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Teacher Perceptions of the Impacts of Environmental Education on the Teaching Process and on Student Learning

Angela Nicole Castelli

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TEACHER PERCEPTIONS OF
THE IMPACTS OF ENVIRONMENTAL EDUCATION
ON THE TEACHING PROCESS AND ON
STUDENT LEARNING

A Thesis
Presented to
The Faculty of the Department of Physical Education and Recreation
Western Kentucky University
Bowling Green, KY

In Partial Fulfillment
Of the Requirements for the Degree
Master of Science, Recreation

By
Angela Nicole Castelli

December 2004

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THE IMPACTS OF ENVIRONMENTAL EDUCATION
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TEACHER PERCEPTIONS OF
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(48)

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The Mammoth Cave National Park Environmental Education Partnership (EEP) has worked with schools and teachers to provide the students with curriculum-based environmental education programs on a regular basis throughout the school year.

Because of this environmental education partnership, this study addresses the following questions: What are teacher perceptions of the impacts of environmental education on student learning and what are teacher perceptions of the impacts of environmental education on the teaching process? Such impacts included students' enthusiasm, motivation, and attitudes towards learning. The study also addresses the impact on skills such as thinking skills, language skills, and math skills. The study addresses the impacts on teachers such as enthusiasm, lesson planning and design, instructional strategies, as well as scheduling and restructuring of curriculum in the classroom or schools.

The methods of investigation included a survey and interview instrument that was administered by the researcher to 35 teachers that participated in the EEP. After gathering the information from the teachers, the researcher then analyzed the data using descriptive statistics such as mean, standard deviation, and frequency. This information was presented in the forms of tables and graphs.

The conclusions to this research show that environmental education had a significant perceived impact on student learning and teaching process. The aspects that showed the most impact were on the students' enthusiasm, motivation, and attitudes towards learning, as well as the teachers' enthusiasm and lesson planning.

Chapter 1

INTRODUCTION

This study examined the perceived impacts of curriculum – based environmental education on students and teachers who utilize the Mammoth Cave National Park Environmental Education Program on a regular basis. This study included perceived impacts of environmental education from the teachers at several schools in south central Kentucky.

The introductory chapter includes the rationale for the study, the problem statements which were the focus of this study, and the research questions. The chapter also provides definitions of terms that are used throughout the study to clarify terminology as well as statements that relate to variables that the researcher could not control or the delimitations of the study.

Rationale

In the late 1700s and into the early 1800s, major changes began to take place in Great Britain, and other parts of Europe, as well as North America. The Industrial Revolution was taking hold in these countries, forever changing the lives and work of people in those parts of the world. Before the revolution, people and animals had to do all of the work whether it was farming or factory. The Industrial Revolution meant that societies were using machines to provide the energy to do most of the work. During this time, coal and other natural resources began replacing the need for human labor, which meant more goods could be produced. Due to the increased use of coal and new developments, high amounts of pollutants were being emitted into the air and more natural resources continued to be exploited for production purposes.

The process of industrialization resulted in the pollution of Earth's air, water, and soil, which pose threats to both human health and the environment. Population grew at rates faster

than before and much of the population became concentrated in urban areas. The Industrial Revolution raised concerns about the use of natural resources because much of the population throughout Europe and North America soared during this time. As the Industrial Revolution reshaped people's daily lives, and the production of goods became easier, natural resources began disappearing rapidly. People slowly began to realize that the resources were disappearing faster than they could replenish themselves and conservation, as an idea, was established.

Conservation became an idea of the people of North America and Europe in the 17th century. When the Europeans settled North America, they viewed the resources as being endless and could not understand the possibility of running out of trees, water, or land. After the Industrial Revolution made its way into North American cities, it became clear that it was possible to run out of certain resources. As the population grew, the resources steadily declined. As time passed and more and more people became aware of the exploitation of Earth's resources, conservation began to take hold, not only as an idea, but also as a recognized necessity. For the past century, conservation has become a buzzword in North America and Europe.

Since conservation practices began in North America, laws have been passed and organizations have been formed to help promote and enforce conservation efforts. Over the past 100 years, conservation efforts have changed but the goals remained the same. One aspect of these conservation efforts has become education. Educating the public and creating public awareness is a necessity for the success of the environment. However, it has been a common misconception that environmental educators are environmental advocates and their only concern is to preach to the public instead of teach.

John Hug (CSMEE, 1977) addressed this issue by discussing the "two hat" dilemma that has been a persistent problem for environmental educator. Many people consider environmental

educators to be activists. Likewise, many environmental educators also consider themselves to be environmentalists. Hug points out that environmental educators then need to keep the proper “hat” on their heads when doing environmental education programs. The emphasis should be on teaching people “how” to think, rather than “what” to think.

Environmental education in the United States evolved in the 1960s in the middle of the environmental awareness movement. But even before then, “the evolution of environmental education has incorporated the significant influence of some of the great eighteenth- and nineteenth-century thinkers, writers, and educators, notably Goethe, Rousseau, Humboldt, Haeckel, Froebel, Dewey, and Montessori” (Palmer, 1998, 4). It is argued that these pioneers contributed to the thought and practice of dealing with the environment, but the recognition of the founding of environmental education goes to Sir Patrick Geddes (1854-1933), a Scottish Professor of Botany. “He is regarded by many as being the first to make that all-important link between the quality of the environment and the quality of education” (Palmer, 1998, 4).

After the acknowledgement of the term in 1965, the goal was to define its meaning and promote its legitimacy. This has been a continuing dilemma for those that are associated with environmental education. Through the years, environmental education has been characterized as many things, “from environmental science to environmental activism, from tree-hugging to tree-farming, from an elitist movement to a popular case” (Heimlich, 2002, 3). Environmentalists, who are usually viewed as extremists, were associated with the term environmental education. “The challenge for environmental education has been to avoid being identified with the negative connotations of the term while still maintaining the connection with environmentalists” (Heimlich, 2002, 3).

Developing a definition for the term environmental education has been a difficult and ongoing process due to the different opinions and attitudes of the public. “Environmental education has different meaning to people depending on their continuum of understanding and school of thought” (Heimlich, 2002, 4). Environmental education encompasses several subject matters and holds a different definition for each. Natural sciences limits environmental education to conservation of ecosystems and our natural resources, as mentioned earlier, and social sciences defines environmental education as pinpointing exemplary human behavior for management and protection of the environment (Heimlich, 2002). Environmental education encompasses all these subject matters, from art and humanities, to math and sciences; therefore, finding a specific definition for this term is difficult.

Since the early 1900s, several national environmental education organizations have been formed in several countries. In North America, the National Association of Environmental Education - - later renamed North American Association for Environmental Education - - was formed in 1971. NAAEE is a “professional association that was established to promote environmental education and support the work of individuals and groups engaged in environmental education through teaching, research, and service” (NAAEE, website).

The first state affiliate of the North American Association of Environmental Education was the Kentucky Association of Environmental Education. KAEE was established in 1975 to “represent teachers, government, industry, parents, and students - - people who understand that each citizen should be able to make wise decisions concerning the environment” (KAEE, website).

With the establishment of these organizations, it became clear that one of the best ways to help our environment was to educate people to be environmentally conscious as well as

environmentally considerate. Although educating adults in our society is beneficial, the best way to initiate change is through the education of our youth. In 1996 NAAEE, under the National Project for Excellence in Environmental Education (NAAEE, 1993), began publishing a series of documents that derive from standards in subject areas to define comprehensive K-12 environmental education programs (NAAEE, website).

