are completely engaged in challenging and authentic learning activities” (Ormiston, 2011, p. 19). Within this background of experiential learning, finding a way to experience school becomes a crucial issue, and identifying the importance of nature causes educators to shift or reframe their focus.

Nature deficit disorder

The world's population increases daily, but the planet does not grow any larger. Following this logic, humans need more and more space to survive. This means nature and the environment will constantly lose space to the growing human population. Louv (2006) believes obesity, attention disorders, and depression could come from a lack of nature experiences. Over eight million children in the United States suffer from mental disorders; therefore, all hypotheses deserve careful examination in hopes of finding any relief for the current problems. Louv (2006) calls this lack of experience in the environment "nature deficit disorder." "More time in nature-combined with less television and more stimulating play and educational settings-may go a long way toward reducing attention deficits in children, and, just as important, increasing their joy in life" (Louv, 2006, p. 107). Because modern students do not play in nature as much as previous generations of children, nature deficit disorder claims many contemporary problems stem from a lack of experience in nature.

Louv (2011), five years after his first major work concerning this phenomenon, continues providing evidence and philosophical insight toward a belief that puts nature squarely as the foundation for human flourishing in the coming decades and centuries. He believes humans will recognize their need to appreciate and return to nature because nature deficit disorder will become so prominent humanity no longer will have the ability to deny its validity. He cautions against the ever increasing dependence on technology. With brains constantly looking only at screens from tablets, cellular devices, and computer monitors, people continue to lose mental processing power and creativity. In

the coming century, humanity can and will restore nature to its proper place of importance.

Nature awareness

Nature and the environment in current educational scholarship have become increasingly more popular. Gardner (1999) reframed his discussion of multiple intelligences to include “Naturalist Intelligence” (p. 48). This involves expertise in identifying, classifying, or recognizing the innumerable species which exist in the world. This also involves an ability to discern between good and bad species, and an aptitude to interact with other various living creatures, according to Gardner (1999). This could also include differentiating different cars just by the sound of the engine. Though Gardner just presents a theory with little to no quantitative research for support, nature and the environment does exist as something intrinsically valuable to humans and education.

The Biophilia Hypothesis, known for advocating the essential relationship human beings have with the environment, comes into the forefront because so many believe the lack of nature and its destruction has harmed and will continue to harm humanity. Wilson (1993) describes it this way: “biophilia is the innately emotional affiliation of human beings to other living organisms” (p. 31). Wilson (1993) believes that modern substitutes which try to replace nature do not adequately satisfy the human desire for community and interrelationships with the natural world. He believes the brain itself evolved in the natural world, not one generated by computers and other machines. The brain, and the human holistically speaking, originated in a bio-centric world. According to this hypothesis, humans need nature, especially for educational purposes.

Kellert (1993) advocates human identity and personal fulfillment depend upon a person's relationship to nature. The physical beauty of nature offers a powerful appeal to humans. The natural value from the environment encompasses "a sense of fascination, wonder, and awe derived from an intimate experience of nature's diversity and complexity" (Kellert 1993, p. 45). Humanity longs to satisfy the desire for interconnection and interdependence within nature. Kellert (1993) wants to prove a biological basis for that connection. This finds legitimacy in the fact that "those who inflict in childhood willful harm on animals, are far more likely in adulthood to reveal repeated patterns of violence and aggressive behavior toward other people" (Kellert, 1993, p. 61). Nature serves as not just a biological foundation for values, but it also helps children develop cognitively and emotionally. "A range of adaptational advantages has been cited as resulting from these basic experiences of nature—enhanced physical skills and material benefits, greater awareness, increased protection and security, opportunities for emotional gratification, improved knowledge, and cognitive capacities" (Kellert, 1993, p. 65). Humans certainly have a biological connection to nature in a positive manner.

Nature takes much importance to humans because animal symbolism has become a part of the language. Lawrence (1993) states "the human need for metaphorical expression finds its greatest fulfillment through reference to the animal kingdom" (p. 301). For example, white people have labeled blacks as monkeys or gorillas, or police officers often resembled pigs in the eyes of critics. Obviously these present negative influences from animal references, but positive expressions do exist. Making a beeline, acting like a busy bee, or resembling someone who has gone batty all penetrate the

human conscious through the use of language. This expresses cognitive biophilia as both negative and positive. “The power of biophilia is manifest not only in direct interaction between people and animals but also through the process of symbolizing through animals” (Lawrence, 1993, p. 332). Animals and nature have a direct connection to humanity, even through the use of language.

