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The Impacts of Environmental Education on Youth and their Environmental Awareness

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An Undergraduate Thesis

Presented to the Faculty of
The environmental Studies Program at the University of Nebraska- Lincoln
In Partial Fulfillment of Requirements
For the Degree of Bachelor of Science

Major: Environmental Studies
With Emphasis of: Natural Resources

Under the supervision of Lisa Pennisi

Lincoln, Nebraska

May 2014

Acknowledgments

Cedar Point Biological Station, and The Lake McConaughy Water Interpretive Center for all your assistance and for allowing us to use your facilities.

Special thanks:

Thesis Advisor Lisa Pennisi, Thesis reader Deb Perryman, UNL Advisor Sara Cooper, and David Gosselin, OPS coordinator Nancy Armstrong, all the Camp Explore Participants, and UNL Camp Leaders

The Impacts of Environmental Education on Youth and their Environmental Awareness

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University of Nebraska, 2014

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The purpose of this article is to identify the effects of environmental education (EE) programs on youth, including: creating environmental awareness, building a connection to the environment, and changing the perceptions youth has on the environment. The study examines the EE program, Science Camp Explore, hosted at the Cedar Point Biological Station and Lake McConaughy Water Interpretive Center in Ogallala, Nebraska. The camp emphasized two main themes, soil and water. To acquire data the study called for a mixed method of questionnaires, cognitive maps (drawing exercise), and the 3CM model. In order to measure the awareness of the pre and post programming, camp themes were integrated into both the questionnaires and the cognitive mapping. Results showed a significant positive effect in the three areas associated with camp curriculum: human's effect on the water cycle, the importance of animals to humans, spending time to fix problems in nature. The results gained from this study can be beneficial in providing a frame work for future EE programs and integrating the nature based education structure into the classroom.

Table of Contents

Title Page 1

Acknowledgements 2

Abstract 3

Contents 4

Introduction..... 5

Literature Review..... 5-7

Material and Methods..... 7-9

Results..... 9-10

Discussion..... 10-11

Summary and Conclusions..... 11

References 12

Tables 13-14

Introduction

The purpose of this study is to identify the effects of teaching Environmental Education (EE) to youth and how these teachings reflect long term appreciation for environmental awareness. Environmental Education is the teaching of how natural environments function and how we as humans effect the environment through our behavior. The study was constructed through qualitative research by engaging students in outdoor activities, nature based curriculum, and relating the children's daily behavior to the effects they have on the environment. Significance of research within the EE field comes in a wide range: building a connection between youth and nature, managing ADHD, increasing focus and self discipline, and enhancing cognitive abilities. There are previous EE studies supporting the various significant reasoning behind this study.

Literature Review

Today's youth will become tomorrow's leaders and as their form of guidance it is our responsibility to provide them with educational experiences, for them to make knowledgeable decisions regarding the environment. Many people believe that environmental education is one of the most important factors for preventing environmental problems (Ozden, 2008). In order to make formative decisions, students must not only become an expert on the subject but also develop a connection to the environment. Judith Cheng and Martha Monroe designed a study that explicitly shows the impact of youth building a connection to the environment. Cheng and Monroe measured children's affective attitude towards the natural environment after participants completed a mandatory EE program. The study consisted of four specific research questions regarding the participants overall connection toward nature. The survey results showed 4 dimensions of children's connection to nature: enjoyment of nature, empathy for creatures, sense of oneness, and sense of responsibility. Cheng and Monroe found that the children's connection influences their intention to participate in nature based activities in the future. Their perceived family value toward nature and perceived control positively influenced their interest in environmentally friendly behavior (Cheng & Monroe, 2010). The work of Donald Burgess and Jolie Mayer-Smith also explored the connection between children and the environment. They investigated children's experience and perception during an outdoor EE program. The study helped researchers understand how nature experiences arouse biophilia. The biophilia hypothesis suggests that humans and nature are biologically connected and that our well-being can be affected by that connection (Burgess & Mayer Smith). Their results showed participants involved with the EE program changes perceptions and formed connections with the surrounding fauna and flora.