“Environmental education has not been considered a discipline, so it is not historically a part of the study within the formal education system” (Heimlich, 2002, 51). This has started to change. Environmental education has been working in partnership with schools to develop curriculum-based programs. There are formal and non-formal educators that are working together for this cause. There are also private organizations that offer environmental education programs such wildlife rehabilitation and preservation facilities as well as privately owned parks. Many of the formal educators work in partnership with the non-formal educators due to experience and the abundant resources at their fingertips. “Many of the goals of environmental education and education reform are similar. These include helping students to be knowledgeable and skilled thinkers who are able to put their knowledge, skills, and creativity to work solving problems, who are practiced at working collaboratively and independently, and who are prepared to take their role as responsible citizens” (Heimlich, 2002, 54).

Studies, which are referenced in chapter 2, have been conducted to determine if these goals of environmental education curriculum-based programs are being achieved. Is environmental education helping students excel in school? A nationwide study was conducted in the late 1990s focusing on schools that use the Environment as an Integrating Context (EIC) for learning. EIC “defines a “framework for education: a framework for interdisciplinary, collaborative, student-centered, hands-on, and engaged learning” (Lieberman & Hoody, 1998,

n.p.). This study focused on the benefits of EIC-based learning in Language Arts, Math, Science, Social Studies, Thinking Skills, and Interpersonal Abilities. “The benefits include:

- Better performance on standardized measures of academic achievement in reading, writing, math, science, and social studies;
- Reduced discipline and classroom management problems;
- Increased engagement and enthusiasm for learning; and
- Greater pride and ownership in accomplishments” (Lieberman & Hoody, 1998, n.p.)

The state of Kentucky has been involved in academically based environmental education for several years and is still striving to improve environmental literacy in the state. “While environmental education is important to citizens of all ages, there is no doubt that children are its primary beneficiaries” (Kentucky Environmental Education Council, 1998, 3). “Because the benefits are not immediately apparent, it has been given a very low priority both in government planning about the environment and in the planning of educational programs” (Kentucky Environmental Education Council, 1998, 1).

This study focused on measuring the educational benefits of academically based environmental education programs. By using a framework similar to the EIC study conducted by Lieberman and Hoody, this study examined if there was a correlation between the schools using academically based environmental education programs; and the impacts on students’ learning as well as the impacts on the teaching process.

Statement of Problem

The Mammoth Cave National Park Environmental Education Partnership (EEP) has worked with schools and teachers to provide the students with curriculum-based environmental education programs on a regular basis throughout the school year. These programs have taken

place in and out of the classrooms and have followed the students' core content and program of studies requirements for each year. The EEP also provided a link between Mammoth Cave National Park and the teachers at each of the schools for training in environmental education and assistance with the environmental education programs.

Because of this environmental education partnership, this study addresses the following questions:

1. What are teacher perceptions of the impacts of environmental education on student learning?
2. What are teacher perceptions of the impacts of environmental education on the teaching process?

Definitions

As with any investigation into a field as diverse as environmental education, some definitions are needed for the purpose of clarity and focus. The following definitions are used throughout this thesis. They represent a combination of statements that come from the literature or have evolved in the course of this investigation.

Environmental Education: a process aimed at developing a world population that is aware of and concerned about the total environment and its associated problems, and which has knowledge, attitudes, motivations, commitments, and skills to work individually and collectively toward solutions of current problems and the prevention of new ones (Intergovernmental Conference on Environmental Education, 1978).

Environment as an Integrating Context (EIC): a method of teaching using the environment and integrating the environment into each lesson and discipline. Gerald Lieberman

and Linda Hoody (1998) developed this method of learning and conducted studies to determine the effectiveness of the program.

Environmental Education Partnership (EEP): the partnership was established at Mammoth Cave National Park to:

1. Develop a unique educational experience known as Parks in Classrooms integrating the Park's cultural and natural resources into all grades and subjects at each of the schools.
2. Initiate the Parks as a Classroom approach by developing a holistic instructional model for the schools that will provide interdisciplinary learning experiences for all students, K-8. The model integrates the natural and cultural values/resources of the park while meeting the educational standards of the county and the State of Kentucky.
3. To increase the awareness and appreciation of the students and teachers in the surrounding community of the mission of the NPS and the significant opportunities provided by the park for education and personal enrichment.
4. To inform students of the Park's critical resource management issues so that they develop an understanding of the complex relationships existing between people and natural ecological systems and better understand National Park Service ethics of resource conservation and stewardship.
5. To help students become aware of biological diversity within the Park and the organization of natural communities and their ecological interactions.
6. To provide a variety of rewarding interdisciplinary experiences that take the students from the classroom setting to the natural setting for supplementary study challenges
7. To promote an understanding of the relationships between the Park and global environmental and social issues so that he students can actively demonstrate their concern for park resources and the environment beyond.
8. To provide leadership to others who desire to initiate similar programs and to establish a model framework for school/park partnership that provides a 21st century educational experience (Mammoth Cave National Park Environmental Education Partnership Agreement, 2004).

Formal Educator: in this study is a person who is a teacher or administrator in a traditional classroom setting.

Education Technician: in this study is a person who is a nonformal educator. Education Technicians typically educate students of all ages and are a part of the National Park Service, Bureau of Land Management, US Forest Service, and other government organizations. There are also private organizations that offer environmental education such as Bird of Prey facilities and privately owned parks. Many of the formal educators will work in partnerships with the nonformal educators due to experience and the abundant resources at their fingertips.

Delimitations

The delimitations of the study were:

1. Schools utilizing this study were delimited to schools that were involved with the EEP and use the program on a regular basis.
2. Teachers utilizing this study were delimited to teachers that were involved with the EEP and use the program on a regular basis.

Chapter 2

REVIEW OF RELATED LITERATURE

The nature of the research questions posed in Chapter I deal with factors relating to the perceptions of the impacts of environmental education on teaching process and student learning.

Therefore, the survey of literature related to this study was considered in three major areas:

1. The need for environmental education
2. The goals of environmental education, and
3. Demonstrate a need for the study

The Need for Environmental Education

“Understanding global environmental issues and taking action to confront them are challenges that need to be addressed not only by educators but also by planners, economists, policy makers, natural and social scientists, and the general public” (Heimlich, 2002, 17). This concept deals with several education disciplines and the concerns of the educators. The question is what makes it environmental education? Many educators believe that environmental education is confined in science. Although much of environmental education is science oriented, “environmental education is cross disciplinary or transdisciplinary; it must include all studies – history, philosophy, economics, the sciences, mathematics, the arts, citizenship, and social studies – for after all, a decision on an environmental issue requires all facets of society to be considered” (Heimlich, 2002, 25).

There are several sources of literature that, help support this research. Environmental education is not an idea unique to the United States, but instead spans the globe. Many countries have implemented some form of environmental or ecological education for children as well as adults. The sources cover many aspects of environmental education such as the history,

planning, need, trends and philosophies, curriculum development, and studies that have focused on the benefits of environmental education in school curriculum. As mentioned earlier, the educators are not only formal educators, but also informal educators.

