ABSTRACT

THE STATUS OF ENVIRONMENTAL EDUCATION IN ILLINOIS PUBLIC HIGH SCHOOL SCIENCE AND SOCIAL STUDIES CLASSROOMS

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This study examined the relationships among the levels of pre-service and inservice teacher preparation in various topic areas within environmental education (EE) and the levels of implementation of those topic areas in public high school science and social studies classrooms in Illinois. The study also measured teacher attitudes toward EE. In March 2012, surveys were sent to all science and social studies teachers in 30 high schools in northern Illinois, 30 high schools in the central part of the state, and 30 high schools in southern Illinois, all randomly selected.

Descriptive, correlational, and inferential statistics were used to analyze the data collected in this study. Findings from this study indicated that teachers who had received pre-service teacher education in EE implemented significantly more EE topics into the curriculum than did teachers who reported receiving no pre-service teacher education in EE. Of those teachers who did have this pre-service experience, their perception of its effectiveness did not significantly impact the level of topic implementation in their classrooms. This suggests that any preparation in EE is better than no preparation at all. The results also indicate a need to expand pre-service and inservice exposure to environmental topics. In addition, science teachers had a higher level of implementation for the majority of the EE topics compared to social studies teachers, even though environmental topics and issues are included in standards for both sets of teachers. This indicates a need to place more emphasis on EE for social studies teachers during both their undergraduate years and inservice programming. Cluster analysis on the implementation of EE topics in this study revealed that within some clusters

there may be common ground upon which to build interdisciplinary units among teams of science and social studies teachers. This may help encourage social studies teachers to address EE issues within their curriculum. The findings also revealed that beginning teachers do not implement the EE topics nearly as much as veteran teachers. Beginning teachers may need additional support from veteran teachers who are experienced in integrating environmental topics into the curriculum.

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THE STATUS OF ENVIRONMENTAL EDUCATION IN ILLINOIS PUBLIC HIGH SCHOOL SCIENCE AND SOCIAL STUDIES CLASSROOMS

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I continued this tradition with my own children, Julie and Jim, as I watched them marvel at the natural wonders of our country.

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Other people in my life have helped shape my environmental ethic and love for nature. My friend, Mike Schneider, is at the top of that list.

All these experiences have led me down the path to where I am today. I am grateful for these lasting memories. They have helped me become a better teacher and I hope my love for the environment has encouraged many of my students over the years to become good stewards of this planet.

DEDICATION

To the love of my life, Bob

TABLE OF CONTENTS

LIST OF TABLES

Table Page

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION TO THE STUDY

Introduction

On February 2, 2007, the Intergovernmental Panel on Climate Change released its Fourth Assessment Report in Paris, France (Natural Resources Defense Council [NRDC], 2007; Starke, 2008). Hundreds of the world's best climate scientists reviewed and synthesized enormous amounts of climate data (NRDC, 2007). According to this report (Intergovernmental Panel on Climate Change [IPCC], 2007a), "Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning many thousands of years" (p. 2). The scientists reported that the major human activities responsible for these increases have come from fossil fuel use, land use changes, and agriculture (IPCC, 2007a). Global warming is occurring and will affect all ecosystems and their inhabitants (Starke, 2009). What are some of the consequences beyond a warmer world?

- The timing of life cycles of many plants is changing. The ranges of many plant and animal species are shifting, while others are facing extinction (IPCC, 2007b; Lovejoy, 2009).
- Some areas of the planet will likely experience more frequent and more pronounced flooding. Other areas are and will be affected by drought conditions (Löw, 2010; Hare, 2009; IPCC, 2007a; IPCC 2007b).
- Human health threats from heat waves are increasing. The ranges of infectious diseases, disease carriers, and insect pests are also expanding (Almendares & Epstein, 2009; IPCC, 2007b).

- As ice sheets in Greenland, Antarctica, and elsewhere melt, sea levels rise and could threaten many low-lying coastal areas around the world. Small, low-lying islands such as Kiribati and the Maldives are particularly vulnerable (Cameron, 2009; IPCC, 2007a; Russell, 2009; Russell & Mastny, 2011).
- Increased stress on water supplies will affect millions of humans and countless other species (Gardner, 2010). The results of this have the potential to disrupt social and political stability (IPCC, 2007b; Wallace, 2009).

In addition to global warming, other environmental issues continue to confront us on a daily basis. Many of the stories we hear are negative, such as the continued loss of the world's forests (Normander, 2012), the ongoing damage to highly productive coral reefs (Glyki & Normander, 2012), and the alarming number of plants and animals on the verge of extinction (Normander, 2012). Other pieces of environmental news are positive: for example, the increase in job opportunities due to the growth of green industries, global investments in renewable energy (Renner, 2012), the development of new LEED (Leadership in Energy and Environmental Design) standards for neighborhood development to encourage the growth of mixed use, pedestrian and environmentally friendly neighborhoods (NRDC, 2011), and the awarding of the 2007 Nobel Peace Prize to former U.S. Vice President Al Gore and the Intergovernmental Panel on Climate Change (Mastny, 2009). Whether positive or negative, environmental issues will continue to be a part of our lives.

The importance of learning about the environment has never been more apparent. The environmental issues described in the previous paragraphs are but a sampling of the problems and opportunities that confront us daily. Our students need to be prepared to tackle these issues in academic settings. Some of them will go on to careers that require, at the very least, a basic understanding of the environment. Others will need more in-depth knowledge. All students, as citizens of the world, will need the knowledge and skills to address environmental issues in their communities and beyond.

The support for environmental education (EE) goes beyond the EE community. President Barack Obama has shown a strong commitment to education and the environment. In a speech on April 27, 2009 to members of the National Academy of Sciences, the President called science "more essential for our prosperity, our security, our health, our environment, and our quality of life than it has ever been before" (Obama, 2009, ¶ 10). He went on to mention a number of environmental issues that we need to confront and mitigate before it is too late. The ability of the United States to address these and other problems depends "on what we do now to educate the next generation" (Obama, 2009, ¶ 58).

Various organizations have expressed their support for EE. The National Science Teachers Association states that environmental education "should be a part of the school curriculum because student knowledge of environmental concepts establishes a foundation for their future understandings and actions as citizens" (2003, p. 1). According to the National Association of Biology Teachers (NABT), "meeting the environmental challenges that face humankind requires a knowledgeable citizenry that understands how relevant scientific information informs sound policy decisions" (2004, p. 1). NABT urges its members to incorporate environmental issues into the curriculum, noting that EE is multidisciplinary and helps students "acquire the skills and knowledge to act on scientific information to make effective decisions on environmental issues" (p.1). In its position statement, Preparing Citizens for a Global Community, the National Council for the Social Studies (NCSS) states, "A global perspective is attentive to the interconnectedness of the human and natural environment and the interrelated nature of events, problems or ideas. An important characteristic of global studies is the analysis or problems, issues, or ideas from a perspective that deals with the nature of change and interdependence" (NCSS, 2001, ¶ 2). Although this is not a direct reference to environmental education, it does contain components of EE.

Other groups supporting EE include the National Environmental Education Foundation (n.d.) and the North American Association for Environmental Education (2009). Some federal agencies also encourage the inclusion of EE in schools. Strategic goal 1 of the Environmental

Education Division of the Environmental Protection Agency is to "promote the use of environmental education in schools and communities to improve academic achievement and stewardship" (United States Environmental Protection Agency, 2006, p. 1). According to the National Science Foundation, "environmental education should be used as an integrating concept in pre-school, elementary, and secondary education" (2003, p. 3). In order for students to learn about the environment, teachers need effective pre-service teacher preparation and continued inservice teacher professional development.

Pre-service Teacher Preparation

For teachers to effectively address environmental topics and issues within the classroom, they need at least a basic grounding in those topics and issues as well as techniques and strategies for incorporating EE into the curriculum. This has been a topic of discussion in international EE circles for more than 30 years. The first Intergovernmental Conference on Environmental Education was held in Tbilisi, Georgia in 1977 (*The Tbilisi Declaration*, 1978). The conference participants stressed, among other things, that significant attention needed to be paid to pre-service and inservice training of elementary and secondary teachers. Goals, objectives, and guiding principles of environmental education were developed. The EE objectives proposed at Tbilisi provide an excellent starting point for pre-service and inservice teacher preparation.

A number of studies have documented the need for a more complete pre-service teacher preparation in environmental education (Disinger & Howe, 1990; Heimlich, Braus, Olivolo, McKeown-Ice, & Barringer-Smith, 2004; McKeown-Ice, 2000; Mastrilli, 2005; Pettus, 1982; Plevyak, Bendixen-Noe, Henderson, Roth, & Wilke, 2001). Van Petegem, Blieck, and Boeve-De Pauw (2007) state that teacher preparation institutions must make environmental education a priority in teacher education. Teachers do not stop learning with the completion of their pre-service coursework. Ongoing professional development is also necessary for continued growth and improvement.

Inservice Teacher Professional Development

Environmental education inservice workshops should address known barriers to EE (Ham & Sewing, 1988; Ham, Rellergert-Taylor, & Krumpe, 1987). Among those barriers, Ham and Sewing (1988) found that nearly 50% of the participants in their research study stated that a lack of content knowledge in natural science was an important reason for not including EE within their curriculum. Despite years of encouraging teachers to embrace the interdisciplinary nature of environmental education, EE for inservice teachers has been primarily science oriented (Wade, 1996). Many EE workshops are funded or sponsored by university science departments, science organizations, and various state natural resource agencies (Ham & Sewing, 1988; Wade, 1996). According to Simmons (1989), the majority of EE curriculum guides are science oriented. Ham and Sewing (1988) found that 62.6% of teachers in their study felt that science was the most appropriate subject area for environmental education. Social studies came in second. Lane, Wilke, Champeau, and Sivek (1994) found that non-science teachers tend to feel that EE belongs in science classes.

This study examines the levels of pre-service and inservice teacher preparation and their relationship with the levels of implementation of topic areas in environmental education in Illinois secondary science and social studies classrooms. The remainder of Chapter 1 will further explain this study.

Conceptual Framework

This study assumes that environmental education is a vital and necessary component of the education of all citizens. Teachers must be prepared to effectively address environmental topics and issues within the classroom (McKeown-Ice, 2000; Plevyak, 1997). Criteria exist to inform these efforts.

Guidelines have been established by the North American Association for Environmental Education (NAAEE) to address the need for quality preparation and professional development among environmental educators (2010b). The guidelines “outline the abilities and

understandings—or competencies—an educator needs to implement environmental education successfully" (p. 2).

The guidelines include six themes: environmental literacy, foundations of environmental education, professional responsibilities of the environmental educator, planning and implementing environmental education programs, fostering learning, and assessment and evaluation. A detailed description of these themes can be found in Chapter 2. NAAEE guidelines form the conceptual framework for this study.

Problem Statement

According to the Tbilisi Declaration (1978) one of the goals of environmental education is "to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment" (p. 3). Given the ever-growing list of environmental problems facing this planet, there is need for solid grounding in environmental education.

Twenty years after Tbilisi, research conducted by the National Environmental Education and Training Foundation and Roper from 1997 through 2001 revealed that American adults still have little knowledge of basic environmental facts, the science underlying environmental knowledge, and public environmental issues (Coyle, 2005). If American adults have little environmental knowledge, it stands to reason that high school students lack this basic literacy as well. Environmental education has yet to reach the status of a core subject area in high schools and thus is infrequently taught. Few studies have been done to determine the status of environmental education in high schools in this country. The most recent status study in Illinois was conducted in 1994 (Smith-Sebasto & Smith) and included K-12 public schools. Illinois could benefit from a current analysis.

Purpose

The purpose of this study was to determine the relationship between the level of implementation of topic areas in environmental education in secondary science and social studies classrooms in Illinois and the levels of pre-service and inservice teacher preparation in environmental education topic areas. Teacher attitudes toward environmental education were also examined.

Research Questions

These three questions guided the study:

1. What is the relationship between the level of implementation of topic areas in environmental education in high school science and social studies classrooms and
    a. the level of pre-service teacher preparation in environmental education topic areas?
    b. the level of inservice teacher preparation in environmental education topic areas?
    c. demographic characteristics of secondary science and social studies teachers?
2. What is the relationship between the attitudes toward environmental education held by high school science and social studies teachers and
    a. the level of implementation of topic areas in environmental education?
    b. the level of pre-service teacher preparation in environmental education topic areas?
    c. the level of inservice teacher preparation in environmental education topic areas?
    d. demographic characteristics of secondary science and social studies teachers?
3. What is the relationship between the level of pre-service teacher preparation in environmental education topic areas and the level of inservice teacher preparation in environmental education topic areas?

Need for the Study

In 1994 Smith-Sebasto and Smith conducted a study to determine the status of environmental education in Illinois K-12 public schools. They found that 92% of the

respondents had not received any pre-service teacher preparation in environmental education. Eighty-one percent of those responding had not received any inservice teacher preparation in environmental education.

Two years after this study, the National Environmental Education Act (NEEA) expired (NAAEE, 2007b). The vision of the NEEA was to achieve an environmentally literate citizenry (National Environmental Education Advisory Council, 1996). Since its expiration there has been a lack of state and federal level attention to environmental education (Coyle, 2005). However, attention is once again turning to the environment. Global warming is frequently in the news. Author Richard Louv's book, *Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder*, has garnered a great deal of attention as well. Louv (2005) argues that today's children have lost their connection to the natural world and are much more in tune with television, video games, and other technological gadgets than they are with their own backyard. The proposed No Child Left Inside Act (H.R.2547 and S.1372) provides for funds to train teachers in environmental education and funds to states to create programs to ensure that high school graduates are environmentally literate (Chesapeake Bay Foundation, 2012).

Ruskey, Wilke, and Beasley (2001) recommended that all states should implement pre-service environmental education programs. They stated that studies to determine the status of EE programs should be repeated every three years because the field of education, including EE, is dynamic. It has been 18 years since a study has been done to determine the status of environmental education in Illinois. With the renewed interest in the environment, I propose that we need an updated study of the status of environmental education in this state. It should serve to provide baseline data from which to compare future trends in EE in Illinois.

The information from this study may be helpful to teacher education institutions that may be considering adding environmental education to their pre-service teacher education requirements. It may also be helpful to those planning environmental education professional development opportunities for inservice teachers.

Delimitations

The study was limited to two disciplines within public high schools only. Although some public high school teachers within other disciplines may include elements of environmental education within their classrooms, I have chosen to focus on science and social studies only. These are the two disciplines within which the environment is most frequently addressed in the Illinois Learning Standards (ISBE, 1997). Public schools are held accountable for meeting these standards.

Assumptions

One of the assumptions of this study was that the participants understood the intent of the survey questions. They would take the questions at face value and not perceive that there were hidden meanings within these items. Another assumption was that participants would answer the survey questions honestly. They would not attempt to embellish the extent to which they teach students about the environment.

Definitions

For the purpose of this study, the following definitions were used.

Environmental education: "A learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action" (The Definitions Project, 2007, p. 4). In this study, environmental education (EE) refers to learning about environmental content topics typically encountered in high school science and social studies curricula.

Environmental literacy: "[The definition of]. . . an environmentally literate person as someone who, both individually and together with others, makes informed decisions concerning the environment; is willing to act on these decisions to improve the well being of other individuals, societies, and the global environment; and participates in civic life" (North American

Association for Environmental Education (NAAEE, 2011, p. 2-3). Environmentally literate high school students have gained knowledge about environmental issues, are aware of the interdisciplinary nature of EE, and are acquiring problem-solving and decision-making skills needed to make informed and responsible decisions regarding the environment (Maryland State Department of Education, 2011; Environmental Literacy Plan Working Group, 2012).

Extent of exposure to environmental education during inservice teacher professional development: In this study, extent of exposure to environmental education during inservice teacher professional development refers to the sum of the scores of science and social studies teachers on a 19-item, 5-point Likert type scale. Each of the 19 items contains a topic area within environmental education. Each item will be rated from 1 (never) to 5 (a great deal). Mean exposure scores will be calculated. Inservice teacher education includes graduate courses, workshops, district offerings, seminars, or conferences taken after teacher certification (Plevyak, 1997).

Extent of exposure to environmental education during pre-service teacher preparation: In this study, extent of exposure to environmental education during pre-service teacher preparation refers to the sum of the scores of science and social studies teachers on a 19-item, 5-point Likert type scale. Each of the 19 items contains a topic area within environmental education. Each item will be rated from 1 (never) to 5 (a great deal). Mean exposure scores will be calculated. Pre-service teacher education includes general coursework, professional studies, and field experiences taken prior to teacher certification (Plevyak, 1997).

Level of implementation of environmental education: In this study, the level of implementation of environmental education refers to the sum of environmental education topics that are incorporated into the curriculum by high school science and social studies teachers. A 5-point Likert type scale was used with each of 19 items representing topic areas within environmental education. Each item was rated from 1 (never) to 5 (a great deal). Mean implementation scores were calculated (Plevyak, 1997).

Topic areas in environmental education: In this study, topic areas in environmental education refer to content topics that are a part of environmental education and are incorporated into the curriculum by high school science and social studies teachers. Sample topics include ecology, energy, environmental politics, and human population (Plevyak, 1997).

Method

A quantitative research design was used for this study. The measurement instrument was an online survey. The survey was a modification of a survey used by Plevyak (1997) in her dissertation research. The participants in this study were Illinois public high school science and social studies teachers. Cluster sampling was used to obtain the desired sample for this research study. The clusters were 90 Illinois public high schools drawn at random. A stratified random sample of these 90 public high schools was drawn from among three geographic regions in the state. All of the science and social studies teachers within these 90 schools were asked to participate in the survey. Descriptive, correlational, and inferential statistics were used to analyze the data collected in this study.

Organization of the Study

This study is organized into five chapters. Chapter 1 includes an introduction to the study including the problem and purpose statements, the research questions and the need for the study. Chapter 2 is a review of the literature relevant to the problem and included the conceptual framework. In Chapter 3, the methods are discussed. Chapter 4 consists of a presentation of the data. Finally, an analysis of the data, conclusions, implications, and suggestions for further study are presented in Chapter 5.

CHAPTER 2

ENVIRONMENTAL EDUCATION IN UNITED STATES PUBLIC SCHOOLS: A LITERATURE REVIEW

This chapter, divided into five sections, is a summary of the research on environmental education in public schools (K-12) in this country:

- History of Environmental Education
- Goals and Objectives of Environmental Education
- Environmental Education, Standards, Benchmarks, and Guidelines
- Current Practice in Environmental Education
- Status of Environmental Education Studies

History of Environmental Education

The roots of modern environmental education (EE) began to take hold by the late 1960s (see chronological summary of EE historical events described in this chapter in Appendix A). The American public began to take notice of such issues as pesticide use, declining air and water quality, decreasing open space, and increasing human population. These issues were brought to the attention of the nation following the publication of books such as Rachel Carson's *Silent Spring* (1962), Stewart Udall's *The Quiet Crisis* (1963), and Paul Ehrlich's *Population Bomb* (1968). Student eco-action groups began sprouting up across the nation (Rome, 2003).

Gaylord Nelson, then a U.S. senator, and Denis Hayes, a student activist, proposed a nationwide teach-in on the environment (Kline, 2007; Rome, 2003). Hayes took on the role as Earth Day coordinator and planned a national event. According to Rome (2003), in April of 1970 approximately 1500 colleges held Earth Day teach-ins, and there were numerous speeches, demonstrations, and events from coast to coast. Most of the events focused on

problems such as solid waste disposal, oil spills and other aquatic issues, thermal pollution of the atmosphere, and a decline in natural resources (Kline, 2007).

As a result of increasing public concern and support for the environment, President Richard M. Nixon shifted his thinking as well (Kline, 2007; Rome, 2003). Although he previously ignored environmental issues, he commented on the need to have clean air and water in his February 1970 State of the Union address (Kline, 2007). He signed the National Environmental Policy Act (NEPA) and the first Environmental Education Act, both in 1970, created the Environmental Protection Agency (EPA), called for a new land ethic and accepted a tough revision of the Clean Air Act.

Internationally, there was a move toward environmental education as well. In 1972 the United Nations Conference on the Human Environment took place in Stockholm, Sweden. Out of this conference, the United Nations Educational, Scientific and Cultural Organization (UNESCO) created The International Environmental Education Program (IEEP) to develop, promote, and fund EE (McKeown & Hopkins, 2003). For the next three years the IEEP worked to develop what became an historic document known as the Belgrade Charter. It was adopted unanimously at the conclusion of the International Environmental Education Workshop in Belgrade, Yugoslavia in October of 1975 and "laid down the principles and established the guidelines for the world-wide environmental education of a generation which spans the earth" (1976, p. 1).