Louv (2011) makes an important distinction between the level of nature experience and an awareness of nature. This serves as a definition for nature awareness otherwise lacking when discussing an abstract concept. The power of nature and an awareness of the natural world mean living in nature and not just with it. One cannot merely experience nature from the comforts of a computer screen saver or through a window in a cabin; but a person fully embraces and becomes aware of nature by touching it, smelling it, tasting it, and hearing it. All five senses determine whether a person has truly become aware of nature. This in turn will produce health and wellness for individuals, businesses, and entire communities as the current century marches forward.

Outdoor education. Outdoor education serves the purpose to allow teachers, parents, and students direct interaction with nature in meaningful ways during the school day. These outdoor and environmental experiences teach students the basic skills of caring for themselves and others. In addition to their own benefit, the outdoors can help students see the adults in their lives, both teachers and parents, as more than just authority figures. Wormeli (2001) found that outdoor experiences gave students greater peer acceptance and more control of their lives, which creates greater confidence and self-esteem. Wormeli, a middle school teacher, supports many outdoor adventures for

students because the environment always has something new to offer students in terms of learning purposes (2001).

One could easily imagine the benefits for nature awareness in the life of a student, but one particular study investigated whether nature makes a positive difference in the lives of juvenile offenders. A study conducted by Russell and Walch (2011) found the test scores of these troubled young men and women increased over six months due to exposure to natural surroundings. Russell and Walch (2011) explain that wilderness and adventure programs effectively serve as therapeutic interventions for adolescents. If an awareness of nature helps juvenile offenders, researchers believe the environment has the ability to help all children reach their full potential.

In a high school setting, one teacher had the opportunity to offer an elective course doing field work in an ecological setting (Griset, 2010). This experiment, called Project Learning Tree and Project Wet, yielded tremendously positive results. The teacher debunks the main caution for most educators when thinking about outdoor education: behavior problems. Griset (2010) reports no behavior problems occurred during the duration of the course and found that the environment helps build self-esteem. It also makes students realize they function as part of something bigger than themselves. Students reported their appreciation for the complexities and curiosities of the natural world greatly increased. Outdoor education benefits students by allowing them to find significance and intrigue in the many facets of life.

The environment benefits not only juvenile offenders and high school students, but it also provides a way for primarily urban students to interact with nature in a meaningful manner. Peters (1994) states, “commons, parks, wooded areas, ponds, and

shore-lines provide opportunities for urban students to conduct field-based studies, and to collect flora, rocks, and water samples for later studies in classrooms” (p. 3). Field trips, films about nature, and walks through nature can help urban students who would not have the opportunity to experience nature otherwise. This increases the potential for these students to support environmental protection and advocacy because of those experiences. Even urban students benefit from nature and outdoor education.

Studies conclude and explain the many benefits of outdoor education over a long period of time, but does an experience in nature over a short time period offer any benefit? Drissner and Hille (2010) evaluated the concept of a green classroom by having small animals and other creatures present in the classroom. They measured the attitudes of students with a questionnaire, examining whether these direct contacts with parts of nature improved attitude or not. The results indicated a positive change of attitudes towards the utilization of nature, but attitudes regarding its preservation did not change significantly (Drissner & Hille, 2010). Regardless, students in this classroom began to see the value of nature, which will undoubtedly raise intrinsic motivation to learn more about the environment.

The situation in America today presents a startlingly reality that schools do not value outdoor experiences for their students. Rivkin (1998) reports that cars and roads have almost eliminated safe outdoor play for many children in the United States. Most schools either have outdoor space as asphalt or just plain grass. Rivkin (1998) believes greenways could provide a safe and meaningful outdoor experience for many children. She also advocates more careful land development specifically for children, and regulating traffic needs through the use of speed bumps, lowered speeds, and restricted

access around the school property. Schools must take action to make available safe and secure outdoor education opportunities for their students.