Environmental education spans the globe in both formal and informal fashions. Kamel wrote an essay (2002), *Ecological Education in the Living Environment*. In his essay he addresses the question, “What does an ecological approach to education mean?” (Kamel, 2002, 22). He addresses the ecological education in Egypt by saying, “in our view, an ecological approach to education implies adopting an approach that is cognizant of both the physical and natural environment as well as the social and cultural environments” (Kamel, 2002, 22). A Palestinian teacher writes, “The cardinal value in any ecological approach in education is a sense of responsibility towards nature, self, others, and future generations (Fasheh, 2002, 46).

Environmental/Ecological education is not a North American discipline nor is it a new discipline. “We have acquired a lot of experience in the past three hundred years, and we know that science without wisdom cannot sustain life” (Fasheh, 2002, 46). With the issues of globalization, constant development, water quality, and the degradation of the World’s ecosystems, countries are pulling together to educate themselves and others on the aspect of the environment. “Thus, cross-cultural communication gains a special significance in the comprehension of environmental degradation and the identification of environmental solutions” (Marouli, 2002, 35).

Palmer (1998) made a very good case for the “promotion and development of environmental education on a major global scale” (35). “In a nut-shell, the ever increasing threats to the resources of the Earth and to the health and stability of its societies, justify an urgent need for an informed global citizenship” (Palmer, 1998, 35). So the question is does

environmental education matter and does it make a difference to environmental awareness, attitudes, and behavior?

In the United States, environmental educators, both formal and informal, have been trying to establish environmental education as a discipline to be taught in schools from primary to secondary levels. “The need to develop education programs that enable student citizens to acquire a universal environmental ethic has been recognized both nationally and internationally” (Engleson & Yockers, 1994, 14). The Wisconsin Department of Public Instruction established a goal statement with five sub-goals that address environmental education in schools. “The goal of environmental education is to help students become environmentally aware, knowledgeable, skilled, and dedicated citizens who are committed to work individually and collectively, to defend, improve, and sustain the quality of the environment on behalf of present and future generations of all living things” (Engleson & Yockers, 1994, 14).

There have been many projects established and implemented to advance environmental education in the United States. “While environmental education is important to citizens of all ages, there is no doubt that children are the primary beneficiaries” (Kentucky Environmental Education Council, 1998, 3).

The Goals of Environmental Education

It is not uncommon to hear the words “education reform” locally or nationally. States have been working with schools, teachers, and administrators to better the education system. Improving the curriculum is the first priority. “Many of the goals of environmental education and education reform are strikingly similar” (Heimlich, 2002, 53). Several of these goals for students were mentioned earlier, such as: becoming knowledgeable and skilled thinkers, practice working collaboratively as well as independently, and to become prepared to take their role as

responsible citizens (Heimlich, 2002). Clark (1997) addressed several assumptions, not necessarily what teachers and administrators believe, but what has been going on in the classrooms. “Closely akin to and emerging from this very fundamental assumption about human nature are others which, though seldom verbalized are reflected in what actually happens in many, probably most, classrooms” (Clark, 1997, 6). Several past assumptions Clark (1997) mentioned are as follows:

- Children will not learn unless you make them
- Children cannot make intelligent decisions related to their education
- Only some children are educable
- All children learn the same way and have similar rates of learning
- Intelligence can be defined and measured exclusively in terms of mathematical and verbal skills

These assumptions today would be considered ridiculous, but you still find classrooms that teach using these assumptions. “Forced by underperformance or even failure, a number of schools have adopted a new approach based on understanding what interests children and what can transform them into active learners” (NAAEE & NEETF, 2002, 1). With this education reform the focus seems to be on test scores and accountability, but there is also focus on the students’ attitudes, discipline, and attendance.

The basis of the researcher’s study deals with these aspects and goals of environmental education in the state of Kentucky, focusing in South-Central Kentucky. Is curriculum-based environmental education helping students improve in school?

There are several sources of information dealing with environmental education, conservation, and using curriculum-based programs in an academic setting. For the introduction,

background information needed to understand the history of both conservation and environmental education was provided. It is also important to stress the benefits of environmental education. Environmental education is rooted in the field of science; however, it has carried over to other disciplines. “It is a lifelong practice of social learning and knowledge transmission that is carried out in all spheres of life” (Hautecoeur, 2002, 3).

A Need for the Study

Gerald Lieberman, PhD, and Linda Hoody, M.A conducted a nationwide study, *Closing the Achievement Gap*, in 1998. This study is the most prevailing study to date on this type of subject. Three other studies have been conducted since using the same idea. These studies are: *California Student Assessment Project: The Effects of Environment-based Education on Student Achievement* (Lieberman and Hoody, 2000); *Environmental Education and the Sunshine State Standards Pre-Kindergarten through Grade Twelve* (Abrams, 1999); and, *Environment-based Education: A Report on its Usefulness in Creating High-performing Schools and Students* (Lozar-Glenn, 2000). The studies focused on schools that use the Environment as an Integrating Context (EIC). “EIC defines a framework for education: a framework for interdisciplinary, collaborative, student-centered, hands-on, and engaged learning” (Lieberman & Hoody, 1998, overview). Lieberman and Hoody (1998) identified several shared features of successful EIC programs. These are:

- Interdisciplinary integration of subject matter
- Collaborative instruction
- Emphasis on problem solving and projects
- Combinations of independent and cooperative learning; and,
- Learner-centered and constructivist approaches (10).

Lieberman and Hoody (1998) conducted the first study of schools using the EIC model and their three-year investigation indicated the following:

- Better performance on standardized measures of academic achievement in reading, writing, math, social studies, and science
- Reduced discipline and classroom management problems
- Development of problem-solving, critical thinking and decision making skills
- Increased engagement and enthusiasm for learning: and,
- Demonstration of greater pride and ownership in student schoolwork (Education Commission of the States, 2002, n.p.)

The second study that Lieberman and Hoody conducted (2000), focused on examining eight pairs of EIC schools and programs in California. “Data from this study, combined with data from the first study, indicated that in most cases, students in EIC programs scored higher than their peers in traditional programs” (Education Commission of the States, 2002, n.p.). “Some of the results published included higher scores on:

- 77% of all comparisons of standardized tests and GPAs;
- 80% of language arts assessments;
- 65% of mathematics assessments;
- 77% of social studies assessments; and,
- 67% of science assessments” (Education Commission of the States, 2002, n.p.).

In addition to these results, Lieberman and Hoody found that discipline and attendance problems were reduced in 84% of the cases.

Within the field of environmental education, several other terms have arisen in the past several years. One of these terms is EIC “Environment as an Integrating Context” and EBE “Environment-Based Education”. These terms are the main focus in schools using curriculum-based environmental education programs. “While environmental education focuses on building a base of environmental knowledge and skill to be applied to environmental stewardship, environment-based education uses a popular subject matter to improve students’ learning skills and create a wider learning context for students, teachers, and the community” (NAAEE & NEETF, 2001, 2).

Kentucky has been involved in environmental education for many decades and schools have been including the curriculum-based environmental education programs for several years. This study is being developed to look at the aspects mentioned earlier that pertain to students’ learning, enthusiasm, self-esteem, and discipline. There have been several studies that address the impacts of environmental education; however there has never been a study that addresses the impacts of nonformal programs on formal education.

Chapter 3

METHODS

This chapter describes how the study was conducted. The chapter includes a brief description of the Environmental Education Partnership (EEP) at Mammoth Cave National Park, followed by a delineation of the population and sample studied. Next, the various data sources are described. The specific data collection procedures are then outlined, followed by a discussion of the procedures used in the data analysis.