In 1977 in Tbilisi, Georgia the first Intergovernmental Conference on Environmental Education was held. It was organized by UNESCO in cooperation with the United Nations Environment Programme (UNEP). The Tbilisi Declaration (1978) grew out of the directives of the Belgrade Charter and called for environmental education to be a lifelong learning endeavor, preparing individuals to protect the environment in an ever-changing world. Goals and objectives for EE initially developed at Belgrade were then further refined at Tbilisi. A summary of those efforts is described next.

Goals and Objectives of Environmental Education

The Belgrade Charter (1976) called for a new "global ethic" (p. 1). Significant educational efforts would be needed in order for society to make the necessary changes. The Charter stated that

> the foundations must be laid for a world-wide environmental education programme that will make it possible to develop new knowledge and skills, values and attitudes, in a drive towards a better quality of environment and, indeed, towards a higher quality of life for present and future generations living with that environment. (p. 2)

With that foundation in mind, the workshop participants came to consensus on the general goal of EE:

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

The UNESCO/UNEP efforts at Tbilisi expanded on the efforts made in Belgrade. The participants at this conference developed criteria to help guide the efforts of environmental education at all levels. They also developed more specific goals for EE as well as categories of EE objectives. According to the Tbilisi Declaration (1978), the goals of environmental education are

- to foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas;
- to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment;
- to create new patterns of behaviour of individuals, groups and society as a whole towards the environment. (p. 3)

The Tbilisi Declaration also included five categories of environmental education objectives:

> **Awareness**: to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems.
> **Knowledge**: to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems.
> **Attitudes**: to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.
> **Skills**: to help social groups and individuals acquire the skills for identifying and solving environmental problems.

> **Participation**: to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems. (p. 3)

Three years after the conference in Tbilisi, Georgia, Hungerford, Peyton, and Wilke (1980) developed a set of goal statements for curriculum development based on the Tbilisi Declaration. The goals were arranged in four levels: 1. Ecological Foundations Level; 2. Conceptual Awareness Level – Issues and Values; 3. Investigation and Evaluation Level; and 4. Environmental Action Skills Level – Training and Application. The authors felt that these goals and their subcomponents were needed to provide curriculum developers and practitioners with definitive EE goals to guide the development of learning standards. However, national standards were still some years away from being developed and implemented.

Environmental Education Standards, Benchmarks, and Guidelines

Not until the 1990s did standards emerge to support environmental education. Six sets of EE standards were written during that decade and some of these have since been updated: *Benchmarks for Science Literacy* (American Association for the Advancement of Science, 1993), the *National Science Education Standards* (National Research Council, 1996), *National Curriculum Standards for Social Studies* (National Council for the Social Studies, 2010), the *Illinois Learning Standards* (Illinois State Board of Education, 1997), *Excellence in Environmental Education—Guidelines for Learning (Pre K-12)* (North American Association for Environmental Education, 2010a), and the *Guidelines for the Preparation and Professional Development of Environmental Educators* (NAAEE, 2010b). The latter two documents were part of the National Project for Excellence in Environmental Education. Some commonalities as well as differences exist among these documents. A brief discussion of each set of standards follows.

Benchmarks for Science Literacy

In 1993 the American Association for the Advancement of Science (AAAS) published *Benchmarks for Science Literac*y as part of Project 2061. *Benchmarks* specifies how students should progress toward science literacy and provides recommendations about what students should know and be able to do by the time they finish grades 2, 5, 8, and 12. There is no benchmark devoted entirely to environmental education, however, because the field of EE is interdisciplinary it fits well with parts of various benchmarks within this publication. For example, benchmarks devoted to the physical setting of this planet have environmental components that include climate change, the water cycle, and energy transformations. According to *Benchmarks*, by the time students complete the 8th grade, they should know that

> Climates have sometimes changed abruptly in the past as a result of changes in the earth's crust, such as volcanic eruptions or impacts of huge rocks from space. Even relatively small changes in atmospheric or ocean content can have widespread effects on climate if the change lasts long enough. (p. 69)

There are also benchmarks which scrutinize ecosystems and various ecological processes including interactions among living things and between living things and their environment. Another representative benchmark deals with the growth of human populations and how that affects economic, political, social, and environmental factors. By the time students complete the 8th grade, they should know that

> The size and rate of growth of the human population in any location is affected by economic, political, religious, technological, and environmental factors. Some of these factors, in turn, are influenced by the size and rate of growth of the population. (p. 163)

Other benchmarks looked at the designed world and its impact on the environment.

National Science Education Standards

Similar to the *Benchmarks for Science Literacy*, the *National Science Education Standards* (NRC, 1996) also included environmental components. For example, Content Standard C had a section devoted to the interdependence of organisms and one that dealt with

matter, energy, and organization in living systems. According to the *Standards*, students in grades 9-12 should have an understanding that

> Human beings live within the world's ecosystems. Increasingly, humans modify ecosystems as a result of population growth, technology, and consumption. Human destruction of habitats through direct harvesting, pollution, atmospheric changes, and other factors is threatening current global stability, and if not addressed, ecosystems will be irreversibly affected. (p. 186)

Content Standard F included sections about population growth, natural resources, environmental quality, natural and human-induced hazards, and science and technology in local, national, and global challenges. The inquiry standards as well as the standards for science teaching, the professional development for teachers of science, and assessment could be applied to environmental education, but are not devoted solely to it.

National Curriculum Standards for Social Studies

The environment is also a topic within the *National Curriculum Standards for Social Studies* (NCSS, 2010). Of its ten themes, four contain elements of environmental education. For example, within the theme People, Places, and Environments, social studies programs should include geographic phenomena such as natural resources, population, soils, and vegetation. They should also give students the opportunities to analyze social and economic effects of environmental changes. Within the theme of Production, Distribution, and Consumption, the topics of consumption of energy and the distribution of natural resources can be found. Science, Technology, and Society is another theme that contains environmental components. It deals, in part, with the transformation of the physical environment due to scientific and technological advances. Examples include offshore oil drilling, the building of dams and levees, and the loss of rain forests due to extraction of natural resources. Issues surrounding the changes in societal beliefs and values resulting from scientific and technological knowledge include some environmental components such as the protection of the physical environment and the conservation of resources. The theme Global Connections asks students to analyze the causes, consequences, and possible solutions to various global issues,

including those dealing with environmental quality and resource allocation. Some of these topics can also be found within the Illinois Learning Standards.

Illinois Learning Standards

The *Illinois Learning Standards* (ISBE, 1997) reflect national standards like the National Science Education Standards and the National Curriculum Standards for Social Studies, and include standards and benchmarks that apply to environmental education. For example, Science Learning Standard 12 B states, "As a result of their schooling students will be able to know and apply concepts that describe how living things interact with each other and with their environment" (p. 34). Science Learning Standard 12 E also pertains directly to Earth Science, including environmental topics. Environmental education includes social science components and thus some of the social science learning standards apply to EE. Those that have the closest connections include Goal 15 (economics), Learning Standards 16C, D, and E (environmental history), Goal 17 (geography), and Goal 18 (social systems). For a complete listing of Illinois learning standards in science and social studies that apply to EE, see Appendix B.

Of course, reflecting the interdisciplinary nature of EE, none of these standards or benchmarks is devoted solely to environmental education. McKeown-Ice (2000) noted that national standards or guidelines specific to EE could help boost pre-service teacher preparation in environmental education. According to Simmons (1999), national standards would help show that environmental education plays an integral role within our nation's schools. As a result of this need to develop standards which would reflect EE's multi-curricular diversity, The National Project for Excellence in Environmental Education was conceived (McCrea, 2010).

The National Project for Excellence in Environmental Education

The National Project for Excellence in Environmental Education was undertaken by Simmons and the North American Association for Environmental Education in 1993 (McCrea,

2010). The project was designed to create guidelines rather than standards for environmental education. One document that arose from this project was *Excellence in Environmental Education: Guidelines for Learning (Pre K-12)* (NAAEE, 2010a). This document

> provides students, parents, educators, home schoolers, administrators, policy makers, and the public a set of common voluntary guidelines for environmental education. . . . These guidelines set a standard for high-quality environmental education across the country, based on what an environmentally literate person should know and be able to do. (p. 1)

These guidelines contain three sets of expectations for performance and achievement for students by the time they complete grades 4, 8, and 12. There is no suggestion that these guidelines be completely met within those three grades. Rather, educators should look at these guidelines in terms of grade ranges: pre K-4, 5-8, and 9-12. Each individual guideline is present at a grade-appropriate level in each of these three sets. For example, the guideline about human/environment interactions changes for each grade range to reflect developmentally appropriate expectations:

- Fourth grade—Learners understand that people depend on, change, and are affected by the environment. (p. 22)
- Eighth grade—Learners understand that human-caused changes have consequences for the immediate environment as well as for other places and future times. (p. 40)
- Twelfth grade—Learners understand that humans are able to alter the physical environment to meet their needs and that there are limits to the ability of the environment to absorb impacts or meet human needs. (p. 61)

Another document in the series, *Guidelines for the Preparation and Professional Development of Environmental Educators* (NAAEE, 2010b), first published in 2000, is designed to assist in the development of programs for pre-service and inservice teacher education. Portions of this document form the heart of the conceptual framework for this study. The guidelines consist of “a set of recommendations about the basic knowledge and abilities educators need to provide high-quality environmental education” (p. 2). These guidelines include six themes as well as what is needed to achieve competency in EE within each them: (1) environmental literacy; (2) foundations of environmental education; (3) professional

responsibilities of the environmental educator; (4) planning and implementing environmental education; (5) fostering learning; and (6) assessment and evaluation.

According to the first theme of the guidelines, “Environmental educators must possess the understandings, skills, and attitudes associated with environmental literacy” (p. 8). Content knowledge and skills should guide the preparation of these instructors. This knowledge should be drawn from traditional disciplines, especially the natural and social sciences. Educators need to understand Earth processes and systems, ecosystems and other aspects of the living environment, human social systems, and the connections between human society and the environment. The skills needed by environmental educators include those common to all educators, e.g., the ability to formulate questions, analyze and interpret information, and communicate with others. However, environmental educators need to hone these skills and understandings in the context of real-world environmental issues and problems. They need to be aware of differing viewpoints regarding solutions to these issues. Finally, another component of environmental literacy is the understanding that what we do as individuals and in groups can make a difference. Armed with the appropriate environmental knowledge and skills, environmental educators should feel empowered to act on this information to ensure environmental quality.

The second theme, foundations of environmental education, states that “Environmental educators must demonstrate a basic understanding of the goals, theory, practice, and history of the field of environmental education” (NAAEE, 2010b, p. 9). They should be familiar with founding documents in EE such as the Belgrade Charter and the Tbilisi Declaration. Environmental educators should recognize that EE is an interdisciplinary field, drawing from many disciplines but especially the natural and social sciences as it deals with interactions among all living organisms, the physical environment, and the human built environment. They should be able to identify the knowledge, skills, and attitudes that contribute to environmental literacy from the first theme. In turn, environmental educators should connect environmental literacy with “the need to provide opportunities for learners to enhance their capacity for

independent thinking and effective, responsible action" (p. 9). Environmental educators should have a basic understanding of how environmental education is implemented in a variety of settings. Not only do individual teachers deliver EE, but so do a variety of organizations and agencies from local groups up to the national level. In addition, environmental educators should be familiar with the evolution of the field of EE, including how various educational movements contributed to the development of environmental education as well as current and emerging issues in the field of EE and the role of environmental education research.

The third theme describes the professional responsibilities of the environmental educator. Educators should "provide environmental education that is appropriate, constructive, and aligned with the standards of the field" (NAAEE, 2010b, p. 12). They should model responsible environmental behavior along with modeling the process of inquiry in environmental investigations. Educators must also understand that they should "provide accurate, balanced, and effective instruction—not to promote a particular view about environmental conditions, issues, or actions" (p. 12). Another responsibility of environmental educators is the need to be active learners throughout their professional lives. Environmental information, issues, research, and education materials and methods need to be continually monitored and updated. This can be accomplished through critically reading professional journals, joining and actively participating in local, state, or national environmental education organizations, and seeking out other professional development opportunities.

The fourth theme is about planning and implementing environmental education. Environmental educators should know their learners. This includes being able to identify methods for presenting the environment and environmental issues, and selecting EE materials and strategies to learners of different ages, backgrounds, and developmental abilities. Educators should have knowledge of instructional methodologies that are suited to environmental education including hands-on observation and discovery in the environment, inquiry, investigating environmental issues, service learning, and problem-based learning. They should also be able to plan age-appropriate instruction and demonstrate the ability to integrate

environmental education into the curriculum. Educators should provide a safe learning environment both indoors and outside for learners. They should be familiar with a variety of technologies that can be used to assist students as they learn about the environment. Finally, educators should be aware of the range of materials and resources that can be used in the field of environmental education. The ability to critically evaluate these resources is also important.

The fifth theme, fostering learning, states, "Environmental educators must enable learners to engage in open inquiry and investigation, especially when considering environmental issues that are controversial and require learners to seriously reflect on their own and others' perspectives" (NAAEE, 2010b, p. 19). Educators should foster a collaborative and open climate in which learners are motivated to learn about the environment. Learners should be encouraged to ask questions and to think critically and independently. Educators need to include not only a range of perspectives, but also the diversity of backgrounds of the learners. They should also be able to plan their lessons effectively and with flexibility to meet environmental education goals.

The sixth and final theme deals with assessment and evaluation. "Environmental educators possess the knowledge, abilities, and commitment to make assessment and evaluation integral to instruction and programs" (NAAEE, 2010b, p. 21). Outcomes for learners should be tied not only to the goals and objectives of environmental education, but to national, state, and local standards as well. Educators must make objectives clear to learners from the beginning. A variety of strategies should be employed for formative and summative assessments. Educators should then use the information gained from such assessments to improve instruction. Knowing how to effectively evaluate an environmental education program is another important skill that educators need in their repertoire.

This study used elements of the first three themes, environmental literacy, foundations of environmental education, and professional responsibilities of the environmental educator, as a conceptual framework. The guidelines stress not only the initial preparation of environmental educators as they develop their environmental literacy and their knowledge of the fundamentals

of environmental education, but their continuing professional development through inservice opportunities in the field (NAAEE, 2010b). In addition, NAAEE "worked with the National Council for Accreditation of Teacher Education (NCATE) on the inclusion of environmental education in the preservice education of the nation's teachers" (McCrea, 2010, p. 6). The result of this collaboration was the development of research-based standards entitled *Standards for the Initial Preparation of Environmental Educators* (NAAEE, 2007a). Although these standards apply to the initial level of teacher preparation, the seventh and final standard stresses the need to engage in lifelong learning and professional development.

The NAAEE guidelines apply to pre-service teacher education programs and environmental education courses, as well as to the professional development of educators (NAAEE, 2010b). In this study, high school science and social studies teachers were surveyed about their pre-service preparation and professional development regarding various environmental concepts and the extent to which they implement those concepts into their teaching. Their personal goals and attitudes toward the environment and environmental education were also examined.

Current Practice in Environmental Education

Environmental education for pre-service teachers begins during their undergraduate years. It is here that the foundation for including EE in their future classrooms is initially established. Once they have entered the profession, inservice opportunities offer teachers the chance to continue their professional development. Barriers to including EE in the curriculum exist at both the pre-service and inservice levels. The next section briefly examines pre-service teacher preparation in EE, inservice teacher professional development, and the major barriers that have been reported.

Pre-service Teacher Preparation

According to McKeown-Ice (2000), EE "is often treated in a shallow manner" (p. 9). In a nationwide survey she found that fewer than one-third of responding teacher preparation institutions gave students a background in environmental issues. Few schools offered a major, minor, concentration, or specialization in environmental education. Students in elementary education programs were more likely to receive EE experiences than were students in secondary programs. In many colleges and universities, only students in science education were exposed to EE at the secondary level. Although few institutions require EE experiences for their pre-service teachers, interest among teacher-preparation faculty and pre-service students is present. Other dated studies have also found a high interest level in environmental education for pre-service teachers. Pettus and Teates (1983) reported that a majority of respondents in a survey of Virginia public school teachers thought that pre-service programs should require a course in teaching environmental education concepts. In addition, eighty percent of principals in northern New York (Tewksbury & Harris, 1982) and 94% of principals in Virginia (Pettus & Schwaab, 1978/1979) felt that EE instruction for pre-service teachers was important, but McKeown-Ice (2000) found that interest in environmental education among college and university administrators was low. Incorporating EE into accreditation and national certification efforts would help to ensure that students were exposed to more EE (Heimlich et al., 2004).

One of the issues facing pre-service teacher educators is where to place environmental education in teacher preparation coursework. In a national study, Heimlich, Braus, Olivio, McKeown-Ice, and Barringer-Smith (2004) found that respondents felt that the best place for EE was within methods courses even though only 14.8% of the responding institutions offered EE in this manner. EE was incorporated into one or a few courses in 16.4% of the institutions, and this was perceived to be the second best place for EE. The majority of the respondents (57.4%) reported that EE was integrated throughout their teacher preparation curricula, but they did not perceive this as the "best fit" for EE. Slightly more than 21% of the respondents stated that EE

at their institution was incorporated into a discipline. In these cases, the best perceived fit for EE was within the environmental sciences, with biology running a close second. Earth science was perceived as the third best fit, followed by social studies, language arts, family living/home economics, and mathematics, in that order.

The major barrier to including EE in teacher preparation programs is the limited time available for EE due to the large number of other certification requirements that students must meet (Heimlich et al., 2004; McKeown-Ice, 2000; Powers, 2004). According to McKeown-Ice (2000), state certification guidelines play a major role in determining the nature of environmental education instruction within pre-service programs at colleges and universities. Even so, state mandates do not ensure that teachers receive preparation in EE. In Wisconsin all teachers seeking certification in early childhood, elementary education, agriculture, science or social studies are to achieve EE competencies prior to obtaining certification. However, according to a study conducted by Lane, Wilke, Champeau, and Sivek (1996), slightly more than half of the teachers who responded to a survey and who were certified after the Wisconsin mandates took effect reported not receiving preparation in EE.

Lane et al. (1995) found that Wisconsin teachers who reported receiving pre-service EE training had more positive responses in regards to their perceived competencies in, attitudes toward, and amount of class time set aside to teaching about the environment than teachers without pre-service EE training. In addition, teachers who completed undergraduate EE courses reported using a wider variety of methods to teach about the environment than teachers who did not receive pre-service EE training. Plevyak, Bendixen-Noe, Henderson, Roth, and Wilke (2001) also found positive associations between teacher attitudes toward EE and the teaching of EE topics. The more positive their attitudes toward including EE and the more they felt that environmental education was important, the more likely these teachers were to include various environmental topics in their curriculum. The study also noted a positive relationship between pre-service EE preparation and the implementation of EE topics.

Teachers who felt they received good exposure to environmental education were more likely to incorporate various EE topics into their curriculum.

Preparation in using affective education methods and environmental action strategies needs to be improved according to Lane et al. (1995). Teachers who received pre-service instruction in these teaching methods and had positive opinions of that instruction felt more competent in using them. However, fewer teachers reported feeling competent in these areas compared to other teaching methods. In a national study, McKeown-Ice (2000) found that far fewer colleges and universities presented pre-service teachers with environmental action strategies than stressed goals of EE. Increasing the amount of exposure to these teaching strategies may, in turn, result in an increased use of these methods in the classroom.

Studies have shown that few teacher preparation institutions offer students an in-depth exposure to environmental education (McKeown-Ice, 2000). However, there is interest in offering EE to pre-service teachers. Pre-service teacher educators continue to debate the best place to include environmental education in the teacher preparation curricula, often citing the limited time available for such incorporation. Studies have shown that the more pre-service teachers are exposed to EE, the more comfortable they feel teaching students about the environment. This exposure is a key factor in the incorporation of environmental education in the K-12 curriculum.

Teacher education is not limited to initial preparation programs. Individuals continue to learn throughout their teaching careers. Inservice professional development is a vital part of that growth.

Inservice Teacher Professional Development

In a national study, Wade (1996) reported that EE inservice education was not a high priority for most state education agencies. The most common providers of environmental inservice for K-12 teachers were the various state natural resource agencies. The inservice workshop facilitators were found to be more knowledgeable about environmental content than

environmental teaching methods. Although EE is interdisciplinary in nature, Wade found that science teachers were far more likely than teachers of other disciplines to attend EE inservice programs. Among science teachers, those who teach within the life sciences are more likely to take advantage of EE inservice opportunities than are teachers of the physical sciences.

Lane et al. (1995) found that Wisconsin teachers had positive opinions of their EE inservice courses. Although they felt that their inservice courses were effective in teaching them about cognitive education methods, their opinions regarding their preparation in the use of affective methods and environmental action strategies were not as positive. However, the more satisfied these teachers were with their inservice EE training, the higher their perceived competencies were in the use of environmental action strategies.