Increases conservation. Conservation of nature embodies an American trademark, while at the same time, environmental degradation plagues almost all areas of the country and the world. Wilson (2003) explains this environmental degradation through five areas: habitat destruction, invasive species, pollution, population, and overharvesting. For example, in Hawaii before humans arrived on the island, experts estimate over one hundred species of birds only known to that island existed. In modern time, only thirty-five remain, with twenty-four of those classified as endangered (Wilson, 2003). Within this context, along with countless other examples of environmental degradation, scholars begin to research ways to increase conservation and allow nature to thrive once again alongside humanity.

Nature has a cognitive and emotional pull on humans which often results in a sense of wonder and imagination (Kahn and Kellert, 2002). Orr (1993) challenges teachers to “reshape education in a way that fosters innate biophilia and the analytical abilities and practical skills necessary for a world that takes life seriously” (p. 433). He continues by prophesying that “if we complete the destruction of nature, we will have succeeded in cutting ourselves off from the source of sanity” (p. 437). Children, when they experience nature, learn to love it and care for it. Since children today spend very little time outdoors, they do not know the environment and nature. Students through experience with the natural world can learn to care for living creatures (Rivkin, 2000). This increases conservation and helps preserve the environment.

Improves test scores. The belief that nature awareness positively influences science achievement motivated the present study, but has anyone else really found any significant results to support such a claim? Blair (2009) believes personal experience and observation of nature and the environment exist as the building blocks for classroom enrichment. In her study, school gardening allowed students to experience growth and decay, predator and prey relations, pollination, carbon cycles, soil morphology, and a host of other aspects within science. Exposure to nature and gardening in childhood helps to shape adult attitudes and values, and experiential learning effectively stimulates higher orders of cognitive thinking. In the study Blair (2009) performed, she found that nine out of twelve studies revealed a positive difference in test measures between students who participated in gardening and those who did not participate. In this instance, school gardening increased science scores in all reported areas.

Improves attitudes. Direct contact with the environment helps to improve the attitude of a child toward it. Drissner and Hille (2010) found improved attitudes toward the value of nature when children directly saw small animals. The students learned to value the interdependence of life. Attitudes, however, will never fully change until a fear of some animals and wildlife diminishes. This concept of fear of wildlife and nature, known as biophobia, will continue to negatively alter attitudes of students until they experience the entirety of the natural environment. Though biophobia has a partly genetic basis, it can also occur from dangerous animals. Examples include snakes and spiders, which have threatened humans throughout evolution (Ulrich, 1993). In the same way, students need to experience water features in order to alleviate biophobia. These aspects

of nature can elicit especially high levels of liking or preference and begin the process of improving the attitude. Biophobia does not have to ruin one's outlook toward nature.

Kimbell, Schuhmann, Brown, and Kellert (2009) believe children lack a sense of appreciation for the natural world because they do not experience it. Physical experience and direct contact become the only avenues for attitudes to improve toward nature and the environment. Education must provide that avenue for increased attitude toward nature. "Merely to know the physical world well enough to get along with it requires a vast amount of education" (Thorndike & Gates, 1929, p. 34). If only getting along with the physical world requires education, then schools must foster an environment where students become familiar with nature. Living in or near nature enhances a person's physical and mental well-being (Kellert, 2005). When the environmental literacy of a student increases, so will their attitude toward nature.

Nature and theology

At this point in the literature review, the researchers include a spiritual and theological aspect for the importance of nature. Coming from a Christian educational institution, they felt the need to address the theological component of "creation" and how it relates to humanity. Undoubtedly, an in-depth analysis of nature and theology across all religions and sects exceeds the interests of the current project; so the researchers identify their approach as from a traditional, Protestant background. The researchers also recognize the vast amount of biblical literature concerning the topic of nature. Regrettably, only a few select passages warrant merit in the literature review. With that understanding, the Bible presents nature as a vital factor for both displaying the glory and handiwork of God as well as mankind's responsibility to creation.

The discussion of nature in the Bible begins in Genesis 1 (New International Version, 1984). The biblical text teaches creation of all life and material as a direct act of God. This includes the sun, moon, stars, vegetation, fish, animals, and humans. One should note, however, according to the Genesis account, man and woman exist as special creatures apart from all other life forms in the universe. After all life began, God marveled at his work, found the goodness within it, and began to rest from the act of creation. The opening chapter in the opening book of the biblical canon indicates the value of nature, humanity, and their interrelatedness.