Environmental Education Partnership at Mammoth Cave National Park

The Mammoth Cave National Park Environmental Education Department works with schools in the surrounding ten counties. The schools work with the department on a monthly basis. The Mammoth Cave National Park Environmental Education Department conducts curriculum-based environmental education programs that are correlated with Kentucky's Core Content and Program of Studies. The programs cover all natural and physical sciences as well as social sciences such as history.

The schools are geographically located in South Central Kentucky in the Barren River Area Development District (BRADD). The schools and the teachers that were involved in the study were all partner schools with the Mammoth Cave National Park Environmental Education Department.

Population and Sample

The researcher has had the opportunity to work with several of the EEP schools. Mammoth Cave National Park Environmental Education Department works with several schools in the surrounding ten counties. The researcher sampled seven of those schools, which were located in several different counties.

Development of the Survey Instrument on Teacher Perceptions

Data were collected through the use of a survey instrument (Appendix A). The instrument was based upon the instrument developed by Lieberman and Hoody (1998) for their study *Closing the Achievement Gap*. This self-administered instrument contained a set of 11 questions that were aimed at determining to what extent the EEP has an impact on student learning and the teaching process. The statements were measured on a Likert Scale numbered one through five with one being the least impact and five being the most.

The survey instrument for this study was somewhat altered from the original instrument used by Lieberman and Hoody (1998). The researcher used a panel of experts from Western Kentucky University and Mammoth Cave National Park to slightly revise the original questions.

Development of the Follow-up Questions

The interviews (Appendix B) were developed using the questions from the survey. These questions allowed for more in depth answers since the survey was developed using a Likert scale. The interview was developed using open-ended questions that follow along with the survey.

The questions were asked in the following order:

- 1) What changes have you observed in your students' enthusiasm for learning, motivation, and attitudes since beginning the partnership with Mammoth Cave?
 - a) Why do you think these changes have occurred?
- 2) How has the partnership with Mammoth Cave helped students develop thinking strategies?
 - a) Why do you think this occurred?

- 3) Which life skills do you think the partnership has helped the students developed?
 - a) How do you think this occurs?
- 4) Which of the skills, e.g., reading, writing, math, and other disciplines, does the partnership help develop?
 - a) How do you think this occurs?
- 5) What impacts does EEP have on your enthusiasm for teaching?
 - a) Why do you think this occurs?
- 6) Has the EEP had an influence on the instructional strategies you use?
 - a) How have you altered your strategies?
 - b) Why do you think that this occurs?
- 7) Has EEP impacted your lesson planning and design?
 - a) How does it affect your lessons?
 - b) Why do you think this occurs?
- 8) What influences has the partnership had on the scheduling or restructuring of the curriculum in the classroom or school?
 - a) Why do you think this occurs?

Reliability of the Survey Instrument

The survey instrument was considered to be controlled because the researcher was the only individual administering the surveys. The measurements were consistent throughout the study and the surveys were administered in a uniform fashion.

Validity of the Survey Instrument

Both instruments used in the present study contain several sets of impact statements. In order to assure that the instruments were valid with respect to content, several steps were taken. Much of the validity was already established through using an instrument that was developed for the national study conducted by Lieberman and Hoody in 1998. Several faculty members at Western Kentucky University and the Environmental Education Coordinator at Mammoth Cave

National Park reviewed all of the items in February 2004. Requests for changes were incorporated in the final form.

The surveys were reviewed and approved by the Human Subjects Review Board at Western Kentucky University. This board determined that there would be no adverse effects on the participants by taking part in the surveys and interviews.

Procedures

The administrators were contacted by phone and email to request permission to include the school in the study. After the administrators granted written permission, the researcher then contacted each of the teachers by phone and email to request their participation in the study. The researcher then went out to each individual school and administered the surveys and interview. The names of the teachers and schools were kept confidential at all times. The teachers that were involved in the study were requested to state their perceptions of the impacts of environmental education on the students' enthusiasm, motivation, and attitudes toward school, their thinking and life skills, as well as their mathematical and language skills. The teachers were asked to state their perceptions of the impacts of environmental education on their enthusiasm for teaching, instructional strategies, the impact the Environmental Education Partnership (EEP) has on lesson planning and design, and the scheduling and structuring in the classroom.

Administration of the Survey Instrument

The surveys were conducted during a two-week period in April 2004. During March 2004, each of the seven schools' administrators was contacted by telephone and email to request permission to conduct the surveys in the chosen schools. The teachers were then

contacted to determine consent for participation in the survey. The researcher received a 100% response to the surveys.

The surveys were scheduled for each school and three to six participants completed the surveys at the scheduled time. Each survey lasted approximately 5 minutes. Prior to the survey, the researcher gave a quick description of the study and the survey and provided each participant with a consent form to read and sign (Appendix C).

Administration of the Follow-up Questions

The interviews were conducted with one teacher from each of the study schools immediately following the surveys. The researcher received a 100% response to the interviews. All responses were recorded on tape and notes were taken to emphasize the main points. The questions were read from the interview instrument and the responses were then recorded both on paper and on tape.

Data Analysis Procedures

Analysis of the Survey Data

The data for this study was collected from thirty-five surveys. This was considered to be descriptive research where the purpose was to describe thoroughly the facts and the characteristics of the environmental education partnership and its effects on the students' learning and attitudes as well as the teachers' techniques and attitudes in the classroom.

After the surveys were administered, the results from the surveys were entered into a statistical analysis software program, SPSS. The results reported were measures of central tendency such as mean and standard deviation. For each variable, the number of responses was

calculated, along with the maximum and minimum values, the mean, the standard deviation, and the frequencies.

Tables one and two were developed to show the means and standard deviation for the responses as well as the maximum and minimum. Graphs 1-11 were developed to show the frequency and percentage of the responses for each variable.

Analysis of the Follow-up Questionnaire Data

The approach the researcher took to analyze the data followed along with the outlined step-by step procedure developed by Johnson and LaMontagne (1993). These steps included:

1. Preparation of the data by transcribing the interviews
2. Familiarization with the data by reading over notes and categorizing the information into possible themes
3. Identification of tentative categories for coding the responses and combing similar responses

Chapter 4

RESULTS

Introduction

The major purpose of this study was to identify the teachers' perceptions of the impacts that the Mammoth Cave National Park Environmental Education Partnership had on student learning as well as the teacher process. This chapter presents the results of the study, beginning with the results of the surveys conducted with the teachers. The results of the follow-up questionnaire, which were organized and categorized, are then presented. These findings relate to the teachers' perceptions of the impacts of environmental education on the teaching process and on student learning.

Results From the Survey Data Analysis

The entire population of teachers completed the survey regarding teachers' perceptions of the impacts of environmental education on teaching process and on student learning. The means and standard deviations for the teachers' responses to the survey are presented in Tables one and two.

Table one indicates that the teachers perceived the greatest impacts being on the students' enthusiasm, motivation, and attitudes towards learning when environmental education is used in the classroom and there is the opportunity for hands on learning. The impacts on life, language, and math skills were perceived to be lower than the impacts on enthusiasm, motivation, and attitudes; however, they were still valued as having a perceived positive impact with their mean values above 3.6.