Environmental Education has also been linked to decrease the affects of ADHD among those that have participated in Frances Kuo and Andrea Taylor's study (2004). Participants showed an increase in managing their ADHD symptoms while engaged in nature/ green space. Kuo and Taylors study examined the impact of a relatively "green" space or natural setting on attention-deficit/hyperactivity disorder (ADHD) symptoms across diverse subpopulations of children. Parents/ Legal guardians of children, who were diagnosed with ADHD were recruited through an online screening process. Kuo and Taylor asked parents to rate the after affects of 49 common after school and weekend activities based off their child's symptoms. Parents rated each of the 49 activities on a Likert scale indicating the child's symptoms. They compared the after affects for activities conducted in a green outdoor setting (farm, parks) and activities conducted in either a built outdoor environment (parking lot, condensed neighborhood) or indoor settings. The findings of this study revealed that the outdoor activities reduced symptoms significantly when compared to the other settings (Kuo & Taylor, 2004).

Another study that emphasizes the positive health aspects associated with the environment was one developed by Marc Berman, John Jonides and Stephen Kaplan. Theses researchers developed a study centered on the Attention Restorative Theory (ART). In this study participants were asked to engage in two experiments. The first experiment participants were randomly assigned to either walk through a park or through downtown. The second experiment asked participants to view pictures of nature. In both experiments the measured their results through a backwards digit span task. Supporting their hypothesis they found there was a restorative value of nature to improving cognitive functioning (Berman et al., 2008). I am able to apply their studies concepts into this study since I will be working with humans in a natural environment. In EE programs it is a key concept to know various ways to infuse cognitive restoration within your participants so that they can recuperate the knowledge they are gaining without exhausting their cognitive abilities.

Lianne Fisman conducted a study similar to this articles particular research; however she focused specifically on an urban EE program. She wanted to research how the awareness of children on their biophysical environment would be impacted by this type of programming. Unlike the previous studies Fisman noted that, awareness is a relevant variable to consider when assessing the impact of a place-based environmental education program on elementary school students (2005). She also stated that the word *awareness* can have broad interpretations and that the researcher must distinguish what they mean when using the word. In constructing this study, I decided to focus on the children's knowledge of soil and water and their awareness of

the natural functions and human impacts. As a result, Fisman's study showed that students living in high socioeconomic neighborhoods presented with local environmental awareness in comparison to those of lower socioeconomic standings.

In developing this study I wanted to include the conceptual framework contributed from the above related research. The study will identify the effect of teaching environmental education to youth, with the main objects: creating environmental awareness, building a connection to the environment, and changing the perception youth has on the environment. Research provided by the study will examine a day camp of two selected samples sizes of different age groups to compare and contrast their overall awareness in regards to the environmental concepts taught throughout camp.

Methods

Camp Explore was hosted by Cedar Point Biological Station (CPBS) and Lake McConaughy Water Interpretive Center in Ogallala, Nebraska. Camp activities involved basic earth sciences, hands on field work, and understanding their environment. Curriculum focused on two main themes: soil and water.

Thirty camp participants were involved in the study and separated into two groups based on age. First session was the Elementary group composed of 22 children ranging from 3rd to 6th grade. The second session, the Middle School group was composed of 8 children ranging from 7th to 9th grade. All camp participants were recruited through the Ogallala public school district and were participants of the Science Camp Explore. Only data collected from consented participants were used. In order to conduct research on underage human subjects all procedures/ methods were reviewed and approved through the Institutional Review Board (IRB) at UNL. Through this process all rights of the participants shall be protected should any issues from the study arise. All camp leaders assisting with the research had gone through Collaborative Institutional Training Initiative (CITI). All participants were given a pseudonym to ensure that their identity be kept confidential.

This was a mixed methods study using both qualitative and quantitative data. Three measures were used to acquire data from students before and after participating in camp programming: questionnaires, and cognitive mapping, 3CM (drawing exercise). Each method was constructed to encompass content taught during the camp that could impact the children's awareness.

Questionnaire

A survey of 13 questions designed to incorporate camp themes was given to measure participant's knowledge before and after camp. The pre and post questionnaires were administered orally to the children. Conducting the questionnaire verbally was a method to overcome variations among the children's reading and writing skills. The follow-up questionnaire was mailed to participants 6 months after camp to be administered at home and then sent back for analysis. Questions were developed to analyze whether or not the participants had an increased awareness or change in perception, related to the main themes of the program such as water and soil. Pre, post and follow-up questionnaires were formatted to a five-level Likert scale.