Psalms 19 depicts two governing forces for how humanity views God and how humanity responds to God. The first governing force comes directly from nature and the natural world. "The heavens declare the glory of God; the skies proclaim the work of his hands" (Psalm 19:1). The author of this passage does not likely believe the universe, space, or clouds literally sing or talk to humans, telling them about God and his characteristics. The author here uses personification to teach the reader theological beliefs. The second governing force, the law and scriptures, offers more details about a particular deity- in this instance, the Judeo-Christian God. "The law of the Lord is perfect, reviving the soul. The statutes of the Lord are trustworthy" (Psalm 19:7). Here the reader learns about the attributes of the Judeo-Christian God; whereas with nature the reader learns about the existence of a deity.

The final passage under examination comes from Paul the Apostle, where he writes beautifully concerning nature.

For the creation was subjected to frustration, not by its own choice, but by the will of the one who subjected it, in hope that the creation itself will be liberated

from its bondage to decay and brought into the glorious freedom of the children of God. We know that the whole creation has been groaning as in the pains of childbirth right up to the present time. (Romans 8:20-22)

The researchers interpret this verse as an expectation of the cosmos for Jesus, the Judeo-Christian God, to redeem it from the present sufferings of death and decay. The illustration of childbirth represents a future hope of restoration and renewal for all of life. This shows the importance of value of creation, because on a future day of redemption, Jesus will not destroy his own created order.

The researchers acknowledge as limited their attempt to convey biblical teachings and doctrines concerning nature and its importance in relation to deity. Hopefully, even this small bit of biblical evidence might illuminate the spiritual connection among nature, humanity, and the divine. Ignoring a theological perspective could greatly alienate many people from the urgency and foundational ethic of viewing the worth of the natural world.

Science education and achievement

Science instruction in the United States remains a pivotal part of school curriculum going into the twenty-first century. With the recent explosion of technological devices and tools which impact the daily life of people, scientific inquiry and understanding must stay in the forefront for all educators. In fact, students must learn the nature of science throughout their education because they must have the ability to assume many scientific-related professions (Parker & Gerber, 2000). Educators must search out any avenue available to help students improve their grasp of science, especially in the

middle school years. The United States cannot afford to see students lag behind in the realm of scientific achievement.

In science classrooms, students have the opportunity to learn through an activation of knowledge already obtained, searching out answers through reflection, and experience learning outside the traditional classroom walls. Most importantly, experiences in nature help students view science in a totally different manner. Murphy, Murphy, and Kilfeather (2011) reported students increasing science scores and attitudes by actually participating in scientific activities. Often, lab materials become costly, and nature awareness would present an opportunity to gain beneficial experiences with less financial cost involved. Educators could transform how their students view science, the environment, and the importance of education through active learning within the science curriculum.

Activating prior knowledge. A person's literacy comprehension depends upon the use of prior knowledge. This same principle reaches into every facet of the educational curriculum. When a student experiences nature, he builds a schema which can help him implement valuable prior knowledge into a science classroom. According to Mariotti (2010), one of the most important factors contributing to the learning and growth of students comes from building and accessing prior knowledge, whether in literacy or science instruction. Educators must capitalize upon the past experiences of their children in order for them to reach full potential.

Children have roughly six hours between the time they come home from school and the time they go to bed. Students, therefore, spent a great deal of their time away from school. During this time, they collect a variety of experiences to bring to the

classroom. Devitt (2011) believes, “The assessment process truly begins by understanding what ideas students are bringing to the classroom. Whether children come to the classroom with accurate representations or misconceptions of natural phenomena, they nonetheless hold personal ideas that are important to them” (p. 46). Dochy, Segers, and Buehl (1999) surveyed over 150 research articles discussing prior knowledge, finding a significant amount of positive results for the practice.

Prior knowledge comes through experience, viewing, seeing, touching, and all of the other senses. Students can build a prior knowledge of plants or insects by running through a field or garden. Fontichiaro (2010) states “new learning builds on prior knowledge” (p. 12). The past experiences and inquiries of children help them make sense of new information and techniques. Rupley and Slough (2010) believe prior knowledge provides an easier route for students to learn science compared to students with no background or experience with this particular subject.