The number of EE inservice courses taken by Wisconsin teachers did not significantly increase their perceived competencies or attitudes toward EE (Lane et al., 1995). However, a positive relationship was found between the number of EE inservice courses received and the amount of class time devoted to EE. Teachers who took EE postgraduate courses reported more positive attitudes toward EE and employed a greater number of teaching methods than did teachers who had not received EE preparation.

Tewksbury and Harris (1982) found that in northern New York, 44% of the K-12 principals surveyed reported that no inservice EE opportunities were available for their teachers. Most of the opportunities that did occur consisted of workshops and conferences.

As of 1995, all states had inservice EE opportunities to some extent (Kirk, Wilke, & Ruskey, 1997). Ruskey, Wilke, and Beasley (2001) reported that by 1998, 30 states had coordinated inservice teacher training programs and four more were developing their programs. The definition used to describe coordinated inservice teacher training comes from the National Environmental Education Advancement Project (1998):

> Teacher training that targets K-12 teachers and enables them to become fully competent to teach to all of the goals of EE. A coordinated system of in-service programs that makes EE training available to all teachers within a state and allows for professional development options in EE as well as credits to maintain teaching certification. (¶ 4)

These studies demonstrate that few opportunities are available for teachers to receive professional development in environmental education. However, studies have shown that the more EE professional development teachers encounter, the more likely they are to include the environment within the courses they teach. They also tend to develop positive attitudes toward this inclusion, and they feel more competent in their abilities to do so. Even with available inservice teacher training, barriers to implementing EE remain.

Barriers to the Implementation of Environmental Education

Lack of teacher preparation in environmental education content and teaching strategies is but one barrier to the classroom implementation envisioned in the National Project for Excellence in Environmental Education. The most significant barrier to teaching EE is time (Ham, Rellergert-Taylor, & Krumpe, 1987; Ham & Sewing, 1987; Tewksbury & Harris, 1982). This includes not only finding class time to include EE, but the time needed to develop an EE curriculum and to prepare materials and lesson plans (Ham & Sewing, 1987; Tewksbury & Harris, 1982).

According to Tewksbury and Harris (1982), lack of funding was viewed as an impediment to including EE in the curriculum. Both a lack of funding and a lack of EE instructional materials were found to be an important barrier in other studies (Ham et al., 1987; Ham & Sewing, 1987; Pettus & Teates, 1983; Smith-Sebasto & Smith, 1997). Ham and Sewing (1987) reported that the lack of funding was ranked as the fourth most important barrier out of a list of 14 potential barriers among the teachers they interviewed in their study. Teachers mentioned not only the purchase of EE materials, but also the costs associated with field trips. Smith-Sebasto and Smith (1997) found that 80% of Illinois teachers who responded to their survey agreed that if they had better access to EE instructional materials, they would be more likely to include environmental education within their curriculum. Seventy percent of those teachers stated that if more funding was available to purchase those materials and to cover other expenses, they would also be more likely to include EE.

Even though environmental education strives to be interdisciplinary, studies have found that some teachers do not include EE because they feel that it is unrelated to their subject area (Ham & Sewing, 1987; Lane, Wilke, Champeau, & Sivek, 1994; Smith-Sebasto & Smith, 1997). Others report a lack of EE knowledge as a barrier to infusing EE into their curriculum (Ham & Sewing, 1987; Lane, et al., 1994; Smith-Sebasto & Smith, 1997).

Periodically, studies have been done to determine the current status of environmental education. Often researchers look at perceived barriers to incorporating EE into the curriculum, how much EE is actually included in the curriculum, teacher perceptions of their pre-service preparation in environmental education, teacher perceptions of their inservice professional development, and teacher attitudes toward including EE in the curriculum. A brief description of some studies about the status of environmental education follows.

Status of Environmental Education Studies

Given the importance of environmental education, and acknowledging the barriers to its effective implementation in K-12 classrooms, several studies have investigated the status of EE. Disinger (1989) conducted a nationwide study to determine to what extent various environmental topics were included in K-12 curricula, which types of EE were being practiced, and whether the environment was infused within other courses or treated as a separate course. He reported that 97.5% of the responding states indicated that EE was infused into other curricular areas at the elementary level. He found that 90% of the responding states (36 out of 40) reported infusion of environmental topics in secondary schools. Of those schools, 77.8% stated that EE was infused into science or biology classes. Twenty-five percent indicated that EE topics could be found within social studies in their states. Disinger reported that 17 of 38 responding states reported that 81 to 100% of their elementary schools included some sort of EE in their curricula. At the high school level, he found that 18 of the 38 responding states indicated that 81 to 100% of their secondary schools included EE to some extent in their curricula. Of those 18, only nine stated that their responses were based on data. The other

respondents admitted their responses were merely estimates. In elementary schools, nature study was listed as the most common form of EE while energy education was reported as the most common form of EE at the secondary level.

Others have done studies on the status of EE at the national level (Kirk et al., 1997; Ruskey et al., 2001) and there have been some state-level status studies (Lane et al, 1994; Lane et al., 1995; Lane et al., 1996; Pettus & Teates, 1983; Plevyak et al., 2001; Smith-Sebasto & Smith, 1994; Tewksbury & Harris, 1982). Smith-Sebasto and Smith's (1994) study was done in Illinois to assess "Illinois teachers' perceived attitudes toward and competencies and/or deficiencies in issues related to environmental literacy, and to assess the current state of EE in K-12 public school curricula" (p. 4). They found that students at all levels were "not getting even minimal amounts of EE in the formal schooling process" (p. 33). Although teachers reported positive attitudes toward EE, the list of barriers, including time, was long. Smith-Sebasto and Smith felt that both pre-service and inservice programs needed to be utilized to a much greater extent before teachers would feel competent to teach EE.

Summary

This chapter was a summary of the literature related to environmental education in K-12 public schools in the United States. The literature shared was divided into five sections: a brief history of EE, the goals and objectives of EE, national standards, benchmarks, and guidelines, the current status of EE, and the status of EE studies. The next chapter describes the methods used in this study.

CHAPTER 3

METHOD

Introduction

The purpose of this study was to determine the relationship between the level of implementation of topic areas in environmental education in secondary science and social studies classrooms in Illinois and the levels of pre-service and inservice teacher preparation in environmental education topic areas. Teacher attitudes toward environmental education were also examined.

This chapter includes the following sections:

- Research questions
- Research design
- Participants
- Instrumentation
- Data collection procedures
- Data analysis procedures
- Limitations

Research Questions

These three questions guided the study:

1. What is the relationship between the level of implementation of topic areas in environmental education in high school science and social studies classrooms and
    a. the level of pre-service teacher preparation in environmental education topic areas?

   b. the level of inservice teacher preparation in environmental education topic areas?
   c. demographic characteristics of secondary science and social studies teachers?

2. What is the relationship between the attitudes toward environmental education held by high school science and social studies teachers and
   a. the level of implementation of topic areas in environmental education?
   b. the level of pre-service teacher preparation in environmental education topic areas?
   c. the level of inservice teacher preparation in environmental education topic areas?
   d. demographic characteristics of secondary science and social studies teachers?
3. What is the relationship between the level of pre-service teacher preparation in environmental education topic areas and the level of inservice teacher preparation in environmental education topic areas?

Research Design

The data collected in this study were coded and represented by numerical scores. A quantitative methodology was used to analyze this type of data (Merriam & Simpson, 1995). The results obtained from quantitative research were analyzed using statistics (Patten, 2000). Statistics help researchers make sense of the data they collect and serve two main purposes:

> 1. Statistics are used to organize and summarize information so the researcher can see what happened in the research study and can communicate the results to others.
> 2. Statistics help the researcher to answer the general questions that initiated the research by determining exactly what conclusions are justified based on the results that were obtained. (Gravetter & Wallnau, 2005, p. 3)

Survey research was chosen because it allowed the researcher to collect data from a large number of people in a shorter period of time than would be possible using telephone or personal interviews (Mertens, 2005; Patten, 2001). A simple descriptive approach was used because the researcher will be analyzing data from the sample taken at one point in time

(Mertens, 2005). Mertens describes the simple descriptive approach as a “one-shot survey” (p. 172). The survey used in this study was a closed questionnaire in that participants were forced to choose one of the alternatives provided. This type of questionnaire allowed for a ready analysis of the data without the need to make additional judgments regarding data coding (Merriam & Simpson, 1995).

Participants

The participants in this study were Illinois public high school science and social studies teachers. Teachers in these two disciplines were chosen because the environment is a component in both the science and social science portions of the Illinois Learning Standards (Illinois State Board of Education, 1997). A table of science and social science benchmarks within the Illinois Learning Standards related to environmental education can be found in Appendix B.

The population for this study consisted of all science and social studies teachers who instruct full time within Illinois public high schools. The size of this population is approximately 9,000 (Illinois State Board of Education [ISBE], 2010a). According to Krejcie and Morgan (1970), an approximate sample size of 368 was needed to generalize the findings of this study to the population of science and social studies teachers in Illinois public high schools. The sample that was drawn from this population consisted of science and social studies teachers who instruct regular division students within grades 9 through 12. Teachers who might have taught at a combined junior/senior high school and instructed high school students as well as seventh and eighth graders were directed to answer the survey questions as they pertained to their high school classes only. Teachers who might have taught both regular division classes as well as special education classes were instructed to answer the survey questions as they pertained to their regular division classes only.

Cluster sampling is a technique in which groups of participants rather than individuals are first selected for inclusion in a study (Patten, 2000). Response rates tend to be higher when

clusters, rather than individuals, are selected for survey research (Patten, 2000). Appeals could then be made to the leaders of the clusters in order to solicit their help in getting larger numbers of individuals to take part in the survey (Patten, 2001). This technique was used to obtain the desired sample for this research study.

The researcher obtained a list of all 686 public high schools in the state of Illinois from the Illinois State Board of Education (ISBE, 2010b). Combined junior/senior high schools were also a part of this list. A stratified random sample of 90 public high schools was drawn from among three geographic regions in the state: north, central, and south. See Appendix C for a list of counties within each region. Ten additional schools per region were also selected and placed in an alternate list in the event that some schools would choose not to participate. The rationale for this stratification was not to make comparisons across subgroups, but to ensure that the different subgroups or geographic regions were represented equally in the study (Patten, 2000). The researcher wanted to include teachers from across the state in this study. Without geographic stratification, a disproportionately large number of teachers from one region might have been selected purely by chance. The stratification was intended to help reduce sampling errors. Within each of the three regions 30 high schools were chosen at random from an alphabetical list using a random number table. Within those 90 high schools, all science and social studies teachers were identified from those schools' websites. Provided they met the selection criteria stated (see above), these teachers comprised the sample for this study. Email addresses for these individuals were obtained from those websites. Two schools did not list the email addresses for these teachers and a phone call was made to the principals of these schools in order to obtain the addresses.

Instrumentation

An online survey was used as the measurement instrument (see Appendix D). It is a modified version of an instrument developed by Plevyak (1997). Content validity of the original instrument was achieved through a review by a panel of experts at the Ohio State University,

the University of Wisconsin at Stevens Point, and four professional environmental educators (Plevyak, 1997). Content validity of this researcher's modified survey was established through review of this instrument by a panel of experts which included a retired faculty member from Eastern Illinois University, a faculty member from the University of Cincinnati, an environmental education expert currently with the United Nations Education, Scientific, and Cultural Organization (UNESCO), and a retired environmental educator and past president of the Environmental Education Association of Illinois. The survey was piloted and revised prior to its distribution to the validity panel.

Reliability was established through pilot testing of the survey instrument. Three constructs were measured in Part Two of the survey instrument. Cronbach's alphas for these constructs were used to establish internal consistency. The construct of positive attitudes toward environmental education consisted of 8 items with a Cronbach's alpha of .892. The construct of positive attitudes toward the environment was made up of 3 items with a Cronbach's alpha of .923. Finally, the construct of self-efficacy consisted of 5 items with a Cronbach's alpha of .949. A reliability coefficient of .7 or higher is considered to be acceptable (Gliem & Gliem, 2003). This frequently used statistical procedure can be used with only one administration of the survey instrument (Mertens, 2005).

Pilot Study

A pilot study was completed in the spring of 2009. A sample of convenience was used. Surveys were sent to all 11 science teachers and the 12 social studies teachers at the high school where the researcher teaches. The questionnaire was modified to allow room for comments from the pilot participants. Mertens (2005) suggests that these participants be encouraged to record their reactions to the questions, especially noting any ambiguities or response options that were not included but should have been. If any questions were unclear, respondents were asked to suggest ways to clarify these questions. They were also requested to record any other questions that they think should have been asked. As recommended by

Peterson (2000), some pilot participants were asked to go through the survey instrument again, thinking aloud as they went. The researcher noted any misunderstandings during this process. It is vital that those taking the survey interpret the questions in the manner that the researcher intends. Peterson (2000) refers to this as *relative understanding*. After the surveys were returned, two teachers from each department were selected for face-to-face interviews. All four teachers were asked to read through the survey aloud while making their thinking known to the researcher as Peterson suggests.

After the completion of this entire process, the researcher read all the comments made by the respondents. Answers to survey items and written or oral comments that suggested possible misinterpretation of questions led to a revision of those questions in an effort to add to the clarity of the survey.

Teachers who participated in the pilot survey were excluded from the data collection phase of this study.

Survey Instrument

The survey consisted of 4 sections. The first section measured the level of implementation of environmental education topics by high school science and social studies teachers. The second section assessed teacher attitudes regarding the environment and environmental education. Part Three of the questionnaire asked teachers to assess the extent to which environmental education topics were addressed in their pre-service teacher education as well as within their inservice programming. The final section asked basic demographic questions. Table 1 shows the alignment of the parts of the survey with the research questions.

Part One asked the participants to reveal the extent to which they implement 19 topic areas related to environmental education into the curriculum. Examples of topic areas include biodiversity, energy, environmental health, environmental politics, natural resources, and waste management. A 5-point Likert scale was used. The scale was coded 1 = never, 2 = rarely, 3 = occasionally, 4 = frequently, 5 = a great deal.

Table 1

Alignment of Research Questions with Data Collection Strategies

Research Questions	Data Collection Strategy
Research Question #1: What is the relationship between the level of implementation of topic areas in environmental education in high school science and social studies classrooms and	Survey Part One
a. the level of pre-service teacher preparation in environmental education topic areas?	a. Part Three
b. the level of inservice teacher preparation in environmental education topic areas?	b. Part Three
c. demographic characteristics of secondary science and social studies teachers?	c. Part Four
Research Question #2: What is the relationship between the attitudes toward environmental education held by high school science and social studies teachers and	Survey Part Two
a. the level of implementation of topic areas in environmental education?	a. Part One
b. the level of pre-service teacher preparation in environmental education topic areas?	b. Part Three
c. the level of inservice teacher preparation in environmental education topic areas?	c. Part Three
d. demographic characteristics of secondary science and social studies teachers?	d. Part Four
Research Question #3: What is the relationship between the level of pre-service teacher preparation in environmental education topic areas and the level of inservice teacher preparation in environmental education topic areas?	Survey Part Three

The purpose of Part Two was to assess general attitudes and information regarding the environment and environmental education. Teachers were asked the extent to which they agreed or disagreed with 23 statements. Sample statements included “All teachers should receive instruction in environmental education prior to earning their teacher certification.” and “I understand environmental topics enough to each about them in the curriculum.” A six-point Likert scale was used rather than a five-point scale. The purpose of the six-point scale was to force the respondents to agree or disagree with each statement, rather than select a mid-point of no opinion. The scale will be coded 1 = Disagree Very Strongly, 2 = Disagree Strongly, 3 = Disagree, 4 = Agree, 5 = Agree Strongly, and 6 = Agree Very Strongly.

Part Three asked teachers to reveal the extent to which each of the 19 topic areas named in Part One were addressed during both their pre-service teacher education programs and their inservice programming. Pre-service teacher education included general coursework, professional studies, and field experiences taken prior to teacher certification. Inservice programming included graduate courses, workshops, seminars, district offerings, or conferences taken after teacher certification. A five-point Likert scale was used. It was coded 1 = never, 2 = rarely, 3 = occasionally, 4 = frequently, 5 = a great deal.

Part Four of this survey asked participants for demographic information. Demographic questions included gender, number of years in the teaching profession, grade level taught, and subjects taught. Teachers were also asked how much time they spend teaching about the environment in their classrooms. According to Peterson (2000), demographic questions can be placed at the end of a survey in an effort to combat survey fatigue. These questions take relatively little effort to complete. Dillman, Tortora, and Bowker (1999) also recommend placing demographic questions at the end of online surveys.

Data Collection Procedures

Data were collected through an online questionnaire using SurveyMonkey. According to Dillman, Tortora, and Bowker (1999), online questionnaires must be respondent-friendly, and

they must load quickly. Participants are less likely to finish a web-based survey if it is slow to load. Instructions should be brief.

An initial email briefly explaining the research was sent to the science and social studies department chairpersons of all the high schools randomly selected in the cluster sampling. A copy of the email can be found in Appendix E. Some high schools did not have department chairpersons, so the email was sent to the principal of those schools. A copy of this email can be found in Appendix F. This correspondence served as the cover letter traditionally used in mail surveys (Mertens, 2005). The email emphasized the importance of this dissertation research and asked these leaders for their help in communicating to their teachers the importance of taking the online survey promptly. Emails were sent to individual teachers one week after the initial emails to department chairpersons and principals (see Appendix G). This email also stressed the importance of the research and invited the potential participants to be a part of this study. They were told that participation was voluntary and that all information would be kept confidential. A link to the survey on SurveyMonkey was given. At this point the teachers could either elect not to participate in the survey or they could agree to participate (thereby giving consent) by clicking on the direct link to the survey on SurveyMonkey. Teachers who might have preferred a mailed survey were given that option but no one requested this. SurveyMonkey does identify respondents and nonrespondents, thus enabling the researcher to send email reminders only to those who had not yet participated in the survey. Nonrespondents were sent up to three weekly reminders (see Appendix H). A return of 221 responses was considered acceptable.

Data Analysis

Descriptive, correlational, and inferential statistics were used to analyze the data collected in this study through the use of SPSS v.19. Descriptive statistics are used to describe characteristics of a sample, summarize, organize, and simplify data (Gravetter & Wallnau, 2005; Mertens, 2005). Correlational statistics “measure and describe a relationship between two

variables" (Gravetter & Wallnau, 2005, p. 412). Inferential statistics allow a researcher to analyze samples and make generalizations about the population from which the samples are derived (Gravetter & Wallnau, 2005). According to Mertens (2005), they are also used to "determine whether sample scores differ significantly from each other or from population values" (p. 403). Table 2 shows how each research question was analyzed.

The use of descriptive statistics for the first two research questions corresponded to the first three sections of the survey instrument. Frequency distributions, means, and standard deviations were obtained by analyzing the Likert scale items in these sections.

"The Pearson correlation measures the degree and the direction of the linear relationship between two variables" (Gravetter & Wallnau, 2005, p. 415). A perfect correlation is identified as a correlation of 1.00, while a score of 0 would indicate no correlation. A positive correlation occurs when both variables move in the same direction, while a negative correlation is found when two variables go in opposite directions (Gravetter & Wallnau, 2005). Pearson's *r* was used to address all three research questions with data from all four sections of the survey. For example, the direction and degree of the relationship between teacher attitudes toward environmental education and the level of pre-service teacher preparation in environmental education topic areas was determined using the Pearson correlation.

The *t*-test "is used to test hypotheses about an unknown population mean μ when the value of σ is unknown" (Gravetter & Wallnau, 2005, p. 222). In this research study neither the population mean, μ, nor the population standard deviation, σ, was known. According to Gravetter and Wallnau, an independent-measures *t*-test is used when comparing separate samples. Based on data obtained from Part Two and Part Four of the survey teachers were divided into two groups, those that taught science courses and those that taught social studies courses. An independent-measures *t*-test was done to compare attitudes toward the environment and environmental education with these two groups of teachers. In cases where the data consist of two sets of scores and the scores in one sample will be directly related to the

Table 2

Data Analysis and Research Questions

Research Question	Data Analysis
1. What is the relationship between the level of implementation of topic areas in environmental education in the high school science and social studies classroom and a. the level of pre-service teacher preparation in environmental education topic areas? b. the level of inservice teacher preparation in environmental education topic areas? c. demographic characteristics of secondary science and social studies teachers?	Frequency distributions Means Standard deviations Pearson correlations *t*-tests ANOVAs Cluster analysis
2. What is the relationship between the attitudes toward environmental education held by teachers and a. the level of implementation of topic areas in environmental education? b. the level of pre-service teacher preparation in environmental education topic areas? c. the level of inservice teacher preparation in environmental education topic areas? d. demographic characteristics of secondary science and social studies teachers?	Means Standard deviations Pearson correlations *t*-tests ANOVAs Cluster analysis
3. What is the relationship between the level of pre-service teacher preparation in environmental education topic areas and the level of inservice teacher preparation in environmental education topic areas?	Pearson correlation

scores in the second sample, a related-samples (paired samples) *t*-test can be performed (Gravetter & Wallnau, 2005). A paired samples *t*-test was run to compare the extent to which EE topics were covered in the curriculum with the amount of pre-service exposure to those topics.