Cognitive Mapping

Cognitive maps use internal mental processes of acquired and stored knowledge to create a mental picture of a physical or spatial environment. In a similar study Lianne Fisman (2005) used cognitive maps children drew of their neighborhoods in order to connect changes in their awareness as a result of being a participant in the environmental program, Open Spaces as Learning Places. Fisman instructions specifically told the children what to include in their drawings. She asked them to include places they go, their home, and special things. I decided to use the same format of Fisman, without giving as much instruction. The children were asked simply to draw what comes to mind when they think of home. They were not given any other instructions so that they could use their own perceptions to create their picture. This exercise was conducted pre and post program in order to compare and contrast the themes found within the pictures.

Conceptual Content Cognitive Mapping (3CM)

The 3CM model was used when participants were asked to describe the word *environment*. This method assessed how the participants conceptualize the topic given and what themes were present. This method is a card sorting approach that involves three main steps (Kearney, 1999). Participant identified concepts/ factors relevant to the topic while the camp leader wrote them down onto note cards. Camp leader then asked the participants to group the cards in any way that makes sense to them (group, pairs, lines). Once grouping is completed participants were asked to label the groups and then explain why the concepts were grouped together in that way. The 3CM exercise was administered orally and recorded before and after camp.

Data Analysis

Statistical analysis was completed using the Statistical Package for the Social Sciences (SPSS) program. The Wilcoxon Matched Pair Test for nonparametric data was used in the SPSS system to conduct statistical test on all data of the pre, post, and follow-up questionnaires. I used the Wilcoxon test because the assumption of

normality in data was violated and the use of the dependent t-test was inappropriate (Biostatistics, 2014). Each of the 13 questions was transmitted into variables that were ranked 1-5 on the Likert scale. For this study I separated the data of the two sample groups, the middle school group and the elementary group. We began by comparing the knowledge scores for the pre Vs post questionnaire for the elementary school group, and then their pre Vs follow-up. We then repeated the same process for the middle school group. In order to analyze the data I assumed our dependent variable was measured in ordinal scale (Likert Scales), and the independent variable consisted of two “related groups”(Biostatistics, 2014). The Null hypothesis was the same for both the middle school and elementary school group. Our null hypothesis stated, post score will be equivalent to pre score, and the follow-up score will be equivalent to the pre score. If the p-value was less than .05, the null hypothesis is rejected and the results would report a significant difference between either the pre and post values or the pre and follow-up values. If the p- value were greater than .05, the null hypothesis would be accepted and would result in no significant difference between the pre values and post values, or the follow-up values and pre values.

The cognitive maps were assessed through Microsoft Office Excel 2007. The middle school group and elementary group were separated from each other in order to compare their individual results. Main themes were chosen based on the amount of times they were mentioned. The pre vs. post themes were compared for each of the two groups.

Results

Questionnaire

When comparing the elementary pre vs. elementary post questionnaires there was significant difference among question one of $p=.035$ (figure 1). The question, *would you spend time after school working to fix problems in nature*, reflects a positive change in the children’s connection to the environment.

Examining the comparison between the elementary pre vs. elementary follow-up, two questions displayed a significant difference. Question 3, *people polluting water can hurt the water cycle process*, scored a p- value of .020 (figure 2). This result indicates an increase in the children’s awareness. Question 12, *plant and animals are important to people*, this variable scored a p-value of .046 (figure 2). The results display both a connection to the environment and an increase in awareness.

Over all, the Elementary group showed a change in both awareness and connection to nature which provides the children with a changed perception of the environment then they had previous to their camp experience.

The Middle school group showed no significant difference across all variables within the questionnaire for both pre vs. post and pre vs. follow-up.

Cognitive mapping

The elementary age group included a broader range of themes compared to the middle school group. The two main themes of camp (soil and water) became more prominent among the participant in the post mapping of the Elementary group in comparison to their pre mapping theme choices (figure 3).

The middle school group clumped themes together when compared to the elementary group. For example: the elementary group listed grass, trees, soil, and plants. The middle school group clumped together similar themes and only listed plants and trees. Middle school participants also had an increase in the theme water from pre to post mapping (figure 4).

Discussion

The goal of the study was to assess the impacts of a one week Environmental education (EE) day camp on youth focusing on participants' environmental awareness. Camp had a significant impact in 3 areas: (1) educated students on how the water cycle system works, in a way that they were able to retain the information long term, (2) created a place for students to connect with nature and develop a sense of responsibility to the environment, students left camp wanting to continue to be involved with nature and help to find solutions (3) enhancing student's knowledge and awareness of the importance of plants and animals.