Table 1

Teachers' Ratings on the Impacts of Environmental Education on Student Learning		
Impacts	Mean	Standard Deviation
Enthusiasm	4.51	.612
Motivation	4.37	.646
Attitude	4.43	.655
Thinking Strategies	4.34	.725
Life Skills	4.23	.808
Language Skills	3.63	1.140
Math Skills	3.71	1.045

Note. (n = 35)

Table two indicates that the teachers perceived the greatest impacts of environmental education being on their enthusiasm, the instructional strategies used in the classroom, as well as their lesson planning and design. The responses received regarding the impacts of environmental education on the structuring and scheduling of the curriculum were perceived to be lower, however, were still valued as having a perceived positive impact with the mean value of 3.97.

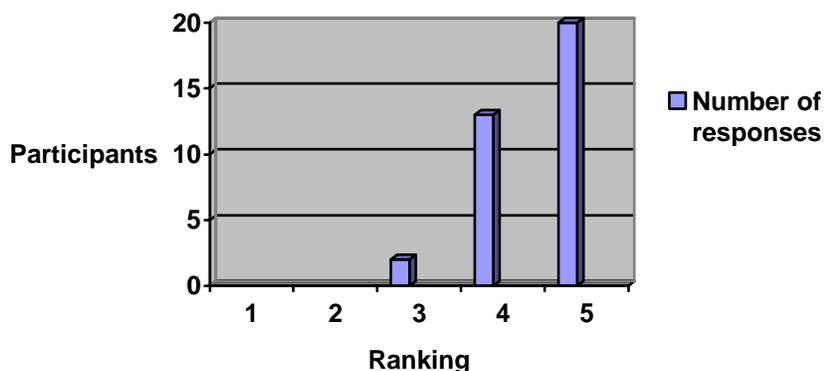
Table 2

Teachers' Ratings on the Impacts of Environmental Education on the Teaching Process		
Impacts	Mean	Standard Deviation
Enthusiasm	4.60	.553
Instructional Strategies	4.37	.690
Lesson Planning	4.06	.938
Curriculum	3.97	.923

Note. (n = 35)

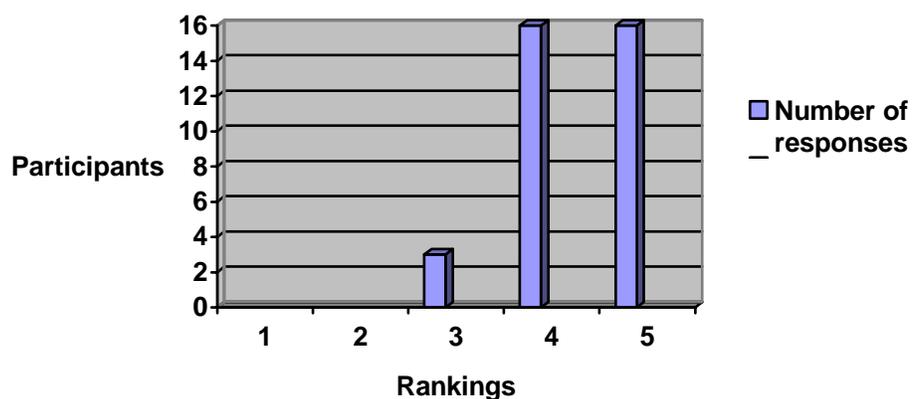
Figures 1-11 show the rankings for each question asked on the survey. The teachers' rankings of each question are shown by the frequency graphs. The rankings range from 1, which is the least amount of impact, to 5, which is the most impact. The results were as follows:

Figure 1: (N = 35) The Extent the EEP Impacted the Students' Enthusiasm for Learning



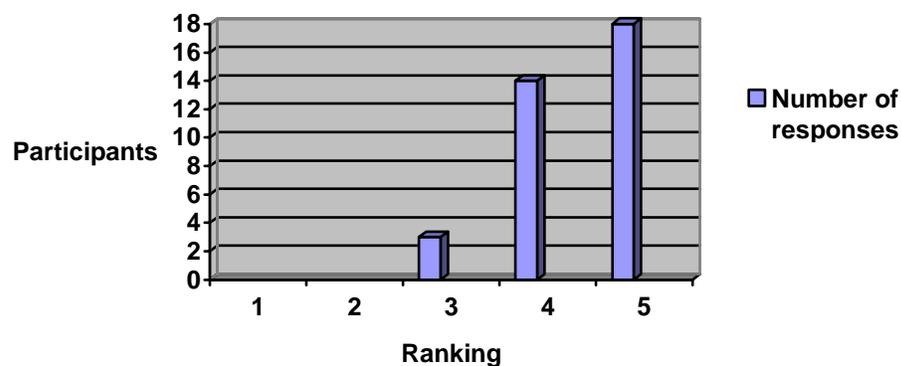
Ranking	1	2	3	4	5
Percent of Teachers	0%	0%	5.7%	37.1%	57.1%

Figure 2: (N = 35) The Extent the EEP Impacted the Students' Motivation to Learn



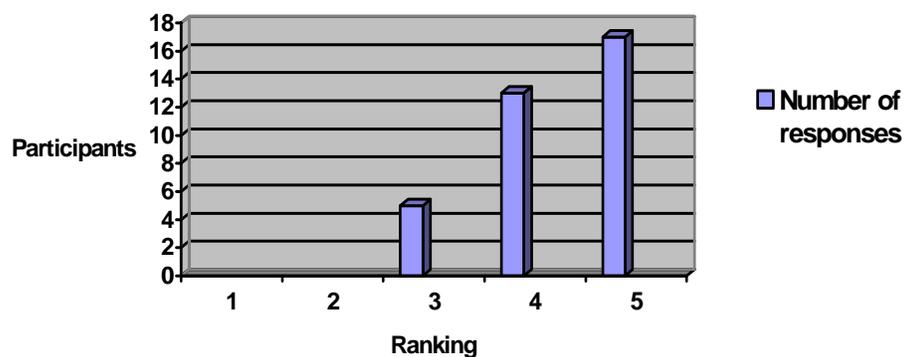
Ranking	1	2	3	4	5
Percent of Teachers	0%	0%	8.6%	45.7%	45.7%

Figure 3: (N = 35) The Extent the EEP Impacted the Students' Attitudes Toward Learning



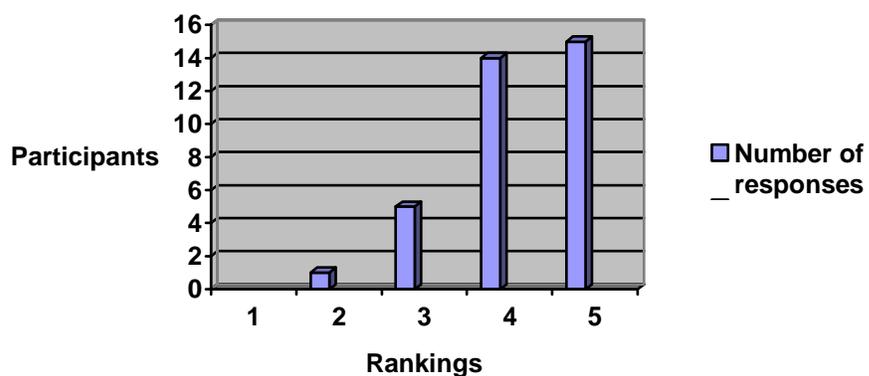
Ranking	1	2	3	4	5
Percent of Teachers	0%	0%	8.6%	40.0%	51.4%