According to Gravetter and Wallnau (2005), an analysis of variance (ANOVA) "is a hypothesis-testing procedure that is used to evaluate mean differences between two or more treatments (or populations)" (p. 327). It is not possible to determine which mean differences are significant and which are not in an ANOVA. Because of this, post hoc tests must then be done in order to determine which mean differences are significant (Gravetter & Wallnau, 2005). Based on demographic data obtained from Part Four, the respondents were divided into three groups based on their years of teaching experience. The level of implementation of environmental topics was then examined among these three groups using an ANOVA. The post hoc test used was the Scheffé test because it provides the greatest protection from Type I errors. ANOVAs were also run comparing these three groups to attitudes toward the environment.

Cluster analysis can be performed "to discover a system of organizing observations, usually people, into groups where members of the groups share properties in common" (Stockburger, 1998, ¶ 1). According to Norušis (2008), cluster analysis is done to "form groups of related variables" (p. 360). The researcher does not predict who belongs in which group, nor does the researcher predetermine the number of groups that would be formed as a result of this analysis. Norušis states that "the goal of cluster analysis is to identify the actual groups" (p. 359). In addition, the members of a group should be similar to each other while at the same time they should be different from those in other groups (Bachelor & Buchanan, 1984; Jain, 2010). This method was used to determine how the EE topics could be clustered based on their level of implementation among the survey participants (see research question one) and how the attitude statements could be grouped based on the responses from these participants (see research question two). Additional statistical tests were then run based on these clusters.

Limitations

The limitations of this study included self-reporting survey responses. Therefore, the validity of the information obtained from the survey will depend on the truthfulness of the participants (Mertens, 2005). Participants were also asked to recall information to the best of their ability from their pre-service years. In addition, the survey was moderately lengthy and some participants elected not to complete the entire survey (*n* = 38). Three reminders were sent to all nonrespondents. Participating in the survey was voluntary and therefore, the response rate was a limitation. Four high schools in the largest school district in the state had been randomly selected to take part in this survey, but they declined to participate. Replacement high schools were then selected from an alternate list. One additional high school also elected not to participate and a replacement high school was selected. The study was limited to two disciplines within public high schools. Although some public high school teachers within other disciplines may include elements of environmental education within their classrooms, the researcher has chosen to focus on regular division science and social studies only. These are the two disciplines within which the environment is most frequently addressed in the Illinois Learning Standards (1997).

Conclusion

This study employed a quantitative methodology. The instrument used was an online survey of Illinois public high school science and social studies teachers. A stratified random sample using a cluster technique was used to select the participants. Results were analyzed through descriptive, correlational, and inferential statistics. The next chapter examines the data obtained in the survey.

CHAPTER 4

FINDINGS

Introduction

This chapter presents the findings of the study. The purpose of the study was to determine the relationship between the level of pre-service and inservice teacher preparation in environmental education and the level of implementation of environmental education in secondary science and social studies classrooms in Illinois. Teacher attitudes toward environmental education were also examined. First, the demographics of the participants will be examined. Following this will be a discussion of the findings as they pertain to each research question.

Demographics of the Participants

The survey was sent to 1,060 science and social studies teachers in March, 2012 through SurveyMonkey. Four individuals opted out. No surveys were returned as undeliverable. A total of 225 teachers (21%) responded. Of those who responded, 187 (83%) completed the survey and 38 (17%) partially completed the survey.

Most of the respondents taught either science or social studies, but three of them taught both subjects. The majority of the science teachers were female, while the majority of the social studies teachers were male. The years of teaching experience were separated into six categories. The greatest number of science teachers (n = 35) fell into the 6- to 10-year category while the greatest number of social studies teachers (n = 18) were found in the 11- to 15-year category. The gender and the years of experience of the respondents are presented in Table 3.

Table 3

Demographics

Demographics	Science Teachers (*n* = 159)	Social Studies Teachers (*n* = 63)	Science and Social Studies Teachers (*n* = 3)
Gender			
Female	58%	27%	67%
Male	42%	73%	33%
Experience			
1 to 5 years	19%	16%	0%
6 to 10 years	22%	25%	33%
11 to 15 years	16%	29%	0%
16 to 20 years	19%	14%	0%
21 to 25 years	7%	5%	0%
Over 25 years	14%	11%	67%
No response	3%	0%	0%

Most of the responding science teachers reported teaching biology for at least a portion of the school day. Table 4 shows the number of science teachers reporting on the subjects they taught. Participants who selected the "other" category reported teaching cognitive science (*n* = 1), food science (*n* = 1), forensics (*n* = 2), horticulture (*n* = 1), materials science (*n* = 1), and scientific research (*n* = 1). Most of the responding social studies teachers reported teaching history for at least a portion of the school day. Table 5 shows the number of social studies teachers reporting on the subjects they taught.

Teachers were also asked if they taught about the environment within a unit, throughout the year, or both. If they reported teaching environmental topics within a unit, they were offered a breakdown of days from which to choose. These choices and the responses can be found in Table 6 for science subjects and in Table 8 for social studies subjects. If they reported teaching environmental topics throughout the year, they were asked how much time they spent on average per week. Minutes were offered, rather than periods, because the length of periods varies from school to school. In addition, some schools have block scheduling and others have

traditional periods. The responses to this question can be found in Table 7 for science subjects and in Table 9 for social studies subjects.

Table 4

Number of Individuals Teaching Various Science Subjects

Subject	Science Teachers (n = 162)[a]
Biology	96
Chemistry	59
Physical Science/Physics	53
Environmental Science	25
Earth/Space Science	24
Integrated/General Science	9
Other	7

[a]This includes all science teachers (n = 159) plus those who teach both science and social studies (n = 3).

Table 5

Number of Individuals Teaching Various Social Studies Subjects

Subject	Social Studies Teachers (n = 66)[a]
History	57
World Issues	12
Geography	11
Government	11
Psychology	10
Civics/Political Science	8
Consumer Education/Economics	6
Sociology	5
Other	0

[a]This includes all social studies teachers (n = 63) plus those who teach both science and social studies (n = 3).

Table 6

Length of Environmental Units in Science Classrooms

Response Choices	Biology		Chemistry		Earth/ Space		Environmental Science		Integrated/ General		Physical Science/ Physics		Other	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
5 days or less	22	28	16	43	1	6	0	0	1	20	20	61	1	20
6 to 10 days	5	6	10	27	2	13	0	0	0	0	5	15	1	20
11 to 15 days	13	16	3	8	3	19	0	0	0	0	3	9	0	0
16 to 20 days	17	22	5	14	5	31	0	0	2	40	2	6	1	20
More than 21 days/ less than 1 semester	19	24	2	5	4	25	0	0	2	40	2	6	1	20
1 semester	1	1	0	3	0	0	7	28	0	0	0	0	0	0
More than 1 semester/ less than 1 year	0	0	0	0	1	6	0	0	0	0	0	0	1	20
1 school year	2	3	1	0	0	0	18	72	0	0	1	3	0	0
Totals	79	100	37	100	16	100	25	100	5	100	33	100	5	100

Table 7

Average Amount of Time per Week Spent Teaching About the Environment in Science Classrooms

Response Choices	Biology		Chemistry		Earth/ Space		Environmental Science		Integrated/ General		Physical Science/ Physics		Other	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
None	3	5	2	6	0	0	0	0	0	0	2	6	0	0
30 minutes or less	47	71	25	69	11	65	0	0	2	50	28	85	4	67
31 to 55 minutes	8	12	8	22	3	18	1	4	0	0	1	3	1	17
56 to 110 minutes	3	5	1	3	1	6	0	0	1	25	1	3	1	17
111 to 165 minutes	1	2	0	0	2	12	2	8	0	0	0	0	0	0
166 to 220 minutes	2	3	0	0	0	0	4	16	0	0	0	0	0	0
221 to 275 minutes	2	3	0	0	0	0	18	72	1	25	1	3	0	0
Totals	66	101	36	100	17	101	25	100	4	100	33	100	6	101

Note. Due to rounding, not all percentages equal 100.

Table 8

Length of Environmental Units in Social Studies Classrooms

Response Choices	Civics/ Political Science		Consumer Education/ Economics		Geography		Government		History		Psychology		Sociology		World Issues	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
5 days or less	5	83	4	100	2	29	6	86	26	79	10	100	4	100	5	50
6 to 10 days	0	0	0	0	1	14	1	14	2	6	0	0	0	0	3	30
11 to 15 days	0	0	0	0	1	14	0	0	4	12	0	0	0	0	1	10
16 to 20 days	0	0	0	0	1	14	0	0	0	0	0	0	0	0	1	10
More than 21 days/ less than 1 semester	1	17	0	0	1	14	0	0	1	3	0	0	0	0	0	0
1 semester	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
More than 1 semester/ less than 1 year	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 school year	0	0	0	0	1	14	0	0	0	0	0	0	0	0	0	0
Totals	6	100	4	100	7	99	7	100	33	100	10	100	4	100	10	100

Note. Due to rounding, not all percentages equal 100.

Table 9

Average Amount of Time per Week Spent Teaching About the Environment in Social Studies Classrooms

Response Choices	Civics/ Political Science		Consumer Education/ Economics		Geography		Government		History		Psychology		Sociology		World Issues	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
None	0	0	0	0	0	0	0	0	2	6	0	0	1	33	0	0
30 minutes or less	1	25	2	67	2	22	4	57	23	74	3	60	2	67	5	45
31 to 55 minutes	1	25	0	0	3	33	3	43	2	6	0	0	0	0	5	45
56 to 110 minutes	1	25	0	0	3	33	0	0	3	10	1	20	0	0	1	9
111 to 165 minutes	0	0	0	0	1	11	0	0	1	3	1	20	0	0	0	0
166 to 220 minutes	1	25	1	33	0	0	0	0	0	0	0	0	0	0	0	0
221 to 275 minutes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	100	3	100	9	99	7	100	31	99	5	100	3	100	11	99

Note. Due to rounding, not all percentages equal 100.

Findings from Research Questions

The following section will discuss the findings based on each research question. Basic descriptive statistics, *t*-tests, ANOVAs, Pearson correlations, and cluster analyses were done. Three respondents taught both science and social studies. These individuals' responses were not counted in any independent-measures *t*-tests involving the separation of science and social studies teachers. Some participants did not answer all questions. An alpha level of .05 was used on all statistical tests to determine significance unless noted otherwise.

Research Question One

The first research question was presented in three parts. Each part will be discussed separately.

What is the Relationship between the Level of Implementation of Topic Areas in Environmental Education in High School Science and Social Studies Classrooms and the Level of Pre-service Teacher Preparation in Environmental Education Topic Areas?

Part one of the survey addressed the level of implementation of 18 topic areas within environmental education (EE). Teachers were asked to indicate the extent to which they implemented these topics into their curriculum. The five-point Likert-type scale was rated from 1 (never), 2 (rarely), 3 (occasionally), 4 (frequently) to 5 (a great deal). Teachers reported that the topics of energy (M = 3.36), natural resources (M = 3.14), and global environmental impacts (M = 3.05) were implemented into the curriculum more often than the other topics. The topics that were reported as being the least implemented into the curriculum were resource management (M = 2.07), environmental economics (M = 2.29), and environmental politics (M = 2.31).

Part three of the survey assessed the extent to which these 18 topic areas were addressed in their pre-service teacher education program. Pre-service teacher education included general coursework, professional studies, and field experiences taken prior to teacher

certification. The same five-point Likert-type scale was used in this section. Teachers reported that the topics of ecology (M = 2.78), natural resources (M = 2.68), and biodiversity (M = 2.67) were addressed more often than the other topics during their pre-service years. The topics that were reported as having the least coverage during pre-service years were resource management (M = 2.01), environmental politics (M = 2.03), and environmental economics (M = 2.08). These three topics were also reported as having been implemented least often into the curriculum. Table 10 compares the means and standard deviations of all 18 topics with respect to pre-service exposure, inservice exposure, and implementation of these topics into the curriculum.

There was a significant difference between the extent to which the topics were covered in the curriculum and the amount of pre-service exposure to those topics in 14 topic areas. In these instances teachers reported covering significantly more of the topic than they were exposed to during their pre-service years. There was not a significant difference in 4 topic areas, biodiversity $t(198) = 1.75$, $p = .082$, $d = 0.12$, resource management $t(184) = 1.53$, $p = .128$, $d = 0.11$, species loss $t(180) = 0.67$, $p = .51$, $d = 0.05$, and sustainable development $t(182) = 1.85$, $p = .066$, $d = 0.04$. Table 11 shows the results of a paired samples t-test on this data.

A Pearson product-moment correlation was run to determine the relationship between the extent to which topics were implemented in the curriculum and the extent to which they were addressed in pre-service teacher education programs. There was a positive correlation between these variables which were all statistically significant. The topic with the strongest positive relationship was ecology ($r = 0.495$, n = 198, $p < .001$) followed closely by biodiversity ($r = 0.480$, n = 199, $p < .001$) and species loss ($r = 0.463$, n = 181, $p < .001$), while the topics with the weakest positive relationship were environmental economics ($r = 0.202$, n = 197, $p = .004$), environmental ethics and values ($r = 0.224$, n = 198, $p = 0.001$) and human population ($r = 0.240$, n = 190, $p = .001$). Correlations for all 18 topics can be found in Table 12.

Table 10

Selected Descriptive Statistics Comparison of Pre-service Exposure, Inservice Exposure, and Implementation of Topics

Environmental Topic	Variable	*n*	*M*[a]	*SD*
Biodiversity	Pre-service	199	2.67	1.39
	Inservice	198	2.08	1.27
	Implementation	225	2.80	1.47
Ecology	Pre-service	198	2.78	1.36
	Inservice	196	2.04	1.17
	Implementation	225	2.98	1.34
Energy	Pre-service	198	2.65	1.22
	Inservice	198	2.31	1.24
	Implementation	225	3.36	1.09
Environmental Economics	Pre-service	198	2.08	1.08
	Inservice	197	1.74	0.93
	Implementation	224	2.29	1.09
Environmental Ethics and Values	Pre-service	199	2.31	1.15
	Inservice	198	1.91	1.05
	Implementation	224	2.75	1.02
Environmental Health	Pre-service	198	2.45	1.13
	Inservice	197	2.12	1.15
	Implementation	223	2.93	1.10
Environmental Lifestyles	Pre-service	189	2.17	1.10
	Inservice	188	1.86	0.99
	Implementation	224	2.55	1.11

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Table 10 (continued)

Environmental Topic	Variable	*n*	*M*[a]	*SD*
Environmental Politics	Pre-service	191	2.03	0.98
	Inservice	189	1.76	0.89
	Implementation	225	2.31	1.06
Global Environmental Impacts	Pre-service	190	2.52	1.19
	Inservice	189	2.13	1.17
	Implementation	223	3.05	1.21
Human Population	Pre-service	190	2.64	1.20
	Inservice	189	2.06	1.14
	Implementation	225	3.03	1.27
Local and Regional Environmental Impacts	Pre-service	190	2.40	1.12
	Inservice	189	2.05	1.11
	Implementation	225	2.70	1.17
Natural Resources	Pre-service	191	2.68	1.16
	Inservice	190	2.18	1.14
	Implementation	223	3.14	1.11
Resource Management	Pre-service	185	2.01	1.08
	Inservice	185	1.70	0.94
	Implementation	225	2.07	1.04
Socio-cultural Environment	Pre-service	185	2.14	1.03
	Inservice	184	1.90	1.00
	Implementation	224	2.45	1.05
Species Loss	Pre-service	181	2.34	1.18
	Inservice	183	1.90	1.07
	Implementation	224	2.38	1.17

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Table 10 (continued)

Environmental Topic	Variable	*n*	*M*[a]	*SD*
Sustainable Development	Pre-service	184	2.19	1.10
	Inservice	182	1.87	0.99
	Implementation	224	2.32	1.11
Technology	Pre-service	184	2.47	1.23
	Inservice	182	2.09	1.15
	Implementation	223	2.86	1.14
Waste Management	Pre-service	185	2.31	1.13
	Inservice	185	2.05	1.10
	Implementation	224	2.55	1.07

[a]1 = never, 2 = rarely, 3 = occasionally, 4 = frequently, 5 = a great deal.

Table 11

The Extent of Implementation of Environmental Education Topics Compared with Extent to which these Topics were Addressed during Pre-service Teacher Education

Topics	*n*	M_D	*SD*	*t*	*df*	*p*	*d*
Biodiversity	199	0.18	1.46	1.74	198	.082	0.12
Ecology	198	0.22	1.36	2.29	197	.023	0.16
Energy	198	0.72	1.31	7.70	197	<.001	0.55
Environmental Economics	197	0.22	1.38	2.23	196	.027	0.16
Environmental Ethics and Values	198	0.45	1.36	4.63	197	<.001	0.33
Environmental Health	196	0.46	1.30	4.99	195	<.001	0.36
Environmental Lifestyles	188	0.36	1.30	3.81	187	<.001	0.28
Environmental Politics	191	0.30	1.20	3.51	190	.001	0.25
Global Environmental Impacts	188	0.53	1.38	5.23	187	<.001	0.38
Human Population	190	0.41	1.52	3.73	189	<.001	0.27
Local and Regional Environmental Impacts	190	0.35	1.39	3.51	189	.001	0.25
Natural Resources	189	0.48	1.39	4.72	188	<.001	0.34
Resource Management	185	0.13	1.15	1.53	184	.128	0.11
Socio-cultural Environment	184	0.32	1.22	3.51	183	.001	0.26
Species Loss	181	0.06	1.23	0.67	180	.506	0.05
Sustainable Development	183	0.19	1.36	1.85	182	.066	0.14
Technology	182	0.41	1.24	4.41	181	<.001	0.33
Waste Management	184	0.27	1.28	2.82	183	.005	0.21

Note. M_D = mean difference; *d* = Cohen's *d*

Table 12

Correlations Between Classroom Implementation of Environmental Topics and Pre-service Teacher Education

Topic	Variable	*n*	*r*	r^2	p^*
Biodiversity	Implementation	225	0.480	0.23	<.001
	Pre-service	199			
Ecology	Implementation	225	0.495	0.25	<.001
	Pre-service	198			
Energy	Implementation	225	0.354	0.13	<.001
	Pre-service	198			
Environmental Economics	Implementation	224	0.202	0.04	.004
	Pre-service	197			
Environmental Ethics and Values	Implementation	224	0.224	0.05	.001
	Pre-service	198			
Environmental Health	Implementation	223	0.336	0.11	<.001
	Pre-service	196			
Environmental Lifestyles	Implementation	224	0.316	0.10	<.001
	Pre-service	188			
Environmental Politics	Implementation	225	0.335	0.11	<.001
	Pre-service	191			
Global Environmental Impacts	Implementation	223	0.340	0.12	<.001
	Pre-service	188			
Human Population	Implementation	225	0.240	0.06	.001
	Pre-service	190			
Local and Regional Environmental Impacts	Implementation	225	0.272	0.07	<.001
	Pre-service	190			

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Table 12 (continued)

Topic	Variable	*n*	*r*	r^2	*p*
Natural Resources	Implementation	223	0.254	0.06	<.001
	Pre-service	189			
Resource Management	Implementation	225	0.415	0.17	<.001
	Pre-service	185			
Socio-cultural Environment	Implementation	224	0.331	0.11	<.001
	Pre-service	184			
Species Loss	Implementation	224	0.463	0.21	<.001
	Pre-service	181			
Sustainable Development	Implementation	224	0.263	0.07	<.001
	Pre-service	183			
Technology	Implementation	223	0.443	0.20	<.001
	Pre-service	182			
Waste Management	Implementation	224	0.337	0.11	<.001
	Pre-service	184			

Note. *r* = Pearson correlation; r^2 = coefficient of determination.
*Correlation is significant at the 0.01 level (2-tailed).

Within part four of the survey teachers were asked if they had received any pre-service teacher education in EE. Of those responding to this question (*n* = 194), 40% did experience some pre-service teacher education in EE while 60% had not. Teachers who did receive environmental education during their pre-service years incorporated EE topics more often into the curriculum than did teachers who did not receive any EE during their pre-service years. Table 13 shows there is a statistically significant difference between the two groups.