Learning through reflection. Educators may teach science through different procedures, but a reflection approach to science education remains a crucial aspect for all teachers. Fontichiaro (2010) suggests reflection as a great avenue for teachers to come full circle with students, going from prior knowledge to a reflective stage in the lesson. McDonald and Dominguez (2009) believe reflection exists as part of the critical thinking process, especially when a student makes a personal decision about the topic or field under consideration. This helps students make personal connections from the classroom textbook to real world scenarios. Most importantly, reflections provide an excellent tool for teachers to assess the learning of a student. It gives a glimpse into the mind of a child. Nature, because of the wonder and beauty, provides a superb subject for reflection.

Learning environments

Learning does not take place in just one location. Acquiring knowledge and information occurs in many different scenarios. Most often, learning does happen inside the walls of a traditional classroom setting; however, educators cannot ignore the possibility for learning outside a school building. This could occur at home, the bus stop, the outdoors, or a number of other places a student experiences throughout childhood. A child's background in nature influencing his or her science achievement makes a compelling argument in favor of the idea that learning does, in fact, frequently take place outside the regular classroom. Therefore, in order to understand how nature awareness influences the science scores of a student, educators must examine the three types of learning environments every student encounters; because studies show the learning context holds as much importance as the method of instruction.

Evaluating the environment in which learning takes place becomes crucial, because differentiating the classroom context improves the education for the entire class. A given student prefers a learning environment different from the preferences of his or her teachers and peers. Chang, Hsiao, and Chang (2011) studied the impact of learning environments upon a child's education. They analyzed a high school earth science class's achievement and attitude toward a subject when the students studied it within their preferred learning environment. This study found students' earth science achievement and positive attitude greatly increased when in differentiated learning environments. Students prefer and excel in various learning environments, so educators must provide those various contexts to promote successful pedagogy with their students.

Formal. The term formal education mostly refers to the learning which takes place inside the traditional classroom setting. Hofstein and Rosenfeld (1996) also associate the terms structured, teacher-led, assessment-based, close-ended, curriculum-based, empirically-measured outcomes, and a host of others, with this education environment. Unfortunately, most students' school experience only includes this one-third of the potential environment variety, and the students thus develop a limited spectrum of learning and cognitive growth. The solitude characteristic of the formal environment does not develop the sense of wonder, enthusiasm, or intrinsic motivation encouraged by the other two environments. Formal learning environment should exist to propel students with a factual foundation for learning to take place in the informal and nonformal environments.

Informal. This term involves any learning taking place outside the traditional classroom. The literature remains unclear about a clear and concise definition of this term, but most scholars believe it involves a combination of many environments outside the school building. This could include national parks, natural history museums, local zoos, botanical gardens, educational campgrounds, science museums, nature centers, and a host of other possibilities. Informal learning could also involve anything outside of school, including home or other similar contexts. Hofstein and Rosenfeld (1996) believe "human beings learn science from a variety of sources, in a variety of settings, and for a variety of reasons" (p. 2). This would involve field trips sponsored by the school or parent organization for the sake of education, but does not necessarily describe a mandatory experience.

Informal learning experiences, as stated earlier, involve mostly field trips. These experiences involve a voluntary aspect to each of the trips. Hofstein and Rosenfeld (1996) list many characteristics of an informal learning environment such as: unstructured, unsequenced, nonassessed, open-ended, learner-led, learner-centered, out-of-school context, non-curriculum based, many unintended outcomes, less directly-measurable outcomes, and social intercourse. Informal learning experiences can help improve the attitude and achievement of students across the world. Often, informal learning has the capability to supplement and complement the formal learning environment.

The informal or nonformal learning experiences can often occur through accidental encounters throughout the day. As expressed earlier, the action must remain learner-centered in order to continue in the life of a student. In fact, learners can leave this environment at any moment because they control their level of participation. To contrast, a faction of the Boy Scouts or other community organization cannot enforce attendance upon young learners. Informal learning, however, never really ends in the life of a student; because every life experience offers an opportunity to learn and grow. Etllng (1993) believes that informal learning occurs when a child learns to speak by listening to adults, and the scholar advocates that parents and educators must become flexible when approaching education opportunities in the informal learning environment.