Figure 4: (N = 35) The Extent the EEP Was Found to be Useful in Helping Students Develop Thinking Strategies



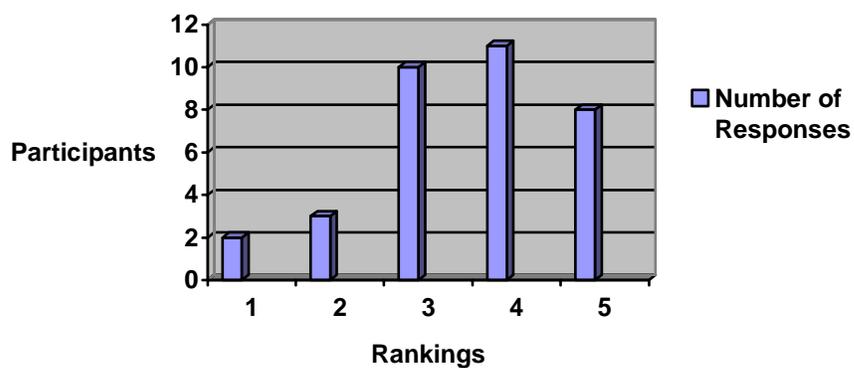
Ranking	1	2	3	4	5
Percent of Teachers	0%	0%	14.3%	37.1%	48.6%

Figure 5: (N = 35) The Extent the EEP Helped Students Develop Life Skills



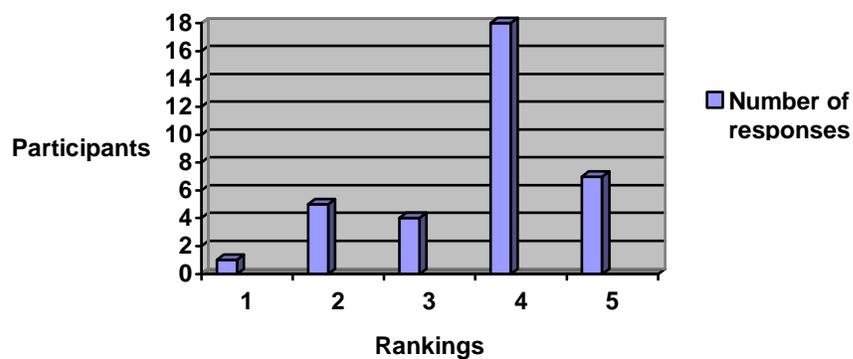
Ranking	1	2	3	4	5
Percent of Teachers	0%	2.9%	14.3%	40.0%	42.9%

Figure 6: (N = 35) The Extent the EEP Had on the Acquisition of Language Skills



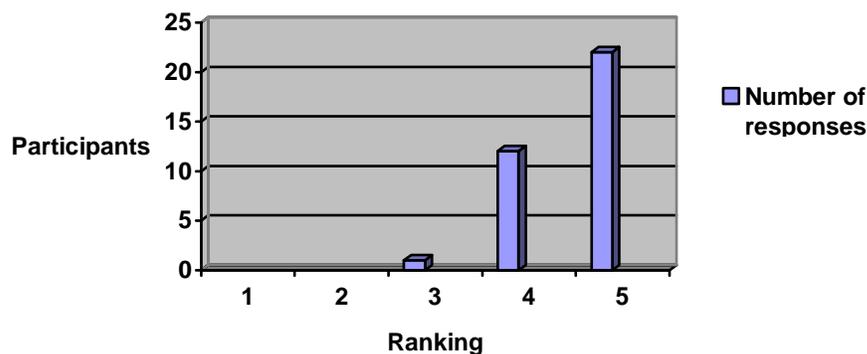
Ranking	1	2	3	4	5
Percent of Teachers	5.7%	8.6%	28.6%	31.4%	25.7%

Figure 7: (N = 35) The Extent the EEP Had on the Acquisition of Mathematical Skills



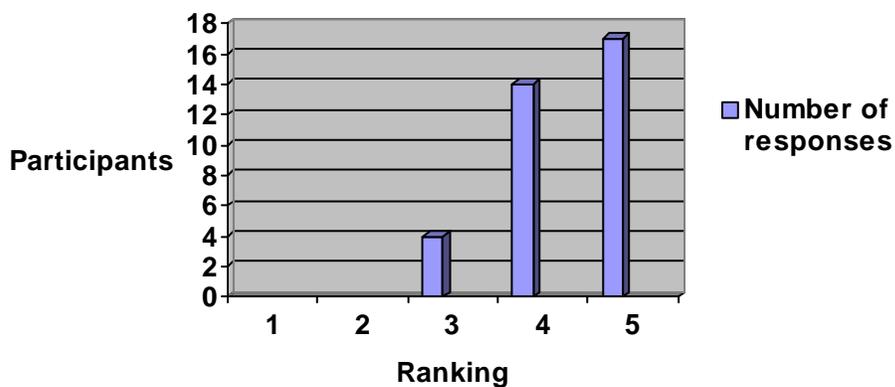
Ranking	1	2	3	4	5
Percent of Teachers	2.9%	14.3%	11.4%	51.4%	20.0%

Figure 8: (N = 35) The Extent the EEP Impacted the Teachers' Enthusiasm for Teaching



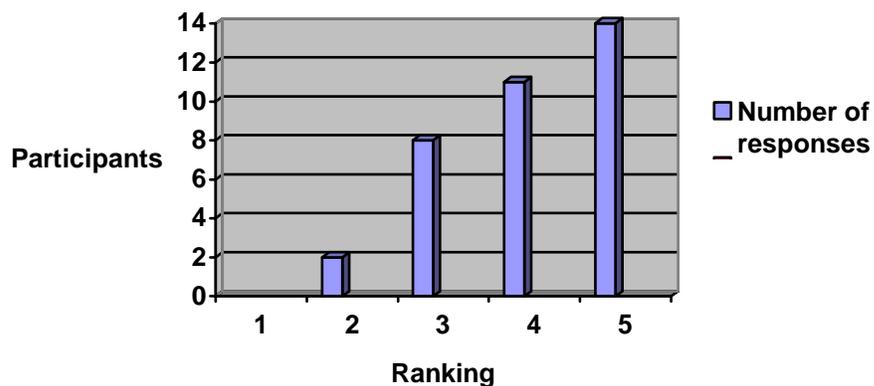
Ranking	1	2	3	4	5
Percent of Teachers	0%	0%	2.9%	34.3%	62.9%

Figure 9: (N = 35) The Extent the EEP Impacted the Instructional Strategies Teachers Use



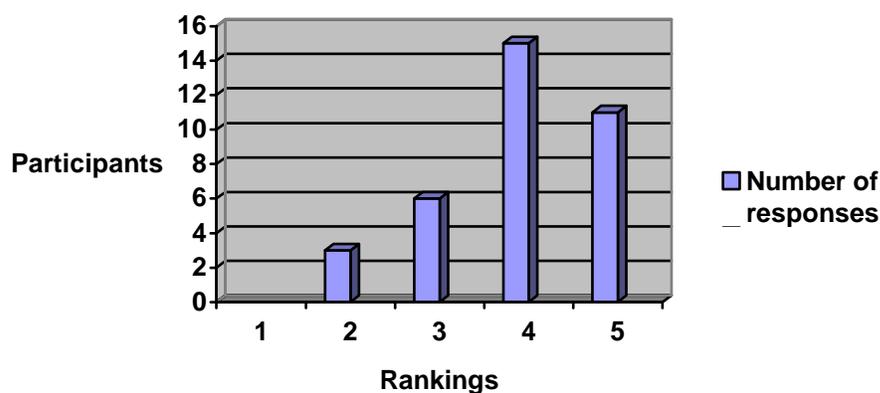
Ranking	1	2	3	4	5
Percent of Teachers	0%	0%	11.4%	40.0%	48.6%