Table 13

Differences Between Teachers Who Had Pre-service Teacher Education in EE and Those Who Did Not on the Extent of Implementation of EE Topics into the Curriculum

Variable	*n*	*M*[a]	*SD*	*df*	*t*	*p*
Overall Extent of Topic Implementation						
Pre-service EE	78	3.10	0.84	192	5.04	<.001
No Pre-service EE	116	2.48	0.84			

Note. The mean represents the overall topic implementation score. [a]1 = never, 2 = rarely, 3 = occasionally, 4 = frequently, 5 = a great deal.

Teachers that did receive pre-service teacher education in EE were then asked the extent to which they agreed or disagreed with three statements concerning their pre-service experiences. The six-point Likert-type scale was rated from 1 (disagree very strongly) to 6 (agree very strongly). For the purposes of analysis, all the *disagree* choices (disagree very strongly, disagree strongly, and disagree) were recoded as 1 (disagree). All the *agree* choices (agree very strongly, agree strongly, and agree) were recoded as 2 (agree). The recoding was done to simplify the data into two groups before further analysis with an independent-measures *t*-test. The three statements were:

- My pre-service teacher education effectively prepared me in using cognitive education methods to teach students about the environment.

- My pre-service teacher education effectively prepared me to use affective education methods to help students examine values relating to environmental issues.
- My pre-service teacher education was effective at providing me with action strategies I can use to give students experience in resolving environmental issues.

Teachers who agreed with these statements incorporated EE topics slightly more often into the curriculum than did teachers who disagreed with these statements. Table 14 shows there was no statistically significant difference between teachers who agreed and teachers who disagreed with the three statements.

Table 14

Teacher Perceptions Regarding the Effectiveness of Pre-service Teacher Education Preparation in Three EE Areas in Relation to the Extent that EE Topics were Implemented into the Curriculum

Effectiveness Statements	*n*	*M*[a]	*SD*	*df*	*t*	*p*
Cognitive methods were effective.						
Agree	58	3.12	0.83	75	-0.64	.521
Disagree	19	2.98	0.91			
Affective methods were effective.						
Agree	50	3.22	0.81	76	-1.80	.076
Disagree	28	2.87	0.87			
Action strategies methods were effective.						
Agree	44	3.14	0.82	76	-0.56	.576
Disagree	34	3.06	0.89			

Note. The mean represents the overall topic implementation score. [a]1 = never, 2 = rarely, 3 = occasionally, 4 = frequently, 5 = a great deal.

What is the Relationship between the Level of Implementation of Topic Areas in Environmental Education in High School Science and Social Studies Classrooms and the Level of Inservice Teacher Preparation in Environmental Education Topic Areas?

Also within part three of the survey teachers were asked about the extent to which these 18 topic areas were addressed in their inservice programming. The same five-point Likert-type scale that was used for the pre-service section was used here. Inservice programming included graduate courses, workshops, seminars, district offerings, or conferences taken after teacher certification. Teachers reported that the topics of energy (M = 2.31), natural resources (M = 2.19), and global environmental impacts (M = 2.13) were addressed more often than the other topics during their inservice programming. It is worth noting that these three topics were also implemented most often into the curriculum. The topics that were reported as having the least coverage during this time were resource management (M = 1.70), environmental economics (M = 1.74), and environmental politics (M = 1.76). These three topics were also reported as having been implemented least often into the curriculum. Table 4 compares the means and standard deviations of all 18 topics with respect to pre-service exposure, inservice exposure, and implementation of these topics into the curriculum.

There was a significant difference between the extent to which the topics were covered in the curriculum and the amount of inservice exposure to those topics in all 18 topic areas ($p < .001$). Therefore, teachers reported covering significantly more of the topic than they had been exposed to during inservice offerings. Table 15 shows the results of a paired samples t-test on this data.

A Pearson product-moment correlation was run to determine the relationship between the extent to which topics were implemented in the curriculum and the extent to which they were addressed in inservice teacher education programs. There was a positive correlation between these variables which were all statistically significant. The topic with the strongest positive relationship was energy (r = 0.501, n = 198, $p < .001$), followed closely by species loss (r = 0.476, n = 183, $p < .001$) and environmental politics (r = 0.437, n = 189, $p < .001$) while the

Table 15

The Extent of Implementation of Environmental Education Topics Compared with Extent to which these Topics were Addressed during Inservice Teacher Programming

Topics	*n*	M_D	*SD*	*t*	*df*	*p*	*d*
Biodiversity	198	0.78	1.51	7.29	197	<.001	0.52
Ecology	196	0.96	1.36	9.90	195	<.001	0.71
Energy	198	1.05	1.17	12.60	197	<.001	0.90
Environmental Economics	196	0.55	1.16	6.61	195	<.001	0.47
Environmental Ethics and Values	197	0.85	1.15	10.30	196	<.001	0.73
Environmental Health	195	0.79	1.24	8.96	194	<.001	0.64
Environmental Lifestyles	187	0.68	1.18	7.91	186	<.001	0.58
Environmental Politics	189	0.58	1.07	7.43	188	<.001	0.54
Global Environmental Impacts	187	0.91	1.29	9.61	186	<.001	0.70
Human Population	189	0.98	1.37	9.87	188	<.001	0.72
Local and Regional Environmental Impacts	189	0.69	1.26	7.57	188	<.001	0.55
Natural Resources	188	0.97	1.25	10.59	187	<.001	0.77
Resource Management	185	0.44	1.10	5.47	184	<.001	0.40
Socio-cultural Environment	183	0.56	1.23	6.16	182	<.001	0.45
Species Loss	183	0.50	1.16	5.85	182	<.001	0.43
Sustainable Development	181	0.51	1.25	5.53	180	<.001	0.41
Technology	180	0.81	1.25	8.71	179	<.001	0.65
Waste Management	184	0.53	1.18	6.14	183	<.001	0.45

Note. M_D = mean difference; *d* = Cohen's *d*

topics with the weakest positive relationship were socio-cultural environment (r = 0.303, n = 183, p < .001), sustainable development (r = 0.313, n = 181, p < .001), and human population (r = 0.348, n = 189, p < .001). Correlations for all 18 topics can be found in Table 16. It is interesting to note that Pearson's r increased in 13 of the 18 topics as compared to the correlation between these 18 topics and pre-service teacher education.

Within part four of the survey teachers were asked if they had received any inservice teacher education in EE. Of those responding to this question (n = 194), 32% did experience some inservice teacher education in EE while 68% had not. Teachers who did receive environmental education during inservice programming incorporated EE topics more often into the curriculum than did teachers who did not receive any EE during inservice opportunities. Table 17 shows there is a statistically significant difference between the two groups.

Table 16

Correlations Between Classroom Implementation of Environmental Topics and Inservice Teacher Education

Topic	Variable	*n*	*r*	r^2	*p**
Biodiversity	Implementation	225	0.403	0.16	<.001
	Inservice	198			
Ecology	Implementation	225	0.426	0.18	<.001
	Inservice	196			
Energy	Implementation	225	0.501	0.25	<.001
	Inservice	198			
Environmental Economics	Implementation	224	0.360	0.13	<.001
	Inservice	196			
Environmental Ethics and Values	Implementation	224	0.388	0.15	<.001
	Inservice	197			
Environmental Health	Implementation	223	0.411	0.17	<.001
	Inservice	195			
Environmental Lifestyles	Implementation	224	0.383	0.15	<.001
	Inservice	187			
Environmental Politics	Implementation	225	0.437	0.19	<.001
	Inservice	189			
Global Environmental Impacts	Implementation	223	0.406	0.16	<.001
	Inservice	187			
Human Population	Implementation	225	0.348	0.12	<.001
	Inservice	189			
Local and Regional Environmental Impacts	Implementation	225	0.390	0.15	<.001
	Inservice	189			

(Continued on following page)

Table 16 (continued)

Topic	Variable	*n*	*r*	r^2	*p**
Natural Resources	Implementation	223	0.383	0.15	<.001
	Inservice	188			
Resource Management	Implementation	225	0.391	0.15	<.001
	Inservice	185			
Socio-cultural Environment	Implementation	224	0.303	0.09	<.001
	Inservice	183			
Species Loss	Implementation	224	0.476	0.23	<.001
	Inservice	183			
Sustainable Development	Implementation	224	0.313	0.10	<.001
	Inservice	181			
Technology	Implementation	223	0.391	0.15	<.001
	Inservice	180			
Waste Management	Implementation	224	0.422	0.18	<.001
	Inservice	184			

Note. *r* = Pearson correlation; r^2 = coefficient of determination.
*Correlation is significant at the 0.01 level (2-tailed).

Table 17

Differences Between Teachers Who Had Inservice Teacher Education in EE and Those Who Did Not on the Extent of Implementation of EE Topics into the Curriculum

Variable	*n*	*M*[a]	*SD*	*df*	*t*	*p*
Overall Extent of Topic Implementation						
Inservice EE	62	3.28	0.87	192	6.56	<.001
No Inservice EE	132	2.46	0.78			

Note. The mean represents the overall topic implementation score. [a]1 = never, 2 = rarely, 3 = occasionally, 4 = frequently, 5 = a great deal.

Teachers that did receive inservice teacher education in EE were then asked the extent to which they agreed or disagreed with three statements concerning their inservice experiences. The six-point Likert-type scale was rated from 1 (disagree very strongly) to 6 (agree very strongly). For the purposes of analysis, all the *disagree* choices (disagree very strongly, disagree strongly, and disagree) were recoded as 1 (disagree). All the *agree* choices (agree very strongly, agree strongly, and agree) were recoded as 2 (agree). The recoding was done to simplify the data into two groups before further analysis with an independent-measures *t*-test. The three statements were:

- My inservice or post-graduate courses effectively prepared me in using cognitive education methods to teach students about the environment.
- My inservice or post-graduate courses effectively prepared me to use affective education methods to help students examine values relating to environmental issues.
- My inservice or post-graduate courses were effective at providing me with action strategies I can use to give students experience in resolving environmental issues.

Teachers who agreed with the latter two of these statements incorporated EE topics slightly more often into the curriculum than did teachers who disagreed with these statements. Table

18 shows there was no statistically significant difference between teachers who agreed and teachers who disagreed with the three statements.

Table 18

Teacher Perceptions Regarding the Effectiveness of Inservice Programming in Three EE Areas in Relation to the Extent that EE Topics are Implemented into the Curriculum

Variable	*n*	*M*[a]	*SD*	*df*	*t*	*p*
Cognitive methods were effective.						
Agree	52	3.24	0.85	60	0.67	.507
Disagree	10	3.45	1.00			
Affective methods were effective.						
Agree	46	3.37	0.81	60	-1.41	.164
Disagree	16	3.02	1.00			
Action strategies methods were effective.						
Agree	47	3.31	0.84	60	-0.44	.665
Disagree	15	3.20	0.96			

Note. The mean represents the overall topic implementation score. [a]1 = never, 2 = rarely, 3 = occasionally, 4 = frequently, 5 = a great deal.

What is the Relationship between the Level of Implementation of Topic Areas in Environmental Education in High School Science and Social Studies Classrooms and Demographic Characteristics of Secondary Science and Social Studies Teachers?

Part one of the survey addressed the level of implementation of 18 topic areas within EE. Teachers were asked to indicate the extent to which they implemented these topics into their curriculum. As stated previously, the five-point Likert-type scale was rated from 1 (never) to

5 (a great deal). Two categories of demographics were used in this analysis. Each demographic will be found in its own section.

Comparison Between the Level of Implementation of Topic Areas in Environmental Education in the Classroom and Discipline Categories (Science or Social Studies) Taught by the Respondents. Part four of the survey contained demographic questions. Participants were asked what specific subjects they taught. For the purpose of this analysis, teachers were categorized as science teachers (n = 159) or social studies teachers (n = 63) depending on the specific subjects they taught. The three individuals who reported teaching both science and social studies courses were excluded from this analysis.

Among science teachers the topic with the highest mean was energy (3.55, which was between "occasionally" and "frequently") and the lowest mean was resource management (2.11, which was between "rarely" and "occasionally"). Among social studies teachers the topic with the highest mean was human population (3.33, which was between "occasionally" and "frequently") and the lowest mean was biodiversity (1.84, which was between "never" and "rarely"). An independent-measures t-test was run comparing this data with the extent to which they implemented the 18 environmental topics into the curriculum. There was a statistically significant difference in the extent to which ten of the 18 topic areas were implemented into the curriculum between science and social studies teachers. For example, science teachers included more energy in their classes (M = 3.55, SD = 1.03) than social studies teachers (M = 2.86, SD = 1.12), $t(220) = 4.43$, $p < .001$. Social studies teachers included more environmental politics in their classes (M = 2.54, SD = 1.09) than science teachers (M = 2.21, SD = 1.04), $t(220) = -2.12$, $p = .035$. The assumption of homogeneity of variances was violated in four topic areas (biodiversity, global environmental impacts, species loss, and sustainable development) as assessed by Levene's Test for Equality of Variances ($p \leq .05$). The non-parametric Kruskal-Wallis t-test was also run on these four topic areas in relationship to the two subject disciplines. The results confirmed the statistical significance of those results and thus, were consistent with

the independent-measures *t*-test. Table 19 shows the differences between science and social studies teachers for all of the 18 environmental topic areas.

The 18 topics were sorted into four clusters using agglomerative hierarchical clustering and the average-linkage-between-groups method. Cronbach's alpha coefficient for internal consistency was run on three of the four clusters. The high alpha numbers indicate that these topics stick together well. Cluster 2 consisted of one topic only and so Cronbach's alpha was not used to establish internal consistency. The topics within each cluster and Cronbach's alpha for three of the clusters can be found in Table 20.

An independent-measures *t*-test was run comparing these clusters of topics with the extent to which science and social studies teachers implemented them into the curriculum. Within each cluster, science teachers had higher means of implementation than social studies teachers. There were statistically significant differences found in Cluster 1 (Biology) and Cluster 2 (Energy). No significant differences appeared in Clusters 3 (Human/Environment Interactions) and 4 (Global Impacts). Results of this *t*-test are found in Table 21.

Comparison Between the Level of Implementation of Topic Areas in Environmental Education in the Classroom and the Years of Teaching Experience. Part four of the survey contained demographic questions. Participants were asked how many years they had been teaching, including the then current school year. Choices were one to five years, six to 10 years, 11 to 15 years, 16 to 20 years, 21 to 25 years, and over 25 years. A one-way ANOVA was run to examine the relationship between the implementation of the topics and the years of experience. Respondents were separated into three groups, beginning teachers with one to five years of experience, mid-career teachers with six to 20 years of experience, and veteran teachers with at least 21 years of experience. In general, the more experience teachers had, the greater the level of implementation of these 18 topic areas. Ten statistically significant differences were found within eight of the topic areas. As an example, within the topic of global environmental impacts, there was homogeneity of variances, as assessed by Levene's Test of Homogeneity of Variance (p = .479). There was a statistically significant difference between

Table 19

Level of Implementation of Environmental Topics by Discipline

Environmental Topics	Discipline	*n*	*M*[a]	*SD*	*df*	*t*	*p*
Biodiversity	Science	159	3.16	1.47	164[b]	7.70	<.001
	Social Studies	63	1.84	1.00			
Ecology	Science	159	3.26	1.31	220	5.43	<.001
	Social Studies	63	2.24	1.18			
Energy	Science	159	3.55	1.03	220	4.43	<.001
	Social Studies	63	2.86	1.12			
Environmental Economics	Science	158	2.25	1.08	219	-1.12	.265
	Social Studies	63	2.43	1.12			
Environmental Ethics and Values	Science	159	2.75	1.06	219	0.08	.934
	Social Studies	62	2.74	0.96			
Environmental Health	Science	157	3.07	1.07	218	2.87	.005
	Social Studies	63	2.60	1.13			
Environmental Lifestyles	Science	158	2.59	1.09	219	1.00	.317
	Social Studies	63	2.43	1.16			
Environmental Politics	Science	159	2.21	1.04	220	-2.12	.035
	Social Studies	63	2.54	1.09			
Global Environmental Impacts	Science	157	3.19	1.14	101[b]	2.68	.008
	Social Studies	63	2.68	1.32			

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Table 19 (continued)

Environmental Topics	Discipline	*n*	*M*[a]	*SD*	*df*	*t*	*p*
Human Population	Science	159	2.91	1.30	220	-2.24	.026
	Social Studies	63	3.33	1.15			
Local and Regional Environmental Impacts	Science	159	2.82	1.17	220	2.67	.008
	Social Studies	63	2.37	1.11			
Natural Resources	Science	158	3.18	1.08	218	1.00	.317
	Social Studies	62	3.02	1.19			
Resource Management	Science	159	2.11	1.06	220	0.79	.429
	Social Studies	63	1.98	0.99			
Socio-cultural Environment	Science	158	2.41	1.05	219	-1.06	.291
	Social Studies	63	2.57	1.06			
Species Loss	Science	159	2.57	1.18	134[b]	4.63	<.001
	Social Studies	62	1.85	0.94			
Sustainable Development	Science	158	2.38	1.17	142[b]	1.35	.178
	Social Studies	63	2.17	0.92			
Technology	Science	158	2.88	1.18	218	0.52	.604
	Social Studies	62	2.79	1.06			
Waste Management	Science	158	2.69	1.06	219	3.18	.002
	Social Studies	63	2.19	1.05			

[a]1 = never, 2 = rarely, 3 = occasionally, 4 = frequently, 5 = a great deal. [b]The assumption of homogeneity of variances was violated as assessed by Levene's Test for Equality of Variances.

Table 20

Topic Clusters

Cluster	Topics	Cronbach's alpha
1 – Biology	Biodiversity Ecology	0.93
2 – Energy	Energy	
3 – Human/Environment Interactions	Environmental Economics Environmental Ethics and Values Environmental Lifestyles Environmental Politics Local and Regional Environmental Impacts Resource Management Socio-cultural Environment Species Loss Sustainable Development Technology Waste Management	0.94
4 – Global Impacts	Environmental Health Global Environmental Impacts Human Population Natural Resources	0.88

groups with the extent to which they implemented the topic of global environmental impacts in the curriculum ($F(2, 216) = 4.46$, $p = .013$). The extent of topic implementation increased from beginning teachers ($M = 2.85$, $SD = 1.22$) to mid-career teachers ($M = 2.96$, $SD = 1.24$) and veteran teachers ($M = 3.52$, $SD = 1.00$) in that order. A Scheffé post-hoc test revealed that the mean increase from beginning teachers to veteran teachers (0.67) was statistically significant ($p = .037$), as well as the mean increase from mid-career teachers to veteran teachers (0.57, $p = .025$). Complete results of this ANOVA are found in Table 22.

The assumption of equal variances (Levene's) was violated in three of the topic areas so a Welch's F was run on these topics. There was not a statistically significant difference between groups with the extent to which they implemented the topic of environmental lifestyles (Welch's $F(2,92) = 1.93$, $p = .151$) in the curriculum. Statistically significant differences between

Table 21

Environmental Topics Clusters by Discipline

Clusters	Discipline	*n*	*M*[a]	*SD*	*df*	*t*	*p*
1 – Biology	Science	159	3.21	1.35	152[b]	7.10	<.001
	Social Studies	63	2.04	1.00			
2 – Energy	Science	159	3.55	1.03	220	4.43	<.001
	Social Studies	63	2.86	1.12			
3 – Human/Environment Interactions	Science	159	2.52	0.91	220	1.10	.274
	Social Studies	63	2.37	0.82			
4 – Global Impacts	Science	159	3.09	1.01	220	1.25	.214
	Social Studies	63	2.90	1.01			

[a]1 = never, 2 = rarely, 3 = occasionally, 4 = frequently, 5 = a great deal. [b]The assumption of homogeneity of variances was violated as assessed by Levene's Test for Equality of Variances.

groups were found in environmental politics (Welch's $F(2,91) = 3.86$, $p = .025$) and in waste management (Welch's $F(2,90) = 7.56$, $p = .001$). A Games-Howell post-hoc test revealed that the mean increase from beginning teachers to veteran teachers (0.57) was statistically significant ($p = .018$) within the topic of environmental politics. Two statistically significant differences between groups were found in waste management. The mean increase from beginning teachers to veteran teachers (0.79) was statistically significant ($p = .001$) as well as the mean increase from intermediate teachers to veteran teachers (0.42, $p = .035$). Complete post hoc results can be found in Table 23.