Summary

This literature review sought to report various findings to provide a basis for the current correlation study involving nature awareness and science achievement in middle school students. The nature of middle school students presents a complex combination of

cognitive, biological, and social changes taking place within and outside their body, while also considering the general attitude of the students toward school and education. Next, the researchers gathered historical and contemporary support for the role of experience in education. Students truly learn by doing, and this literature review supports the theory of experiential education. Next, nature deficit disorder and the concept of nature awareness hold a crucial role in modern educational philosophy because of the depleting resources found in the environment. By experiencing nature, students learn to appreciate it, while simultaneously improving test scores. Next, the researchers examined exactly how nature awareness improves science achievement through activating prior knowledge and reflecting upon the beauty of nature. Finally, the researchers contrasted formal and informal learning environments, as well as the importance of providing both opportunities to every student.

Chapter III

Methods and Procedures

Instrument Development

Due to the qualitative nature of human experience and measurement of human interest, the researchers used a survey to collect data in this study as their colleagues have done similarly in previous studies. They implemented the survey developed by Chandler and Swartzentruber (2011), since its implementation demonstrated a significant test retest reliability. Although, since the former study included fourth-grade participants and this study included seventh-grade participants, the researchers modified survey questions fifteen and sixteen for a more age-appropriate response. Question fifteen became “Have you ever watched a TV show about people in nature (*Man vs. Wild, Survivor, etc.*)?” Question sixteen became “Have you ever owned a Silly Band shaped like any animal?” Aside from those minor modifications, the researchers used the identical survey form.

Instrumentation

The researchers provided each of their seventh-grade students with a copy of the nature survey on paper, which the students completed by hand using their own pen or pencil. The researchers explained the three-option response for each question posed about a different experience in nature, including yes😊, yes😞, or no. The yes😊 indicated the student had the experience and a positive association with the experience. The yes😞 indicated having the experience but a negative association with the experience. The answer no indicated not having the experience. Every student heard each survey question read aloud and received an opportunity for question clarification to ensure total reading

comprehension of the survey. The researchers collected the completed surveys individually to ensure the completion of each question.

Participants

The seventh-grade students who participated in this study attended a public middle school in an urban area of East Tennessee and a private Christian school in a suburban area of East Tennessee. Written parental consent for the students' participation in the study provided a sample size of 69 students. This sample excluded the students permitted to participate, but who also completed a modified TCAP assessment. The researchers chose to discard the data of those students in order to remove the confounding variable from this study.

Research Design

The student participants completed the nature survey during the week of January 23-27 and as a retest during the week of February 21-24. The researchers calculated each student's nature awareness score from the survey response by assigning zero points to each question marked no, one point for a yes marked with an unhappy face, and two points for yes marked with a happy face. From the two sets of results, the researchers calculated the test-retest reliability of their instrument and decided the test survey data reflected the most accurate sample. Each student's averaged survey score was then compared to the standardized science test scores— TCAPs in the public school and SATs in the private school.

Data Analysis

In order to accurately compare the standardized scores of the TCAP and SAT exams, the researchers calculated z -scores in both sets of raw scores. The z -score and

nature awareness score from each student then provided the data in a test for correlation. The researchers applied a Pearson correlation to determine if correlation exists between students' standardized science test scores and nature awareness.

Chapter IV

Results

Analysis of Data

The research project sought to determine whether a correlation exists between students' experience in nature, determined by a nature awareness score, and their standardized test science scores. This study spanned six weeks and included seventh-grade students from two schools.

Due to the significant test retest reliability, $r = +.83$, $n = 55$, $p < .01$, of the Nature Awareness Survey developed by Chandler and Swartzentruber (2011), the researchers decided to administer the same survey in this study. They did, however, modify two questions for more age-appropriateness. The modified Nature Awareness Survey still included seven questions in each of the original three categories that follow: direct experiences in nature, indirect experiences in nature, and vicarious experiences in nature. The modified survey also included an account for students' attitudes toward each nature experience as in the original instrument. The researchers chose to reaffirm dependability of their modified Nature Awareness Survey by administering the survey as a test during the week of January 23-27 and as a retest during the week of February 21-24. A Pearson correlation for the data revealed a significant test retest reliability between the two modified surveys, $r = +.89$, $n = 69$, $p < .01$, two tails.