The two main themes of the camps curriculum increased from pre camp exposure to post camp exposure. The main lessons taught focused on the water cycle, water characteristics, and soil sciences. Looking at the results of both the questionnaire and the cognitive maps the water concepts were obtained greater than the soil concepts that were taught. Reasoning behind this may be from having more water related activities than soil throughout camp.

Micic, revealed the idea that cognitive mapping can potentially become a "tool box" or problem solving resource (2001). Ackerman et al (1993) described cognitive mapping as a way to decide how we might act or intervene in order to achieve what we prefer within that world- a predict and control view of problem solving. I think we could take both ideas and turn them into a pre assessment for educators in all fields, i.e. integrating the EE program framework into the classroom. By using the 3CM model educators can examine pre and post maps to detect where the gaps are among students knowledge of class content. For example looking at this

study, the results in the cognitive mapping show an increase in the theme *water* among participants of both groups. However, the theme *soil* had a very small increase among the elementary group and was not present at all in the middle school group. This is interesting because both were emphasized during camp, yet student's awareness only increased in regards to water. If I were to teach this camp again I could look at this data see that the lack in awareness was with the soil unit and then frame my curriculum similar to the water unit. This method can be infused into all types of classroom settings to help build a bridge across those knowledge gaps.

Conclusion

The purpose of this study was to identify the effects of teaching EE to youth and how these teachings can create long term environmental awareness. Using a mixed method study of pre, post, and follow-up questionnaires, cognitive maps, and the 3CM model we were able to examine these effects. The objectives were to create environmental awareness, building a connection to the environment, changing the perception youth has on the environment. Results revealed a significant increase in awareness among the elementary group. Elementary participants became more inclined to spend their own free time helping to fix problems in nature. This shows that the Science Camp Explore engaged a sense of responsibility among the children, creating a connection to the environment. The results of elementary group in the pre vs. follow-up questionnaire displayed a significant change in perception when asked the importance of animals to humans. Student after camp were able to make the connection between direct and indirect correlation. They became aware that animals contribute to the well being of humans and humans can greatly affect the well being of animals.

This study can be used as a resource for future research within the EE field. I would recommend to focus research on the younger age groups. In this study I found that all my significant results reside within the elementary school group and none within the older middle school group. I would also recommend a much larger sample size. Results were limited based on the studies extremely small sample sizes. Analyses of significant became more difficult with a smaller sample size. One area that could use closer examination would be to do a comparative study between camps with participants with varying backgrounds (rural, suburban, and urban). The study could observe the similarities and differences in the children's perception of EE and environmental awareness.

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Tables

Figure 1. Compares Elementary School Pre, Post and Follow-up Questionnaires.

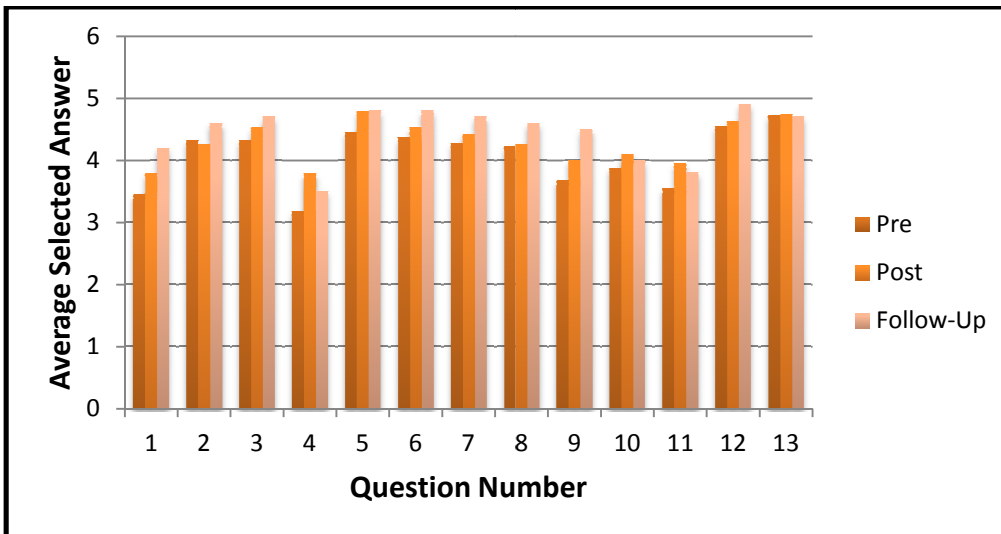


Figure 2. Compares Middle School Pre, Post and Follow-up Questionnaires.