Table 22

Implementation of Environmental Topics Scores for Experience Groups

Environmental Topics	Experience Groups	*n*	*M*[a]	*SD*	*df*	*F*	*p*
Biodiversity	1 to 5 years	41	2.49	1.43	220	2.88	.058
	6 to 20 years	134	2.75	1.48			
	21 years +	46	3.22	1.43			
Ecology	1 to 5 years	41	2.68	1.35	220	2.37	.096
	6 to 20 years	134	2.97	1.33			
	21 years +	46	3.30	1.33			
Energy	1 to 5 years	41	3.44	1.00	220	2.33	.100
	6 to 20 years	134	3.22	1.14			
	21 years +	46	3.61	1.02			
Environmental Economics	1 to 5 years	41	2.17	1.09	219	1.98	.141
	6 to 20 years	133	2.26	1.05			
	21 years +	46	2.59	1.15			
Environmental Ethics and Values	1 to 5 years	41	2.49	0.90	219	2.36	.097
	6 to 20 years	134	2.79	1.04			
	21 years +	45	2.96	1.04			
Environmental Health	1 to 5 years	40	2.78	1.19	218	1.79	.169
	6 to 20 years	134	2.90	1.11			
	21 years +	45	3.20	1.01			

(Continued on following page)

Table 22 (continued)

Environmental Topics	Experience Groups	*n*	*M*[a]	*SD*	*df*	*F*	*p*
Environmental Lifestyles	1 to 5 years	41	2.29	0.98	94	1.93[b]	.151
	6 to 20 years	134	2.61	1.19			
	21 years +	45	2.67	0.93			
Environmental Politics	1 to 5 years	41	2.00	0.98	93	3.86[b]	.025
	6 to 20 years	134	2.34	1.11			
	21 years +	46	2.57	0.91			
Global Environmental Impacts	1 to 5 years	41	2.85	1.22	218	4.46	.013
	6 to 20 years	134	2.96	1.24			
	21 years +	44	3.52	1.00			
Human Population	1 to 5 years	41	2.98	1.26	220	0.22	.803
	6 to 20 years	134	3.04	1.26			
	21 years +	46	3.15	1.32			
Local and Regional Environmental Impacts	1 to 5 years	41	2.27	1.14	220	5.80	.004
	6 to 20 years	134	2.72	1.17			
	21 years +	46	3.11	1.08			
Natural Resources	1 to 5 years	41	2.98	1.08	218	3.31	.039
	6 to 20 years	132	3.05	1.16			
	21 years +	46	3.50	0.96			

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Table 22 (continued)

Environmental Topics	Experience Groups	*n*	*M*[a]	*SD*	*df*	*F*	*p*
Resource Management	1 to 5 years	41	1.80	0.93	220	4.29	.015
	6 to 20 years	134	2.05	1.04			
	21 years +	46	2.43	1.07			
Socio-cultural Environment	1 to 5 years	41	2.17	0.97	219	3.23	.042
	6 to 20 years	133	2.46	1.07			
	21 years +	46	2.74	1.02			
Species Loss	1 to 5 years	40	2.20	1.09	219	4.09	.018
	6 to 20 years	134	2.28	1.16			
	21 years +	46	2.80	1.17			
Sustainable Development	1 to 5 years	41	1.95	1.05	219	7.25	.001
	6 to 20 years	134	2.29	1.11			
	21 years +	45	2.82	1.03			
Technology	1 to 5 years	40	2.95	1.32	218	0.77	.464
	6 to 20 years	134	2.81	1.09			
	21 years +	45	3.04	1.11			
Waste Management	1 to 5 years	41	2.17	0.97	92	7.56[b]	.001
	6 to 20 years	134	2.54	1.12			
	21 years +	45	2.96	0.90			

Note. Degrees of freedom (*df*) are totals.
[a] 1 = never, 2 = rarely, 3 = occasionally, 4 = frequently, 5 = a great deal. [b]Welch's *F* was run on these

Table 23

Environmental Topics Post Hoc Comparison for Years of Experience

Environmental Topics	Comparisons	M_D[a]	*p*
Environmental Politics	1 to 5 years vs. 21 years +	0.57	.018[b]
Global Environmental Impacts	1 to 5 years vs. 21 years +	0.67	.037
	6 to 20 years vs. 21 years +	0.57	.025
Local and Regional Environmental Impacts	1 to 5 years vs. 21 years +	0.84	.004
Resource Management	1 to 5 years vs. 21 years +	0.63	.018
Socio-cultural Environment	1 to 5 years vs. 21 years +	0.57	.042
Species Loss	6 to 20 years vs. 21 years +	0.52	.032
Sustainable Development	1 to 5 years vs. 21 years +	0.87	.001
	6 to 20 years vs. 21 years +	0.53	.019
Waste Management	1 to 5 years vs. 21 years +	0.79	.001[b]
	6 to 20 years vs. 21 years +	0.42	.035[b]

Note. Unless stated otherwise, post hoc tests were Scheffé.
[a]M_D = mean difference. [b]Games-Howell post hoc

An ANOVA was run on the clusters of implementation topics and these groups of teaching experience. In general, the more experience teachers had, the greater the level of implementation within these four clusters. No statistically significant differences were found in Clusters 1, 2, and 4. However, there was a statistically significant difference between groups with the extent to which they implemented the topics within Cluster 3 ($F(2, 218) = 4.87$, $p = .009$). Complete results of this ANOVA are found in Table 24. A Scheffé post-hoc test revealed that the mean increase from beginning teachers to veteran teachers (0.57) was statistically significant ($p = .009$), as well as the mean increase from mid-career teachers to veteran teachers (0.32, $p = .090$).

Research Question Two

The second research question was presented in four parts. Each part will be discussed separately.

What is the Relationship between the Attitudes toward Environmental Education held by High School Science and Social Studies Teachers and the Level of Implementation of Topic Areas in Environmental Education?

Part Two of the survey assessed general attitudes regarding the environment and environmental education. Teachers were asked to indicate the extent to which they agreed or disagreed with 23 statements. The six-point Likert-type scale was rated from 1 (disagree very strongly) to 6 (agree very strongly). Five of the statements (numbers 20, 23, 32, 34, and 38) were initially worded as more negative toward EE. In order to run Pearson's correlations on these negatively worded statements, scales were reversed and recoded. For example, all individuals who chose 1 (disagree very strongly) were recoded to 6 (agree very strongly).

A Pearson's correlation was run to determine the relationship between the mean topic implementation score (2.70) and the mean recoded attitude score (3.98). The correlation was positive and statistically significant ($r = 0.687$, $n = 215$, $p<.001$) at the 0.01 level (2-tailed).

Table 24

Clustered Implementation of Environmental Topics Scores by Years of Experience

Topic Clusters	Experience Groups	*n*	*M*	*SD*	*df*	*F*	*p*
1 – Biology	1 to 5 years	41	2.59	1.34	220	2.81	.062
	6 to 20 years	134	2.86	1.35			
	21 years +	46	3.26	1.35			
2 – Energy	1 to 5 years	41	3.44	1.00	220	2.33	.100
	6 to 20 years	134	3.22	1.34			
	21 years +	46	3.61	1.02			
3 – Human/Environment Interactions	1 to 5 years	41	2.22	0.84	220	4.87	.009
	6 to 20 years	134	2.47	0.89			
	21 years +	46	2.79	0.80			
4 – Global Impacts	1 to 5 years	41	2.89	1.00	220	2.89	.058
	6 to 20 years	134	2.98	1.04			
	21 years +	46	3.36	0.92			

Note. Degrees of freedom (*df*) are totals.
[a]1 = never, 2 = rarely, 3 = occasionally, 4 = frequently, 5 = a great deal.

What is the Relationship between the Attitudes toward Environmental Education held by High School Science and Social Studies Teachers and the Level of Pre-service Teacher Preparation in Environmental Education Topic Areas?

A Pearson's correlation was run to determine the relationship between the overall mean pre-service environmental teacher education score (2.4) and the mean recoded attitude score (3.98). The correlation was positive and statistically significant (r = 0.414, n = 199, p<.001) at the 0.01 level (2-tailed).

What is the Relationship between the Attitudes toward Environmental Education held by High School Science and Social Studies Teachers and the Level of Inservice Teacher Preparation in Environmental Education Topic Areas?

A Pearson's correlation was run to determine the relationship between the overall mean inservice environmental teacher education score (2.00) and the mean recoded attitude score (3.98). The correlation was positive and statistically significant (r = 0.421, n = 199, p<.001) at the 0.01 level (2-tailed).

What is the Relationship between the Attitudes toward Environmental Education held by High School Science and Social Studies Teachers and Demographic Characteristics of Secondary Science and Social Studies Teachers?

Part Two of the survey assessed general attitudes regarding the environment and environmental education. Teachers were asked to indicate to which they agreed or disagreed with 23 statements. As stated previously, the six-point Likert-type scale was rated from 1 (very strongly disagree) to 6 (very strongly agree). No answers were reversed (recoded) in this analysis. Two categories of demographics were used. Each demographic will be found in its own section.

Comparison Between the Individual Attitude Statement Scores toward Environmental Education and Discipline Categories (Science or Social Studies) Taught by the Respondents. An independent-measures *t*-test was run comparing science and social studies teachers with the individual attitude statements. The three individuals who reported teaching both science and social studies courses were excluded from this analysis. Attitude statements were not recoded in this analysis. There were statistically significant differences in 22 of the 23 attitude statements between science and social studies teachers. For example, social studies teachers tended to disagree with statement 37, "Environmental topics serve as engaging themes for integrated teaching units," (M = 3.78, SD = 0.88), while science teachers tended to agree with it (M = 4.396, SD = 0.79), $t(197) = 4.67$, $p < .001$). The assumption of homogeneity of variances was violated in two attitude statements (28 and 35) as assessed by Levene's Test for Equality of Variances ($p < .05$). The difference between science and social studies teachers was not statistically significant in attitude statement 34, "Integrating EE into the curriculum is difficult," ($p = .096$). The differences between science and social studies teachers' attitude scores for all 23 environmental attitude statements are displayed in Table 25.

The 23 attitude statements were sorted into four clusters using agglomerative hierarchical clustering and the average-linkage-between-groups method. Cronbach's alpha coefficient for internal consistency was run on three of the four clusters. The high alpha numbers indicate that these topics stick together well. Cluster 4 consisted of one attitude only, so Cronbach's alpha was not used to establish internal consistency. The attitudes within each cluster and Cronbach's alpha for three of the clusters can be found in Table 26.

Cluster 1 consists of personal attitudes regarding the environment and was thus named World View. The second cluster is made up of attitudes dealing with perceived preparation for and capability of teaching EE topics and was therefore named Self-efficacy. Cluster 3 addresses attitudes regarding the degree of commitment to environmental education and was thus named Commitment to EE. The fourth cluster is made up of a single attitude that is

Table 25

Individual Environmental Attitude Statements by Discipline

Environmental Attitude Statements	Discipline	*n*	*M*[a]	*SD*	*df*	*t*	*p*
19. I am an environmentally aware person.	Science	152	4.78	0.83	210	4.20	<.001
	Social Studies	60	4.23	0.89			
20. I am not sure what integrating EE into the curriculum involves.	Science	152	2.72	1.03	210	-6.06	<.001
	Social Studies	60	3.68	1.08			
21. All teachers should receive instruction in EE prior to receiving their teacher certification.	Science	150	3.89	1.00	208	5.22	<.001
	Social Studies	60	3.10	0.97			
22. I am a supporter for the integration of EE into the curriculum.	Science	151	4.46	0.82	209	5.65	<.001
	Social Studies	60	3.70	1.03			
23. I believe that traditional subjects should have a priority over EE.	Science	148	3.61	0.86	205	-5.13	<.001
	Social Studies	59	4.31	0.93			
24. I enjoy/would enjoy teaching EE.	Science	149	4.52	0.96	207	6.37	<.001
	Social Studies	60	3.53	1.14			
25. I have the resources necessary to carry out my desired level of EE instruction.	Science	148	3.85	1.15	206	4.72	<.001
	Social Studies	60	3.03	1.10			
26. Integrating EE into my teaching is important to me.	Science	147	4.31	0.90	205	6.47	<.001
	Social Studies	60	3.35	1.10			
27. With my present education I feel capable of teaching EE.	Science	149	4.29	1.08	207	6.54	<.001
	Social Studies	60	3.17	1.22			

(Continued on following page)

Table 25 (continued)

Environmental Attitude Statements	Discipline	*n*	*M*[a]	*SD*	*df*	*t*	*p*
28. Integrating EE into the curriculum would enable teachers to more effectively meet the needs of all students.	Science	149	3.96	0.82	96[b]	4.94	<.001
	Social Studies	60	3.27	0.95			
29. Environmental education helps students understand environmental issues.	Science	148	4.72	0.80	206	2.55	.011
	Social Studies	60	4.38	1.03			
30. I understand environmental topics enough to teach about them in the curriculum.	Science	150	4.47	1.02	208	5.53	<.001
	Social Studies	60	3.62	0.99			
31. Teachers should provide students with opportunities to gain actual experience in resolving environmental issues.	Science	146	4.27	0.77	199	2.95	.004
	Social Studies	55	3.89	0.96			
32. Environmental education should be integrated into the science curriculum only.	Science	147	2.86	0.84	200	-3.48	.001
	Social Studies	55	3.33	0.90			
33. As an individual, I consider myself to be an environmentally responsible citizen.	Science	146	4.51	0.75	199	2.79	.006
	Social Studies	55	4.18	0.77			
34. Integrating EE into the curriculum is difficult.	Science	146	3.27	0.88	199	-1.67	.096
	Social Studies	55	3.51	0.90			
35. A goal of my teaching is to increase students' level of environmental responsibility.	Science	146	4.04	0.95	78[b]	3.40	.001
	Social Studies	55	3.40	1.27			
36. As an individual, I consider myself to be an environmentally active citizen.	Science	147	4.12	0.88	200	.2.26	.025
	Social Studies	55	3.80	0.97			

(Continued on following page)

Table 25 (continued)

Environmental Attitude Statements	Discipline	*n*	*M*[a]	*SD*	*df*	*t*	*p*
37. Environmental topics serve as engaging themes for integrated teaching units.	Science	145	4.39	0.79	197	4.67	<.001
	Social Studies	54	3.78	0.88			
38. Environmental education is difficult to teach.	Science	146	2.83	0.79	198	-3.79	<.001
	Social Studies	54	3.31	0.84			
39. Environmental education should be integrated throughout all subjects in our K-12 educational system.	Science	144	4.15	1.06	196	4.08	<.001
	Social Studies	54	3.44	1.11			
40. All pre-service teachers should be required to take an EE methods course.	Science	146	3.59	0.97	199	4.94	<.001
	Social Studies	55	2.82	1.02			
41 I am effective at integrating the study of environmental concepts and issues into my subject level.	Science	144	4.04	0.96	196	4.13	<.001
	Social Studies	54	3.39	1.07			

[a]1 = disagree very strongly, 2 = disagree strongly, 3 = disagree, 4 = agree, 5 = agree strongly, 6 = agree very strongly. [b]The assumption of homogeneity of variances was violated as assessed by Levene's Test for Equality of Variances.

Table 26

Attitude Clusters

Cluster		Attitudes	Cronbach's alpha
1 – World View	19	I am an environmentally aware person.	0.83
	29	Environmental education helps students understand environmental issues.	
	33	As an individual, I consider myself to be an environmentally responsible citizen.	
	36	As an individual, I consider myself to be an environmentally active citizen.	
2 – Self-efficacy	20	I am not sure what integrating EE into the curriculum involves.[a]	0.91
	25	I have the resources necessary to carry out my desired level of EE instruction.	
	27	With my present education I feel capable of teaching EE.	
	30	I understand environmental topics enough to teach about them in the curriculum.	
	34	Integrating EE into the curriculum is difficult.[a]	
	38	Environmental education is difficult to teach.[a]	
	41	I am effective at integrating the study of environmental concepts and issues into my subject level.	

(Continued on following page.)

Table 26 (continued)

Attitude Clusters

Clusters		Attitudes	Cronbach's alpha
3 – Commitment to EE	21	All teachers should receive instruction in EE prior to receiving their teacher certification.	0.94
	22	I am a supporter for the integration of EE into the curriculum.	
	24	I enjoy/would enjoy teaching EE.	
	26	Integrating EE into my teaching is important to me.	
	28	Integrating EE into the curriculum would enable teachers to more effectively meet the needs of all students.	
	31	Teachers should provide students with opportunities to gain actual experience in resolving environmental issues.	
	32	Environmental education should be integrated into the science curriculum only.[a]	
	35	A goal of my teaching is to increase students' level of environmental responsibility.	
	37	Environmental topics serve as engaging themes for integrated teaching units.	
	39	Environmental education should be integrated throughout all subjects in our K-12 education system.	
	40	All pre-service teachers should be required to take an EE methods course.	
4 – Commitment to Core	23	I believe that traditional subjects should have a priority over EE.[a]	

[a]These statements were reversed and recoded.

centered on the viewpoint that traditional core subjects should take precedence over EE and was named Commitment to Core.

An independent-measures *t*-test was run comparing these clusters of attitudes between science and social studies teachers. Within each cluster science teachers had higher means and thus, more positive attitudes toward EE than social studies teachers. There were statistically significant differences found in all clusters (Table 27).

Table 27

Teacher Attitude Clusters by Discipline

Clusters	Discipline	*n*	*M*[a]	*SD*	*df*	*t*	*p*
1 – World View	Science	152	4.53	0.65	210	3.68	<.001
	Social Studies	60	4.15	0.75			
2 – Self-efficacy	Science	152	4.11	0.77	210	6.16	<.001
	Social Studies	60	3.36	0.85			
3 – Commitment to EE	Science	152	4.15	0.67	210	6.50	<.001
	Social Studies	60	3.44	0.81			
4 – Commitment to Core	Science	148	3.39	0.86	205	5.13	<.001
	Social Studies	59	2.69	0.93			

[a]1 = disagree very strongly, 2 = disagree strongly, 3 = disagree, 4 = agree, 5 = agree strongly, 6 = agree very strongly.

Comparison Between the Overall Mean Attitude toward Environmental Education and Discipline Taught by the Respondents. The overall mean attitude toward EE by all respondents (*n* = 215) was 3.98 (*SD* = 0.68). Table 28 shows there is a statistically significant difference

between science and social studies teachers' overall mean attitudes toward environmental education. Recoded answers were used to obtain these means.

Table 28

Differences Between Science and Social Studies Teachers' Overall Mean Attitudes Toward Environmental Education

Variable	*n*	*M*[a]	*SD*	*df*	*t*	*p*
Teacher Attitudes Toward EE						
Science Respondents	152	4.17	0.60	210	7.07	<.001
Social Studies Respondents	60	3.51	0.65			

[a]1 = disagree very strongly, 2 = disagree strongly, 3 = disagree, 4 = agree, 5 = agree strongly, 6 = agree very strongly. [b] Includes three teachers who teach both science and social studies

Comparison Between the Mean Attitude toward Environmental Education and the Years of Teaching Experience. Respondents were asked how many years they had been teaching, including the then-current school year. Choices were one to five years, six to 10 years, 11 to 15 years, 16 to 20 years, 21 to 25 years, and over 25 years. A one-way ANOVA was run to examine the relationship between attitudes toward environmental education and the years of teaching experience. Respondents were separated into three groups: beginning teachers with one to five years of experience, mid-career teachers with six to 20 years of experience, and veteran teachers with at least 21 years of experience.

Twelve statistically significant differences were found within 23 of the attitude statements. As an example, within attitude statement 26 (Integrating EE into my teaching is important to me) there was homogeneity of variances, as assessed by Levene's Test of Homogeneity of Variance (p = .170). There was a statistically significant difference between groups with this attitude statement ($F(2, 205) = 7.11$, p = .001). The level of agreement increased from beginning teachers (M = 3.67, SD = 1.17) to mid-career teachers (M = 3.98, SD

= 0.99) and veteran teachers (*M* = 4.50, *SD* = 0.976) in that order. A Scheffé post-hoc test revealed that the mean increase from beginning teachers to veteran teachers (0.83) was statistically significant (*p* = .002), as well as the mean increase from mid-career teachers to veteran teachers (0.52, *p* = .015). Complete results of this ANOVA are found in Table 29.

The assumption of equal variances (Levene's) was violated in three of the attitude statements so a Welch's F was run on these items. There was not a statistically significant difference between groups with attitude statement 33, "As an individual, I consider myself to be an environmentally responsible citizen" (Welch's *F*(2, 77) = 1.58, p = .214). In addition, there was not a statistically significant difference between groups with attitude statement 38, "Environmental education is difficult to teach" (Welch's *F*(2,66) = 1.65, *p* = .199). A statistically significant difference between groups was found with attitude statement 31, "Teachers should provide students with opportunities to gain actual experience in resolving environmental issues" (Welch's *F*(2,79) = 3.95, *p* = .023). A Games-Howell post-hoc test revealed that the mean increase from beginning teachers to veteran teachers (0.48) was statistically significant (*p* = .019) within attitude statement 31. Complete post hoc results can be found in Table 30.