Figure 10: (N = 35) The Extent the EEP Impacted the Teachers' Lesson Planning and Design



Ranking	1	2	3	4	5
Percent of Teachers	0%	5.7%	22.9%	31.4%	40.0%

Figure 11: (N = 35) The Extent the EEP Influenced the Scheduling or Structuring of the Curriculum in the Classroom



Ranking	1	2	3	4	5
Percent of Teachers	0%	8.6%	17.1%	42.9%	31.4%

Results of the Follow-up Interviews

In an effort to gain additional information about the perceptions of the impacts of environmental education on the teaching process and on student learning, interviews were conducted with one teacher from each of the schools participating in the study. Several questions that were asked have been combined into single statements.

1. What changes have you observed in your students' enthusiasm, motivation, and attitudes for learning since beginning the partnership with Mammoth Cave National Park and why do you think this occurs?

The teachers mentioned that the students are excited and inspired to participate because they are able to get out of the classroom and get involved in hands on learning

experiences. Students that do not do well in the classroom setting are excelling outside in the environmental education activities. Students are excited when they know there will be hands on activities. There is an interest and awareness as they begin to think outside the box and ask questions.

2. How has the partnership with Mammoth Cave National Park helped students develop thinking strategies and why do you think this occurs?

The environmental education partnership has helped students realize that there is more to their world than just school. It has helped students relate different things to real life because it brings in real world activities. There is a personal connection to what is going on and the students are taking knowledge from a book and associating it with real life. The partnership has also facilitated group work and problem solving as well as visualization. It has helped students think outside of the box and it teaches them that there is more than one right answer as long as they can provide an explanation and evidence to support their answer. Environmental education has motivated students to come up with different scenarios and pose their own questions

3. Which life skills do you think the partnership has helped the students develop and how do you think this occurs?

“The partnership has helped students develop responsibility to the Earth and made them realize their choices can affect the Earth” (personal communication, April 20, 2004). It has helped develop appreciation and awareness as well as critical thinking and how to work in groups. The programs helped the students make prior connections and understand processes.

4. Which of the skills, e.g., reading, writing, math, and other disciplines, does the partnership help develop?

The partnership has helped with all disciplines from science and math to social studies and writing. “The strength of environmental education is that it is interdisciplinary by nature and it strengthens the different content areas when used together” (personal communication, April 20, 2004).

5. What impacts does the EEP have on your enthusiasm for learning?

The teachers get excited because the activities are meaningful and fun and they see the students’ excitement. It works really well when outside people can come in and give the students a different perspective and it allows the teachers to present new things to their students and add to the curriculum. It motivates teachers to be more hands on, more verbal, and to present things to their students in different ways.

6. Has the EEP had an influence on the instructional strategies you use? How have you altered your strategies?

Teachers that have experienced an influence on their instructional strategies seek to participate in more environmental education workshops. It gives the teachers the opportunity to bring resources and materials into the classroom to use with their students in addition to the Mammoth Cave National Park environmental education activities.

7. Has the EEP impacted your lesson planning and design?

There has been an impact on the teachers’ lesson planning and design since starting the partnership with Mammoth Cave National Park. Teachers are designing their lessons on environmental education activities and they are planning ahead of time

to fit Mammoth Cave into their schedule. They use the partnership for preparation, introduction, reviewing, and supplemental information for their students. Teachers want the training to do the activities on their own and to help develop lesson plans to make the activities fit into the curriculum.

8. What influences has the partnership had on the scheduling or restructuring of the curriculum in the classroom or school?

Environmental education is branching out. The more teachers use it, the more other teachers get interested in using environmental education in their classrooms. The teachers are scheduling the curriculum around the visits to Mammoth Cave National and when the park guides come out to the classrooms. There is shorter teaching time; however, teachers are able to be more creative.

Chapter 5

DISCUSSION

Introduction

The purpose of this study was to determine what teachers' perceptions were regarding the impacts of environmental education on student learning as well as on teaching process. To do that, research questions were addressed that related to the impacts of environmental education and teachers' perceptions of these impacts. This chapter discusses the results of this study, as well as possibilities for future research.

Discussion of the Results of Surveys

The first set of research questions was addressed through the use of a survey instrument designed to measure the perceptions of teachers on the impacts related to using the Mammoth Cave National Park Environmental Education Partnership. Each question related to what teachers perceived the impacts of the EEP to be on students' learning such as their enthusiasm, motivation, attitudes, and different skills, as well as the impacts on the teaching processes such as lesson planning and design, and structuring and scheduling of curriculum. This section discusses the analyses of the responses to the survey.

Teachers' Responses

Several teachers at the study schools completed the survey instrument. Visual inspection of the means from their ratings revealed very high ratings for some of the responses and fairly high ratings for others. Ratings of the impacts on students' enthusiasm, motivation and attitudes were rated higher than the impacts on specific skills.

The ratings of the impacts on teachers' enthusiasm were rated higher than any other impact on teachers. This indicates teachers feel that environmental education is having a positive perceived impact on students as well as teachers.

Discussion of the Follow-up Interviews

The follow-up interviews were developed to give more insight on the survey questions. The questions remained the same as the questions on the survey but allowed for some explanation of why teachers felt environmental education was impacting students and teachers and what aspects of the partnership with Mammoth Cave were rated as having the most perceived impact.

The most positive impacts were on the students' and teachers' attitudes. Bringing environmental education into the classroom and getting the students outside the classroom had the most perceived positive impact on everyone's enthusiasm and motivation. The teachers enjoy and appreciate the idea of a new perspective, which is given through the partnership with Mammoth Cave National Park. The perceived impact on motivation came in when the students realized they were being given the opportunity to do something different. Students responded well to getting outside the classroom and doing hands-on projects in an outside environment.

Discussion of the Impacts on Students

The perceived impacts on skills such as thinking, math, and life skills were still rated as being positive, but not as highly as the impacts on attitudes. The skills the partnership helped develop were the thinking skills. The partnership was able to take concepts out of books and relate them to real life issues that the students were able to identify with. For example, when students studied water quality and pollution, it made more of an impact on the students to bring

in real life situations that hit close to home. The partnership allowed the students to associate environmental problems and solutions with things going on in their backyard.

Discussion of the Impacts on Teachers

The greatest impacts on the teachers were with the teachers' enthusiasm for teaching. The partnership has allowed the teachers to become more involved with their students through hands-on activities. Bringing the outdoors into the classroom allowed the teachers to see a new perspective and different methods of presenting the information to the class. Another impact that environmental education has had on teachers is with the teachers' lesson planning and design. Teachers were finding that they were planning ahead of time and using the partnership to introduce, build on, and review topics in the classroom. The teachers scheduled all trips and visits for the entire fall or spring season within the first week of being back at school. Each activity was planned to coincide with the lessons the teachers were covering at the time of the visit.