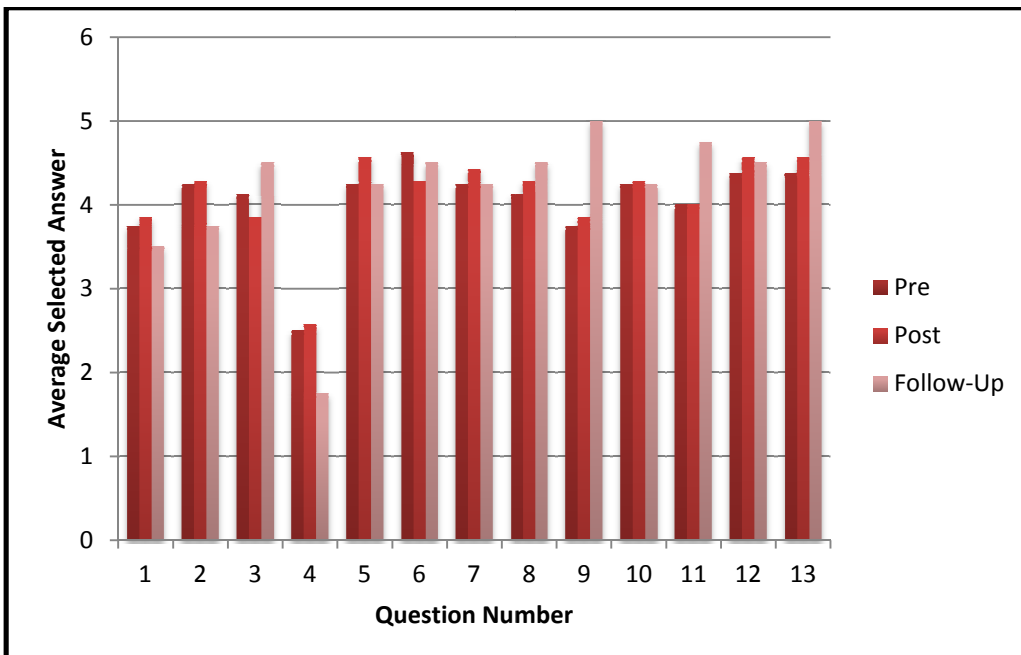


Figure 3. Cognitive Mapping of Main Themes among the Elementary School group.

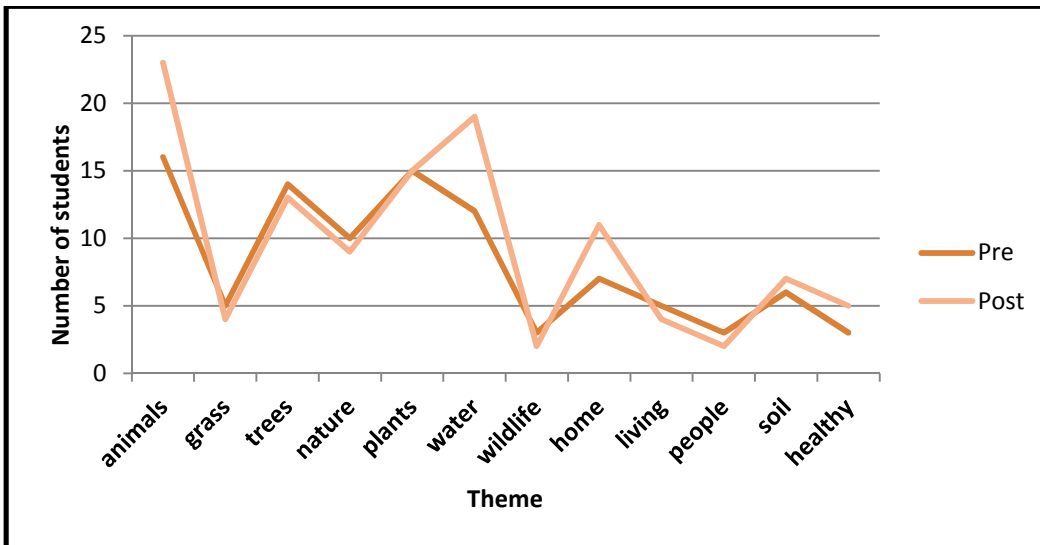


Figure 4. Cognitive Mapping of Main Themes in Middles School Groups.