An ANOVA was run on the attitude clusters and these groups of teaching experience. The more experience teachers had, the more positive the attitudes within these four clusters. No statistically significant differences were found in Clusters 1 (World View) and 4 (Commitment to Core). There were statistically significant differences between groups with respect to attitudes within Clusters 2 (Self-efficacy) and 3 (Commitment to EE). As an example, within Cluster 3 there was homogeneity of variances, as assessed by Levene's Test of Homogeneity of Variance (*p* = .861. There was a statistically significant difference between groups (*F*(2, 210) = 5.17, *p* = .006). The level of agreement increased from beginning teachers (*M* = 3.70, *SD* = 0.80) to mid-career teachers (*M* = 3.92, *SD* = 0.77) and veteran teachers (*M* = 4.23, *SD* = 0.69) in that order. Complete results of this ANOVA are found in Table 31. A Scheffé post-hoc test revealed that the mean increase from beginning teachers to veteran teachers (0.53) was statistically significant (*p* = .008). Complete post hoc results can be found in Table 32.

Table 29

Attitude Statement Scores for Experience Groups

Environmental Attitude Statements	Experience Groups	*n*	*M*[a]	*SD*	*df*	*F*	*p*
19. I am an environmentally aware person.	1 to 5 years	37	4.41	0.73	212	2.87	.059
	6 to 20 years	131	4.62	0.90			
	21 years +	45	4.87	0.92			
20. I am not sure what integrating EE into the curriculum involves.	1 to 5 years	37	3.38	1.14	212	6.73	.001
	6 to 20 years	131	3.04	1.11			
	21 years +	45	2.51	1.04			
21. All teachers should receive instruction in EE prior to receiving their teacher certification.	1 to 5 years	36	3.47	1.00	210	1.96	.143
	6 to 20 years	130	3.62	1.10			
	21 years +	45	3.91	0.90			
22. I am a supporter for the integration of EE into the curriculum.	1 to 5 years	37	3.92	1.01	211	3.79	.024
	6 to 20 years	130	4.25	0.92			
	21 years +	45	4.49	0.90			
23. I believe that traditional subjects should have a priority over EE.	1 to 5 years	37	4.00	1.08	207	2.06	.130
	6 to 20 years	127	3.84	0.96			
	21 years +	44	3.59	0.69			
24. I enjoy/would enjoy teaching EE.	1 to 5 years	37	4.00	1.20	209	3.96	.020
	6 to 20 years	129	4.18	1.06			
	21 years +	44	4.64	1.10			

(Continued on following page)

Table 29 (continued)

Environmental Attitude Statements	Experience Groups	*n*	*M*[a]	*SD*	*df*	*F*	*p*
25. I have the resources necessary to carry out my desired level of EE instruction.	1 to 5 years	36	3.50	1.25	208	4.40	.013
	6 to 20 years	128	3.51	1.14			
	21 years +	45	4.09	1.16			
26. Integrating EE into my teaching is important to me.	1 to 5 years	36	3.67	1.17	207	7.11	.001
	6 to 20 years	128	3.98	0.99			
	21 years +	44	4.50	0.98			
27. With my present education I feel capable of teaching EE.	1 to 5 years	36	3.83	1.28	209	4.08	.018
	6 to 20 years	129	3.87	1.20			
	21 years +	45	4.44	1.22			
28. Integrating EE into the curriculum would enable teachers to more effectively meet the needs of all students.	1 to 5 years	36	3.44	0.84	209	5.84	.003
	6 to 20 years	129	3.72	0.91			
	21 years +	45	4.11	0.89			
29. Environmental education helps students understand environmental issues.	1 to 5 years	36	4.53	0.77	208	0.40	.672
	6 to 20 years	129	4.62	0.89			
	21 years +	44	4.70	0.93			
30. I understand environmental topics enough to teach about them in the curriculum.	1 to 5 years	36	4.14	0.99	210	3.51	.032
	6 to 20 years	130	4.15	1.08			
	21 years +	45	4.62	1.11			

(Continued on following page)

Table 29 (continued)

Environmental Attitude Statements	Experience Groups	*n*	*M*[a]	*SD*	*df*	*F*	*p*
31. Teachers should provide students with opportunities to gain actual experience in resolving environmental issues.	1 to 5 years	35	3.97	0.71	81	3.95[b]	.023
	6 to 20 years	123	4.13	0.84			
	21 years +	44	4.45	0.85			
32. Environmental education should be integrated into the science curriculum only.	1 to 5 years	35	3.17	0.71	202	0.99	.373
	6 to 20 years	123	2.93	0.89			
	21 years +	45	3.00	0.98			
33. As an individual, I consider myself to be an environmentally responsible citizen.	1 to 5 years	35	4.29	0.62	79	1.58[b]	.214
	6 to 20 years	123	4.41	0.75			
	21 years +	44	4.59	0.90			
34. Integrating EE into the curriculum is difficult.	1 to 5 years	34	3.65	0.88	201	3.64	.028
	6 to 20 years	123	3.32	0.88			
	21 years +	45	3.11	0.86			
35. A goal of my teaching is to increase students' level of environmental responsibility.	1 to 5 years	35	3.57	1.01	201	7.18	.001
	6 to 20 years	122	3.78	1.12			
	21 years +	45	4.38	0.86			
36. As an individual, I consider myself to be an environmentally active citizen.	1 to 5 years	35	3.80	0.76	202	2.16	.117
	6 to 20 years	123	4.04	0.97			
	21 years +	45	4.22	0.80			

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Table 29 (continued)

Environmental Attitude Statements	Experience Groups	*n*	*M*[a]	*SD*	*df*	*F*	*p*
37. Environmental topics serve as engaging themes for integrated teaching units.	1 to 5 years	34	4.06	0.89	200	2.31	.102
	6 to 20 years	122	4.18	0.82			
	21 years +	45	4.44	0.89			
38. Environmental education is difficult to teach.	1 to 5 years	34	3.21	1.04	68	1.65[b]	.199
	6 to 20 years	122	2.93	0.72			
	21 years +	45	2.80	0.89			
39. Environmental education should be integrated throughout all subjects in our K-12 educational system.	1 to 5 years	34	3.79	1.12	198	0.59	.554
	6 to 20 years	122	3.93	1.11			
	21 years +	43	4.07	1.12			
40. All pre-service teachers should be required to take an EE methods course.	1 to 5 years	34	3.09	0.93	201	2.48	.087
	6 to 20 years	123	3.60	0.81			
	21 years +	45	3.36	1.02			
41 I am effective at integrating the study of environmental concepts and issues into my subject level.	1 to 5 years	34	3.53	0.90	198	8.15	<.001
	6 to 20 years	121	3.79	1.02			
	21 years +	44	4.39	1.02			

Note. Degrees of freedom (*df*) are totals.
[a]1 = disagree very strongly, 2 = disagree strongly, 3 = disagree, 4 = agree, 5 = agree strongly, 6 = agree very strongly. [b]Welch's *F* was run on these cases.

Table 30

Environmental Attitude Statements Post Hoc Comparison for Years of Experience

Environmental Attitude Statements	Comparisons	M_D[a]	*p*
20. I am not sure what integrating EE into the curriculum involves.	1 to 5 years vs. 21 years +	0.87	.002
	6 to 20 years vs. 21 years +	0.53	.022
22. I am a supporter for the integration of EE into the curriculum.	1 to 5 years vs. 21 years +	0.57	.024
24. I enjoy/would enjoy teaching EE.	1 to 5 years vs. 21 years +	0.64	.036
25. I have the resources necessary to carry out my desired level of EE instruction.	6 to 20 years vs. 21 years +	0.58	.017
26. Integrating EE into my teaching is important to me.	1 to 5 years vs. 21 years +	0.83	.002
	6 to 20 years vs. 21 years +	0.52	.015
27. With my present education I feel capable of teaching EE.	6 to 20 years vs. 21 years +	0.58	.025

(Continued on following page)

Table 30 (continued)

Environmental Attitude Statements	Comparisons	M_D[a]	*p*
28. Integrating EE into the curriculum would enable teachers to more effectively meet the needs of all students.	1 to 5 years vs. 21 years +	0.67	.004
	6 to 20 years vs. 21 years +	0.39	.044
30. I understand environmental topics enough to teach about them in the curriculum.	6 to 20 years vs. 21 years +	0.48	.039
31. Teachers should provide students with opportunities to gain actual experience in resolving environmental issues.	1 to 5 years vs. 21 years +	0.48	.019[b]
34. Integrating EE into the curriculum is difficult.	1 to 5 years vs. 21 years +	0.54	.029
35. A goal of my teaching is to increase students' level of environmental responsibility.	1 to 5 years vs. 21 years +	.081	.003
	6 to 20 years vs. 21 years +	0.60	.005

Note. Unless stated otherwise, post hoc tests were Scheffé.
[a]M_D = mean difference. [b]Games-Howell post hoc

Table 31

Teacher Attitude Clusters by Years of Experience

Clusters	Experience Groups	*n*	*M*	*SD*	*df*	*F*	*p*
1 – World View	1 to 5 years	37	4.26	1.34	212	2.49	.085
	6 to 20 years	131	4.41	1.35			
	21 years +	45	4.60	1.35			
2 – Self-efficacy	1 to 5 years	37	3.68	0.77	212	6.80	.001
	6 to 20 years	131	3.84	0.85			
	21 years +	45	4.30	0.86			
3 – Commitment to EE	1 to 5 years	37	3.70	0.80	212	5.17	.006
	6 to 20 years	131	3.92	0.77			
	21 years +	45	4.23	0.69			
4 – Commitment to Core	1 to 5 years	37	3.00	1.08	207	2.06	.130
	6 to 20 years	127	3.16	0.96			
	21 years +	44	3.41	0.69			

Note. Degrees of freedom (*df*) are totals.
[a]1 = disagree very strongly, 2 = disagree strongly, 3 = disagree, 4 = agree, 5 = agree strongly, 6 = agree very strongly.

Table 32

Clustered Environmental Attitude Statements Post Hoc Comparison for Years of Experience

Clusters	Comparisons	M_D[a]	*p*
2 – Self-efficacy	1 to 5 years vs. 21 years +	0.63	.004
	6 to 20 years vs. 21 years +	0.46	.007
3 – Commitment to EE	1 to 5 years vs. 21 years +	0.53	.008

Note. Post hoc tests were Scheffé.
[a]M_D = mean difference.

Research Question Three

The third research question had a single part.

What is the relationship between the level of pre-service teacher preparation in environmental education topic areas and the level of inservice teacher preparation in environmental education topic areas?

A Pearson product-moment correlation was run to determine the relationship between the extent level of pre-service teacher preparation in EE topic areas and the level of inservice teacher preparation in EE topic areas. There was a positive correlation between these variables which were all statistically significant. The mean Pearson's *r* was 0.46. Complete results can be found in Table 33.

Table 33

Correlations Between Pre-service and Inservice Teacher Education Preparation in EE Topic Areas

Topic	Variable	*n*	*r*	r^2	*p**
Biodiversity	Pre-service	199	0.445	0.20	<.001
	Inservice	198			
Ecology	Pre-service	198	0.433	0.19	<.001
	Inservice	196			
Energy	Pre-service	198	0.467	0.22	<.001
	Inservice	198			
Environmental Economics	Pre-service	198	0.490	0.24	<.001
	Inservice	197			
Environmental Ethics and Values	Pre-service	199	0.468	0.22	<.001
	Inservice	198			
Environmental Health	Pre-service	198	0.456	0.21	<.001
	Inservice	197			
Environmental Lifestyles	Pre-service	189	0.422	0.18	<.001
	Inservice	188			
Environmental Politics	Pre-service	191	0.388	0.15	<.001
	Inservice	189			
Global Environmental Impacts	Pre-service	190	0.425	0.18	<.001
	Inservice	189			
Human Population	Pre-service	190	0.397	0.16	<.001
	Inservice	189			
Local and Regional Environmental Impacts	Pre-service	190	0.389	0.15	<.001
	Inservice	189			

(Continued on following page)

Table 33 (continued)

Topic	Variable	*n*	*r*	r^2	*p**
Natural Resources	Pre-service	191	0.489	0.24	<.001
	Inservice	190			
Resource Management	Pre-service	185	0.510	0.26	<.001
	Inservice	185			
Socio-cultural Environment	Pre-service	185	0.431	0.19	<.001
	Inservice	184			
Species Loss	Pre-service	181	0.522	0.27	<.001
	Inservice	183			
Sustainable Development	Pre-service	184	0.424	0.18	<.001
	Inservice	182			
Technology	Pre-service	184	0.497	0.25	<.001
	Inservice	182			
Waste Management	Pre-service	185	0.422	0.18	<.001
	Inservice	185			

Note. *r* = Pearson correlation; r^2 = coefficient of determination
*Correlation is significant at the 0.01 level (2-tailed).

Additional Findings

It was decided to look at an additional statistical test that went beyond the research questions. Could pre-service teacher preparation, inservice teacher preparation, and teacher attitudes be used to predict the level of implementation of environmental education topic scores? Upon running a stepwise multiple regression analysis, it was determined that the level of pre-service teacher preparation could not be used to predict the level of implementation of EE topic areas because it did not yield a statistically significant result. Inservice teacher preparation and teacher attitudes in relation to level of implementation of EE topic scores were statistically significant. Together, teacher attitudes and inservice teacher preparation accounted for 52% of the variance in the implementation of EE topics. Table 34 shows that teacher attitudes toward environmental education accounted for 49% of the variance in the level of implementation of EE topics. Inservice teacher preparation accounted for the other 3% of the variance. Teacher attitudes and inservice teacher preparation statistically significantly predict the implementation of EE topics into the curriculum, $F(2, 196) = 104.76$, $p<.001$.

Table 34

Stepwise Multiple Regression Analysis of Two Variables Used to Predict Implementation of Environmental Education Topic Scores

Independent Variables	*R*	R^2	*B*	*SE B*	*β*	*p*
Teacher Attitudes	.70	.49	.80	.07	.62	<.001
Inservice Teacher Preparation	.72	.52	.18	.05	.19	.001

Summary

Chapter 4 described the demographics of the survey participants and the results of the statistical analyses which addressed the research questions. An additional finding was also

examined. The discussion of these results, conclusions, and suggestions for further study are addressed in Chapter 5.

CHAPTER 5

CONCLUSIONS

The purpose of this study was to determine the relationship between the level of pre-service and inservice teacher preparation in environmental education and the level of implementation of environmental education in secondary science and social studies classrooms in Illinois. Teacher attitudes toward environmental education were also examined.

This chapter will include a discussion of the findings, recommendations for pre-service and inservice teacher preparation, and suggestions for future research.

Discussion of Findings

According to the *Guidelines for the Preparation and Professional Development of Environmental Educators* (NAAEE, 2010b) first three themes, portions of which formed the conceptual framework for this study, environmental educators "must possess the understandings, skills, and attitudes associated with environmental literacy" (p. 7). They must also "demonstrate a basic understanding of the goals, theory, practice, and history of the field of environmental education" (p. 8). As part of their professional responsibilities, environmental educators need to be updating their knowledge and skills related to teaching students about environmental issues.

The first theme, *Environmental Literacy*, was partially addressed when teachers were asked about their pre-service teacher preparation in EE topic areas. The *Guidelines* acknowledge that educators need knowledge of environmental processes and systems as part of environmental literacy. This is essential in order to engage students as they learn about environmental issues. This theme was also addressed in the attitude section of the survey.

Environmentally literate citizens understand personal and civic responsibilities toward the environment.

The second theme, *Foundations of Environmental Education*, was partially addressed when teachers were asked about the level of implementation of the 18 EE topic areas within their curricula. Teachers need to be aware that environmental education is an interdisciplinary field which requires educators to integrate topics across various disciplines. They were also asked various attitude questions about integration in the survey.

The third theme, *Professional Responsibilities of the Environmental Educator*, discusses the need for ongoing learning and professional development. Teachers in this study were asked about the level of inservice teacher preparation in the 18 EE topic areas. Teachers were also asked whether or not cognitive, affective, and action strategy methods were effectively addressed during both pre-service teacher education and inservice opportunities. All three of these methods are essential in EE instruction.

A discussion of the implications for each research question will follow.

Research Question 1 Interpretations

The first research question was presented in three parts. The first part explored the relationship between the level of implementation of topic areas in environmental education in the classroom and the level of pre-service teacher preparation in those EE topic areas.

The topics that were reported as having been implemented into the curriculum more often than the other topics were energy, natural resources, and global environmental impacts. Only one of these, natural resources, was among the top three topics addressed during their pre-service years. The other two were ecology and biodiversity. Plevyak (1997) also found that ecology, natural resources and biodiversity were addressed more often than other EE topics during pre-service years for Ohio and Wisconsin elementary teachers. It appears that not much has changed in the last 15 years in pre-service exposure to these EE topics. However, Ohio and Wisconsin elementary teachers reported ecology, biodiversity, and socio-cultural

environment as the topics that they implemented into the curriculum more often than other topics. Therefore, Illinois high school science and social studies teachers are emphasizing different topics today compared with the elementary teachers in Plevyak's study. The topics that were reported by the Illinois teachers as being the least implemented into the curriculum (resource management, environmental economics, and environmental politics) were also the topics that were reported as having the least coverage during pre-service years. This suggests that teachers may not include topics within their teaching repertoire if they had little instruction in those topics during their undergraduate years. Simply put, they may not feel adequately prepared to include those topics in their curriculum.

Teachers reported that the levels of implementation of all 18 topic areas in environmental education were higher than the levels of pre-service teacher preparation in these areas. Plevyak (1997) found similar results. In her study, Ohio and Wisconsin elementary teachers' levels of implementation for the majority of topic areas were higher than the levels of pre-service teacher preparation in those topics. In this study, however, a paired samples *t*-test revealed that the differences between them were significant in only 14 of these topic areas. In addition, a Pearson product-moment correlation revealed that there was a positive correlation between these variables which were all statistically significant. This means that the value of the variable *pre-service environmental teacher preparation* may be used to predict the value of the other variable, *the implementation of environmental topics* into the curriculum. This does not imply a cause and effect relationship. Two of the topics with the strongest positive relationship (ecology and biodiversity) were also reported among the top three topic areas covered during pre-service years. One of the topics with the weakest positive relationship (environmental economics) was reported among those that were the least covered during pre-service years.

Teachers who had received pre-service teacher education in EE implemented significantly more EE topics into the curriculum than did teachers who reported receiving no pre-service teacher education in EE. This suggests that including teacher education in environmental education during the undergraduate years is very important for the future

inclusion of EE topics in high school science and social studies classrooms. Lane et al. (1995) found that Wisconsin teachers who had received pre-service EE preparation spent significantly more class time devoted to EE than teachers who had not experienced pre-service EE preparation. Of those teachers who did have this pre-service experience, their perception of its effectiveness did not significantly impact the level of topic implementation in their classrooms. This suggests that any preparation in EE is better than no preparation at all. Lane et al. (1995) also reported that the perceived effectiveness of pre-service EE preparation did not appear to have a significant relationship to the amount of time devoted to teaching EE concepts.

The second part of research question one explored the relationship between the level of implementation of topic areas in environmental education in the classroom and the level of inservice teacher preparation in EE. The three topics that were addressed more often than the other topics during inservice programming—energy, natural resources, and global environmental impacts—were also the topics that were implemented most often into the curriculum. This finding suggests that the more current teachers are with EE topics, the more likely they are to address those topics with their students. The three topics that were reported as having been implemented least often into the curriculum (i.e., resource management, environmental economics, and environmental politics) were also the three topics that received the least coverage during inservice programming. This might suggest that if teachers are not exposed to certain EE topics during inservice preparation, they are less likely to include those topics within their classrooms. This could also be related to their pre-service preparation. These three topics were also the least covered during undergraduate years. Some teachers may be less inclined to seek out inservice opportunities in these areas if these topics are outside of their "comfort zone." Other teachers may attempt to find inservice opportunities in these areas in order to strengthen their teaching repertoire *because* they had little exposure to them in college. However, inservice programs in these topic areas may be difficult to find. This would suggest that there is a need for EE professional development opportunities.

Teachers reported that the levels of implementation of all 18 topic areas in environmental education were significantly higher than the levels of inservice teacher preparation in all 18 areas. Plevyak (1997) found similar results. A paired samples *t*-test in this study revealed that the differences between them were significant in all 18 topic areas. In addition, a Pearson product-moment correlation revealed that there was a positive correlation between these variables which were all statistically significant. This suggests that some of the differences in the levels of implementation of the topic areas are accounted for by the levels of inservice teacher preparation in these topic areas. Again, this lends support to the notion that the levels of inservice teacher preparation affect the level of implementation of those topics in the classroom. Pearson's *r* increased in 13 of the 18 topics as compared to the correlation between these 18 topics and pre-service teacher education. Exposure to these topics *during* teachers' careers may have a greater impact on the extent to which they address the EE topics in the classroom compared to the impact due to the extent to which they were exposed to these topics during pre-service years.