After establishing the reliability of the survey instrument, the researchers analyzed the survey data. Since some of the participants attended a private school that used the SAT examination and some attended a public school that used TCAP examinations, the researchers could not compare the scores of the two different

standardized science tests. Therefore, they calculated a z -score for both sets of raw scores. With the complete set of z -scores and the students' nature awareness scores calculated from the Nature Awareness Survey, the researchers applied a Pearson correlation to the recorded data. A correlation for the data revealed a student's awareness of nature and his or her standardized science test score were not significantly related, $r = .09$, $n = 69$, $p > .05$, two tails. These findings led the researchers to reject the alternate hypothesis.

Although this study found no significant correlation between student nature awareness and standardized science test scores, the researchers considered the possible influence to the correlation by a student's particular school. However, Pearson correlations performed within the two separate sets of data also indicated no significance. A correlation for the data revealed the nature awareness of a student in a private school and his or her standardized science test score were not significantly related, $r = .22$, $n = .15$, $p > .05$, two tails; and neither were the nature awareness of a student in a public school and his or her standardized science test score significantly related, $r = .07$, $n = 54$, $p > .05$, two tails.

Chapter V

Discussion

Summary

This study sought to examine the relationship between the standardized science test scores of seventh-grade students and their awareness of nature. Fifteen of the sixty-nine student participants attended a private Christian school in a suburban setting, while the rest attended a public school in an urban setting. However, both schools were in East Tennessee. The researchers obtained parent permission from each student participant, thus achieving a substantial but not random sample size.

The researchers provided a test and retest of the Nature Awareness Survey to address the students' various interactions with and attitudes toward aspects of nature. The researchers assumed students would thoughtfully and honestly consider their responses to the survey. The responses to the twenty-one questions determined a student's nature awareness score, which the researchers then analyzed, with the student's standardized science test score, using a Pearson correlation. The researchers chose to use standardized science test scores because they could most easily be used to include participants from both public and private schools. Standardized scores also provide continuity for the students from year to year. The researchers assumed these scores accurately reported the students' science knowledge. After analyzing the data, the researchers found no significant relationship between the students' nature awareness scores and standardized science test scores.

Conclusions

This study further demonstrates the substantial internal reliability of the Nature Awareness Survey established by Chandler and Swartzentruber (2011). The researchers modified only two of the twenty-one survey questions, and the correlation still indicated a strong significance. These data indicate a solid instrument, capable of possibly testing for further correlations.

Alone, this study cannot encourage teachers of middle school science to include students' exposure to nature in their classroom instruction. Likewise, the study of Davenport and Sutherland also shows no significance between a middle school student's awareness of or attitude toward nature and his or her science scores (2011). The researchers do not conclude, however, that correlation could never exist in these areas. Rather, they propose the possible influence of additional factors in this particular age group. This influence might simply shift the way in which a student's awareness of nature correlates to his or her science achievement and therefore require further search for correlation.

Initially, the researchers considered puberty as the strongest difference between the fourth-grade participants of the Chandler and Swartzentruber study and the middle-school participants of Davenport and Sutherland and these researchers. The vast biological, psychological and emotional changes happening during these years do offer countless explanations for this lack of correlation, without necessarily suggesting an irreversible scenario. The researchers considered test anxiety as one such example. If research suggests a connection between an onset of test anxiety and the developmental stage of puberty, these researchers would assume a compromise to a potentially

significant correlation by inaccurate science test scores. Similarly, the researchers considered the subject matter of the middle school curriculum and the standardized tests at those grade levels. A close examination into these areas could identify a compromise to undiscovered correlation, or maybe potential modification in the areas to pursue future correlation.

Recommendations

The researchers suggest further research in this study with more varied samples. The participation of students from different parts of the country or world, and especially at different grade levels, could suggest further insight to any correlation in nature awareness and science achievement. The researchers recommend modifying the instrumentation to address more age-appropriate science curriculum. Future researchers might also discover correlation between nature awareness and other academic subjects like history, language arts, mathematics, music, physical education, or art.