The impacts on instructional strategies were mixed. Many teachers said that the EEP had a positive impact on the instructional strategies they used in the classroom and other said that there was little impact. Many teachers have discovered new ways to present the information to their students through using environmental education. Teachers want the training to do the activities in the classroom and also to have the resources from the workshops.

Limitations

There were several limiting factors related to the design of this study. One of the limitations was that the researcher only involved schools that worked with and took part in Mammoth Cave National Park's Environmental Education Partnership. If this study was

repeated, the results may be different if other schools were involved that do not participate in the EEP. Not all environmental education programs may have the same effects on teachers and students. There would be different degrees of involvement in environmental education. The other aspect of this limitation was that the teachers responded by what they perceived the impacts to be on students. No students were interviewed for this study.

The teachers were willing to participate in this study because they were familiar with the researcher. Other studies would need to strive to receive the same kind of participation results. Although the 100 percent participation is not a limitation, the familiarity between the researcher and the teachers could be considered as biased.

Future Study

The focus of this study was the schools surrounding Mammoth Cave National Park that have been involved in the Mammoth Cave National Park Environmental Education Partnership. These schools only represent the surrounding counties. Additional studies are needed to represent the other geographical areas. These future studies should focus not only on partnership schools, but any schools that uses environmental education in the classroom. It is also possible to analyze state standardized test scores to help determine the progress of the students.

The study also provided some baseline data for Mammoth Cave National Park. Additional studies could be used to ask new questions regarding the impact of environmental education in schools. Other studies could be used to evaluate the Mammoth Cave National Park Environmental Education Partnership as well as to determine what areas need more focus to have more of an impact on students and teachers.

This study has produced some results that relate to the goals and objectives of environmental education. As with any study providing baseline information, this study should be built on in an effort to answer additional questions about the impacts of environmental education as well as examining the possibilities that exist for students and teachers that become involved in environmental education. The practical application of these findings should be refined and shared in the future. As cultures progress and resources decline, environmental education may prove to be one of the best ways to get students involved in and educated about the environment at an early age. Education is the planet's future.

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APPENDICES

APPENDIX A
QUANTITATIVE RESEARCH INSTRUMENT

Name: _____ School: _____

Years Teaching: _____ Years involved in EE: _____

Years involved with Mammoth Cave Environmental Education Partnership: _____

Grade/s Teaching: _____

Please answer the questions using the scale 1-5, with 1 being the least and 5 being the most. EEP addresses the Environmental Education Partnership with Mammoth Cave National Park.

Impacts on Students' Learning:

To what extent has EEP had on your students' enthusiasm for learning? 1 2 3 4 5

To what extent has EEP had on your students' motivation? 1 2 3 4 5

To what extent has EEP had on your students' attitudes? 1 2 3 4 5

To what extent have you found EEP to be useful in helping students develop thinking strategies? 1 2 3 4 5

To what extent does EEP help students develop life skills 1 2 3 4 5

To what extent does EEP have on the acquisition of language skills? 1 2 3 4 5

To what extent does EEP have on the acquisition of mathematical skills? 1 2 3 4 5

Impacts on Teaching:

To what extent does EEP have your enthusiasm for teaching? 1 2 3 4 5

To what extent has EEP had on the instructional strategies that you use? 1 2 3 4 5

To what extent has EEP impacted your lesson planning and design? 1 2 3 4 5

To what extent has EEP influenced the scheduling or structuring of the curriculum in the classroom? 1 2 3 4 5

APPENDIX B
QUALITATIVE RESEARCH QUESTIONS

Name: _____ School: _____

Impacts on Students' Learning

- 1) What changes have you observed in your students' enthusiasm for learning, motivation, and attitudes since beginning the partnership with Mammoth Cave?
 - a) Why do you think these changes have occurred?
- 2) How has the partnership with Mammoth Cave helped students develop thinking strategies?
 - a) Why do you think this occurred?
- 3) Which life skills do you think the partnership has helped the students developed?
 - a) How do you think this occurs?
- 4) Which of the skills, e.g., reading, writing, math, and other disciplines, does the partnership help develop?
 - a) How do you think this occurs?

Impacts on Teaching

- 1) What impacts does EEP have on your enthusiasm for teaching?
 - a) Why do you think this occurs?
- 2) Has the EEP had an influence on the instructional strategies you use?
 - a) How have you altered your strategies?
 - b) Why do you think that this occurs?
- 3) Has EEP impacted your lesson planning and design?
 - a) How does it affect your lessons?
 - b) Why do you think this occurs?
- 4) What influences has the partnership had on the scheduling or restructuring of the curriculum in the classroom or school?
 - a) Why do you think this occurs?

APPENDIX C

NOTICE OF HUMANS SUBJECTS APPROVAL

Western Kentucky University
Informed Consent Form

Project: Teacher perceptions of Environmental Education on the Teaching Process and Student Learning

Investigator: Angela Castelli: Graduate Student
Western Kentucky University
Department of Physical Education and Recreation
(270) 782-6429
Castea@wku.edu

You are invited to participate in a thesis research study conducted through Western Kentucky University.

The University requires that you receive and sign this statement before participating in this study. The investigator will explain to you in detail the purpose of the project, the procedures to be used, and the potential benefits and possible risks of participation. Please read this explanation and feel free to contact Angela Castelli if you have any regarding the study. If you then decide to participate in the project, please complete the survey and submit it to the project investigator.

Nature and Purpose of the Project: This study entails collecting data from elementary and middle schools teachers throughout South-central Kentucky. The data will be collected through surveys and interviews. The published data will be aggregate data from all the surveys and individual comments or quotes from the individuals participating in the interviews. All names of the teachers and the schools participating in this study will remain confidential and will not be published.

Explanation of Procedures: Those willing to participate in this study should answer all the questions in the survey and during the interview and then submit the survey to the investigator.

Discomfort and Risks: There are no known discomforts or risks associated with this project. Other than requesting the perceived benefits of Environmental Education in relation to the students and teachers, there will be no personal information gathered and each participant will remain anonymous.

Benefits: The collected data will help teachers, administrators, and educators better understand the purpose and benefits of using the Mammoth Cave National Park Environmental Education Partnership in conjunction with the lessons in the classroom. This study will also help environmental educators assess where environmental education can be most beneficial and what needs more work.

Confidentiality: All names and schools will remain confidential and will not be released in the results of the study. The information collected through the surveys and the interviews will not be kept confidential and will be used in presentations and published articles. Specific data that

is made public will not be able to be traced back to an individual. The teachers will not be asked to provide their name or the name of their school in the survey or interview.

Refusal/Withdrawal: Refusal to participate in the survey or the interview will in no way have any effect on any future services you may be entitled to from the environmental education department. Anyone who agrees to participate in this study is free to withdrawal from this study at any time with no penalty. You may, at any time, voluntarily exit the survey and your school's data will be inaccessible and not included in the study.

You understand also that it is not possible to identify all potential risks in a research study, and you believe that reasonable safeguards have been taken to minimize both the known and potential but unknown risks.

Signature of Participant

Date

Witness

Date

THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY THE WESTERN
KENTUCKY UNIVERSITY HUMAN SUBJECTS REVIEW BOARD

Dr. Phillip E. Meyers, Human Protections Administrator

TELEPHONE: (270) 745-4652