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APPENDICES

APPENDIX A:

LETTER OF APPROVAL OF KNOX COUNTY SCHOOLS

KNOX COUNTY SCHOOLS
ANDREW JOHNSON BUILDING

Dr. James P. McIntyre, Jr., Superintendent



October 10, 2011

Dr. Chris Templar
Johnson Bible College
7900 Johnson Drive
Knoxville, TN 37998

Dr. Templar:

You are granted permission for your students to conduct their Action Research projects.

In all research studies names of individuals, groups, or schools may not appear in the text of the study unless specific permission has been granted through this office. The principal researcher is required to furnish this office with one copy of the completed research document.

Good luck with your studies. Do not hesitate to contact me at 865-594-1735 if you need further assistance or clarification of the research policies of Knox County Schools.

Yours truly,

A handwritten signature in cursive script that reads "John Beckett".

John Beckett
Supervisor
Research and Evaluation

Project Number: 1112009

/pl

APPENDIX B:

LETTER OF APPROVAL OF THE KING'S ACADEMY

Dr. Templar,

It is acceptable for Andrew Fultz to test his research project (Nature Awareness and Science Scores) at The King's Academy during the spring semester.

Thank You,

LeRoy Beam – Principal

APPENDIX C:
PARENTAL PERMISSION FORM



Dear Parents and Guardians:

We, Maegan Freese and Andrew Fultz, invite your 7th grade student to participate in a Nature Awareness Survey. This survey will be distributed during class once in January and once in February and consists of only yes or no questions about nature experiences. Your student's grades will not be affected by his/her responses on the survey, because it is merely a tool to acquire data about 7th grade students' awareness of nature. We also would like your permission to use your student's science standardized test grades as part of our research. Your student's name will not be included anywhere in this project, and we ensure the privacy of your student's survey results also.

If you agree to let us use the results of this survey, as completed by your student, please fill out the slip at the bottom of this letter. Cut along the dotted lines, and return the slip to your student's teacher by January 20th. If your child does not bring back this slip, he/she will not be allowed to participate in our study. We are excited for your student's help in our project.

Sincerely,

Maegan Freese & Andrew Fultz

Johnson University Graduate Students

I give (student's name) _____ permission to participate
in the Nature Awareness research study.

Signature _____

Date _____

APPENDIX D:

NATURE AWARENESS SURVEY

Nature Awareness Survey

Name: _____

Please answer the questions by checking one of the boxes.

1. Have you hiked in the woods?	___yes ☺	___yes ☹	___no
2. Have you ever had a pet in your home?	___yes ☺	___yes ☹	___no
3. Have you walked in a stream?	___yes ☺	___yes ☹	___no
4. Have you looked at the stars at night?	___yes ☺	___yes ☹	___no
5. Have you caught fireflies?	___yes ☺	___yes ☹	___no
6. Have you ever climbed a tree?	___yes ☺	___yes ☹	___no
7. Have you ever built a snowman?	___yes ☺	___yes ☹	___no

8. Has your family ever had a vegetable garden?	___yes ☺	___yes ☹	___no
9. Has your dog had puppies (or cat/kittens)?	___yes ☺	___yes ☹	___no
10. Have you ever been to a zoo?	___yes ☺	___yes ☹	___no

11. Are there flower gardens around where you live?	___yes 😊	___yes ☹️	___no
12. Have you visited a nature center (IJAMS Nature Center, Tennessee Aquarium)?	___yes 😊	___yes ☹️	___no
13. Have you ever listened to the sounds bugs make at night?	___yes 😊	___yes ☹️	___no
14. Has there ever been a pet in your school classroom?	___yes 😊	___yes ☹️	___no

15. Have you ever watched a TV show about people in nature (<i>Man vs. Wild, Survivor, etc.</i>)?	___yes 😊	___yes ☹️	___no
16. Have you ever owned a Silly Band shaped like any animal?	___yes 😊	___yes ☹️	___no
17. Have you ever watched a weather show/movie?	___yes 😊	___yes ☹️	___no
18. Have you ever watched TV shows about real animals?	___yes 😊	___yes ☹️	___no
19. Have you ever read about dinosaurs?	___yes 😊	___yes ☹️	___no
20. Have you ever had photographs of animals in your house?	___yes 😊	___yes ☹️	___no
21. Have you ever read books in your home about real animals?	___yes 😊	___yes ☹️	___no