Fewer teachers (32%) reported having experienced some inservice teacher education in EE as compared to those who had exposure to pre-service teacher EE (40%). Inservice opportunities in EE may be difficult to find. On the other hand, if these opportunities do exist, teachers may find it challenging to spend time in inservice activities that are outside of their school district offerings. Ham and Sewing (1987) found that time is the most significant barrier to teaching EE. Teachers who had received inservice teacher education in EE implemented significantly more EE topics into the curriculum than did teachers who reported receiving no inservice teacher education in EE. This suggests that offering teacher education in environmental education while teachers are employed at the high school level is very important for the inclusion of EE topics in high school science and social studies classrooms. This finding strengthens the interpretations of the Pearson's correlation. Lane et al. (1995) found that Wisconsin teachers who had received inservice EE preparation spent significantly more class time devoted to EE than teachers who had not experienced inservice EE preparation. Of those

teachers who did have this inservice experience, their perception of its effectiveness did not significantly impact the level of topic implementation in their classrooms. This suggests that any inservice exposure in EE is better than no exposure at all. On the contrary, Lane et al. (1995) found that the perceived effectiveness of inservice EE preparation did appear to have a significant relationship to the amount of time devoted to teaching EE concepts. However, they noted that the positive relationship was not particularly strong.

The third part of research question one explored the relationship between the level of implementation of topic areas in EE and various demographic characteristics of secondary science and social studies teachers. There was a statistically significant difference in the extent to which ten of the 18 topic areas were implemented into the curriculum between science and social studies teachers. I expected to find that science teachers addressed the topics of biodiversity, ecology, environmental health, global environmental impacts, local and regional environmental impacts, species loss, and waste management significantly more than social studies teachers. These topics traditionally fall within the science curriculum. Additionally, it was not surprising to find that social studies teachers addressed the topic of environmental politics significantly more than science teachers because politics traditionally falls within the social studies curriculum.

An unexpected finding was that the topic of energy was addressed significantly more in the science classroom. Because of the attention paid to energy needs in the world today, I expected to find that there was no significant difference between science and social studies teachers regarding the implementation on this topic. In 1989 Disinger reported that energy education was the most common form of EE at the secondary level. Additionally, I was surprised to find the topic of human population was implemented significantly more in the social studies curriculum. Issues surrounding human population trends traditionally fall into both curricula, so no significant difference was expected. I also expected to find that environmental economics and socio-cultural environment would be addressed significantly more in the social studies classroom because both economics and sociology are subjects within the discipline of

social studies. Although both topics were addressed more often among the social studies teachers, the difference was slight. The reasons behind these results were not revealed in this study. However, Disinger (1989) found that environmental education in general was infused more into the science curriculum than the social studies curriculum.

When a cluster analysis was run on the implementation of the EE topics, the biology cluster was addressed significantly more in the science curriculum, which was to be expected. The topic of energy was its own cluster for reasons that were not revealed in this study. It was addressed significantly more in the science curriculum than the social studies curriculum. The reasons for this finding were not revealed in this study. Again, because of the interdisciplinary complexities of energy issues today, I had expected to find no significant difference between science and social studies teachers on the extent of the implementation of this topic. Perhaps because energy is a more modern issue and because social studies courses are often taught chronologically, social studies teachers lack the time to cover this topic closer to the end of the school year. The third cluster, human/environment interactions, and the fourth cluster, global impacts, were addressed more in the science classroom, but not significantly more than the social studies classroom. It is likely that within each of the topics in these last two clusters, there are elements that are addressed within both curricula. Therefore, collectively as a cluster, there were no significant differences found. These clusters may provide some common ground upon which to build interdisciplinary units among teams of science and social studies teachers at individual high schools.

The level of implementation of these topic areas was also compared with the years of teaching experience. Veteran teachers included all 18 topic areas more often than did teachers with less experience. This suggests that with increasing years of experience, teachers may have the time, the knowledge level, and the confidence to add more items to their repertoire. Beginning teachers are often overwhelmed with developing their teaching skills, addressing district requirements, building their content knowledge, and implementing classroom

management strategies. As such, they may not have time to add even more content and skills to their teaching repertoire.

The post hoc test revealed where the differences among experience groups were significant. These significant differences were found within eight of the 18 topic areas. Seven of these topics were among those with the lowest implementation levels. Five of these topics were among those with the lowest levels of inservice exposure. This may suggest that veteran teachers increased the levels of implementation in these topics on their own time in an effort to compensate for their lack of exposure to these topics as beginning teachers. Further study would be needed to confirm this speculation and it may reveal other reasons as well.

The topic of global environmental impacts had a high implementation level and a relatively low level of inservice exposure. Veteran teachers increased their level of implementation of this topic as well. This does not fit the pattern of the other seven topics and may be due to the fact that global environmental impacts (for example, burning of fossil fuels, global warming, deforestation, earthquakes, hurricanes) are often in the news and as such, teachers may feel that they need to increase their level of implementation. I expected the topics of environmental lifestyles and environmental economics to be in this post hoc list, but they were not. They have a low level of implementation and a low inservice rate. It seems that even veteran teachers are not including these topics very often. Environmental economics was also reported as one of the topics with the lowest exposure during pre-service years. It appears that teachers are not increasing their exposure to this topic as they gain years of experience. Inservice opportunities involving environmental economics could help increase teachers' knowledge base, which may lead to greater implementation levels in the classroom. The environmental lifestyles topic involves participation in local, national, or global environmental issues, personal decision-making, and issues investigation. These subtopics, among others, were included in the Tbilisi Declaration (1978), in a set of goal statements for EE curriculum development (Hungerford et al., 1980), within NAAEE's *Guidelines for Learning* (2010a), and the *Guidelines for the Preparation and Professional Development of Environmental Educators*

(NAAEE, 2010b). The latter document also includes instructional methodologies that are useful in approaching these subtopics in the classroom. Despite repeated efforts to encourage teachers to include these subtopics within their curricula, the participants in this study do not appear to be doing so. This study did not address possible reasons for this. However, because of the nature of the discipline of science, science teachers may be uncomfortable with addressing these particular subtopics. It does suggest that more emphasis needs to be placed on affective and action strategies related to these subtopics during both pre-service preparation and inservice teacher programming.

Research Question Two Interpretations

The second research question was presented in four parts. The first part explored the relationship between teacher attitudes toward EE and the level of implementation of topic areas in environmental education. A Pearson product-moment correlation revealed that there was a positive correlation (r = 0.687) between these variables which were all statistically significant. This means that the value of the variable *teacher attitudes toward EE* may be used to predict the value of the other variable, *the implementation of environmental topics* into the curriculum. Plevyak (1997) also reported a positive relationship between these two variables.

The second part of research question two explored the relationship between teacher attitudes toward environmental education and the level of pre-service teacher preparation in EE. A positive relationship (r = 0.414) was found between these variables as well. This finding is supported by research by Lane et al. (1995), who reported that Wisconsin teachers who received pre-service teacher preparation in EE had more positive attitudes toward teaching about the environment.

The third part of research question two examined the relationship between teacher attitudes toward environmental education and the level of inservice teacher preparation in EE. A positive relationship (r = 0.421) was discovered between these variables. Lane et al. (1994)

also noted that the more inservice Wisconsin teachers received, the more time they spent on EE in the classroom.

The fourth part of research question two looked at the relationship between teacher attitudes toward environmental education and demographic characteristics of the respondents. The two categories of demographics were discipline categories and years of experience. Based on the statistical findings of this study, there is a significant difference in the attitudes toward EE between science and social studies teachers. This was apparent in not only the overall attitude score between teachers in these two disciplines, but in the scores of 22 of the 23 individual attitude statements as well. High school science teachers are more positive in their attitudes toward the environment and environmental education than high school social studies teachers. Science teachers consistently had higher means for all the positive attitude statements. Social studies teachers consistently had higher means for all the statements that could be considered to have a more negative connotation toward environmental education. Environmental education is interdisciplinary and although there are a number of learning standards that include environmental education for social studies in Illinois, it seems that social studies teachers tend to think of EE as a science topic. Other studies have found that some teachers do not include EE because they feel it is unrelated to their subject area (Ham & Sewing, 1987; Lane, et al., 1994; Smith-Sebasto & Smith, 1997). Perhaps the more negative attitudes toward EE held by social studies teachers may be at least part of the reason they do not include as much EE in their curriculum as science teachers do.

Cluster analysis revealed that even when the attitudes were grouped into clusters, science teachers still had more positive attitudes toward the environment and environmental education than social studies teachers. Science teachers hold a more positive world view toward the environment (Cluster 1). They also displayed attitudes that demonstrated their higher level of commitment to EE as compared to social studies teachers (Cluster 3). Additionally, this analysis revealed that social studies teachers do not feel as well prepared to teach EE as science teachers (Cluster 2). This could be another reason why social studies

teachers do not include as much EE in their classroom as science teachers. Lane et al. (1995) found that Wisconsin teachers who had received pre-service EE preparation spent more class time on environmental topics than teachers who had not had pre-service exposure to EE. In this study, social studies teachers tend to agree more with the statement that traditional subjects should have a priority over EE (Cluster 4). This suggests that they do not fully understand the interdisciplinary nature of EE. They may also be looking at EE as if it were a separate discipline outside of the social studies realm.

Attitudes were also examined as compared to the years of teaching experience. In general, attitudes became more positive as teachers gained more experience in the classroom. This coincides with the finding that veteran teachers had a higher level of implementation of EE topic areas within their curricula. It seems that with experience, teachers not only add more EE topics, but their attitudes become more positive. Perhaps as teachers increase their knowledge level, their confidence, and their ability to effectively manage their classrooms, they feel less overwhelmed in their jobs. Veteran teachers may thus be more relaxed and comfortable with their abilities to integrate EE into their curricula and this may lead to improved attitudes in many respects. Beginning teachers may feel overwhelmed with many issues related to teaching and that stress may impact their attitudes toward including EE within their classrooms.

There were statistically significant differences found within twelve of the 23 attitude statements. The majority of these attitude statements concerned the integration of EE and perceived competencies of teaching EE. This, again, supports the notion that veteran teachers may be more comfortable with their abilities and thus, their attitudes toward EE become more positive. Interestingly, there was not a statistically significant difference found in attitude statement 38, “Environmental education is difficult to teach.” All three experience groups disagreed with this statement. This may indicate that even beginning teachers might include more EE if there weren’t so many other issues confronting them early in their careers.

An analysis of the attitude clusters compared to the years of experience revealed statistically significant differences in Clusters 2 (self-efficacy) and 3 (commitment to EE). This

supports the previous analyses regarding increased levels of perceived competency and the inclusion of EE in the curriculum as teachers gain experience.

Research Question Three Interpretations

The third research question examined the relationship between the level of pre-service teacher preparation in environmental education topic areas and the level of inservice teacher preparation in those same areas. A Pearson product-moment correlation revealed that there was a positive correlation ($r = 0.46$) between these variables which were all statistically significant. This means that the value of one variable may be used to predict the value of the other variable. From this study it is not possible to determine if teachers who received pre-service preparation in EE topic areas are more likely to seek out inservice opportunities in these areas or if teachers seek out inservice opportunities in EE topic areas because they feel they lacked this preparation during their undergraduate years.

Additional Findings Interpretations

Pre-service teacher education in the individual 18 EE topic areas varied from a low to a medium correlation with the level of classroom implementation of environmental topics. The level of pre-service teacher preparation could not be used to predict the level of implementation of the 18 topic areas. Plevyak (1997) found similar results among Ohio and Wisconsin elementary teachers. However, in this study teachers include environmental education topics more often if they have had pre-service teacher education *in* EE. The perceived effectiveness of this pre-service experience does not appear to have an impact. Again, pre-service exposure to the EE topics was *not* a predictor of how much implementation of these topics takes place in the classroom. This seems to suggest that being exposed to the topic areas in undergraduate coursework does not necessarily result in the teaching of those topics more often in the classroom. However, if the teachers experience pre-service *teacher education* in EE, they are more likely to include the topics they learned within their curriculum. Simply having content

coursework does not ensure that teachers will include this content if they have not had instruction in EE methods.

Teachers' attitudes had a high correlation (r = 0.687) with the level of implementation of environmental topics. Their attitudes also accounted for 49% of the variance in the level of implementation of EE topics. This indicates that teacher attitudes are a good predictor of the degree to which environmental topics are implemented in high school science and social studies classrooms in Illinois. Similarly, Plevyak (1997) found a positive association between teacher attitudes and implementation of EE topics among Wisconsin elementary teachers.

Inservice teacher education in the individual 18 EE topic areas tended to have a medium correlation with the level of implementation of those EE topics. The correlations varied from r = 0.501 to r = 0.303. The inservice preparation accounted for only 3% of the variance in the level of implementation of EE topics. This demonstrates that inservice teacher education is not a good predictor of the degree to which environmental topics are implemented in high school science and social studies classrooms in Illinois. Plevyak (1997) found similar results among Wisconsin elementary teachers.

In contrast, Plevyak (1997) discovered that among Ohio elementary teachers, inservice environmental teacher preparation was a good predictor of the amount of implementation of EE topics. She also found that Ohio elementary teachers' attitudes toward EE were not a good predictor of the amount of implementation of EE topics. This is contrary to the results of this study and the Wisconsin elementary teachers in Plevyak's research.

Recommendations for Practice

- The results of this study support the need to expand pre-service exposure to environmental education topics. In the 15 years between Plevyak's study and this one, the environmental topics that were addressed the most often did not change. The topics that were reported as being the least covered by Illinois high school science and social studies teachers were also the topics that were least covered during their

undergraduate years. Increased exposure to a variety of environmental topics may cause teachers to be more prepared to include those topics within their curriculum.

- The findings of this study support the need to expand environmental pre-service teacher education. Certainly having the content knowledge in environmental topic areas is vital. The NAAEE *Guidelines* (2010b) support that idea. Content knowledge alone, however, does not ensure that teachers will have the ability to integrate environmental topics into a wide variety of disciplines. That requires that they learn *how* to integrate such topics. This could be accomplished through the expansion of pre-service teacher education in EE, and the *Guidelines* support that idea as well. This study found that teachers who had some sort of pre-service teacher education in EE were far more likely to include environmental topics within their curriculum than teachers who simply had content coursework in environmental topics, but no pre-service EE teacher education.
- Science teachers had a higher level of implementation for the majority of the EE topics compared to social studies teachers. Even though the standards for both disciplines include environmental topics and issues, high school social studies teachers in Illinois do not seem to address the environmental topics and issues found in the Illinois Learning Standards to a great extent. Environmental education is an interdisciplinary endeavor and many of these environmental topics have a social component to them. More emphasis on environmental topics for social studies teachers during both their undergraduate years and inservice programming should take place.
- There is a need to expand inservice EE offerings to classroom teachers. The results of this study suggest that the more current teachers are with EE topics and ways to integrate these topics into the curriculum, the more likely they are to address those topics with their students. Inservice teacher education includes graduate courses, workshops, seminars, district offerings, and conferences taken after teacher certification. In addition to workshops offered by Illinois Regional Offices of Education

and district offerings, colleges and universities could offer more graduate courses and seminars in instructional strategies for infusing environmental topics into the curriculum. Additional content knowledge at the graduate level may not be as important as coursework within Colleges of Education, whose goal is to help people become better teachers of instructional methods rather than content specialists with Master's levels of knowledge that would be beyond the typical high school student. The NAAEE *Guidelines* support the knowledge of a wide variety of instructional methodologies. State-level organizations of science teachers and social studies teachers could encourage their members to make presentations at conferences that would help their peers in these regards.

- The results of cluster analysis on the implementation of EE topics in this study reveal that within two of the four clusters there may be common ground upon which to build interdisciplinary units among teams of science and social studies teachers at individual high schools. This may also help reveal to social studies teachers the applicability of many EE topics to their discipline.
- The findings of this study also revealed that beginning teachers do not implement the EE topics nearly as much as veteran teachers. Because beginning teachers are often overwhelmed with a wide variety of issues, this may suggest that beginning teachers would benefit from additional support mechanisms such as mentoring from veteran teachers experienced in integrating environmental topics into the curriculum.

Recommendations for Future Research

- Further research could be done to explore the relationship between the levels of pre-service and inservice exposure to EE topic areas. A study could be done to investigate whether teachers who had a high level of exposure to EE topics during their undergraduate years are more or less likely to seek out inservice opportunities in these areas once they are employed as classroom teachers. Another possibility is that

teachers who had a relatively low level of exposure to EE topics during their pre-service years may seek out inservice opportunities in order to expand their knowledge and teaching repertoire.

- A follow-up qualitative study could be conducted with a smaller group of high school science and social studies teachers. Interviews could reveal more definitive reasons as to why social studies teachers have a lower level of implementation of many EE topics as compared to science teachers. It could also suggest the types of inservice programming that would be successful at increasing the amount of EE within both disciplines.
- An up-to-date status study of pre-service EE methods courses and graduate-level EE methods courses or other higher education outreach opportunities in the EE field in Illinois may reveal weaknesses or gaps in these efforts to increase environmental literacy among teachers. The results may point the way toward improving teacher education in EE which would, in turn, impact thousands of students in the state.

Final Thoughts

Ever since environmental issues moved into the public consciousness and the environmental movement took hold in the early 1970s, environmental educators have tried to convince other teachers to include environmental education in the curriculum. This is an ongoing effort toward the goal of producing an environmentally literate citizenry.

The findings of this study support the need for more pre-service exposure to environmental topics and the expansion of pre-service environmental education. If EE is to emerge from the purview of a “science-only club” at the high school level, and find itself integrated among other subjects as it is intended to be, a concerted effort needs to take place among pre-service teacher educators to make this happen. Despite the inclusion of a number of environmental learning standards within the social studies portion of the *Illinois Learning Standards* (ISBE, 1997), I found that high school science teachers tend to include

environmental topics more often in the curriculum as compared to high school social studies teachers. Perhaps if pre-service social studies teachers learned how to implement instructional strategies for integrating EE within their future curricula, we would see a positive trend toward broader adoption of these integration efforts.

The environmental education of teachers should not stop once they enter the profession. This study suggests that the more current teachers are with EE topics and ways to integrate those topics into the curriculum, the more likely they are to address those topics with their students. Inservice offerings need to increase so that teachers can add environmental topics and strategies as they grow in their profession.

An ongoing, sustained level of quality support for teachers before they enter the field and once they are in the classroom will help address the critical need for more environmental education. The implementation of effective, research-based strategies should, in time, impact our students in a positive way and help us meet the goal of an environmentally literate society.

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APPENDIX A

A BRIEF HISTORY OF ENVIRONMENTAL EDUCATION

Table A

A Brief History of Environmental Education

Decade	Event
1960s	Environmental awareness publications included: Carson (1962), Udall (1963), Ehrlich (1968)
1970s	The first Earth Day was held April 22, 1970. President Nixon signed the National Environmental Policy Act, the first Environmental Education Act, and created the Environmental Protection Agency. In 1972 the United Nations Conference on the Human Environment took place in Stockholm, Sweden. The Belgrade Charter (1976) acknowledged the need for global environmental education. The Tbilisi Declaration (1978) laid out specific goals and objectives for environmental education.
1980s	Hungerford, Peyton, and Wilke (1980) developed a set of goal statements for curriculum based on the Tbilisi Declaration.
1990s	The American Association for the Advancement of Science (1993) published *Benchmarks for Science Literacy*. In 1996 the National Research Council published the *National Science Education Standards*. The Illinois State Board of Education (1997) published the *Illinois Learning Standards*. The National American Association for Environmental Education (1999) published *Excellence in Environmental Education: Guidelines for Learning (Pre K-12)*.
2000s	In 2004, the National Association for Environmental Education published *Guidelines for the Preparation and Professional Development of Environmental Educators*.

APPENDIX B

SELECTED ILLINOIS SCIENCE AND SOCIAL STUDIES BENCHMARKS RELATED TO ENVIRONMENTAL EDUCATION

Table B1

Illinois Learning Standards Goal 12 Science

Learning Standard	Early High School	Late High School
B. Know and apply concepts that describe how living things interact with each other and with their environment.	**12.B.4a** Compare physical, ecological and behavioral factors that influence interactions and interdependence of organisms.	**12.B.5a** Analyze and explain biodiversity issues and the causes and effects of extinction.
	12.B.4b Simulate and analyze factors that influence the size and stability of populations within ecosystems (e.g., birth rate, death rate, predation, migration patterns).	**12.B.5b** Compare and predict how life forms can adapt to changes in the environment by applying concepts of change and constancy (e.g., variations within a population increase the likelihood of survival under new conditions).
E. Know and apply concepts that describe the features and processes of the Earth and its resources.	**12.E.4a** Explain how external and internal energy sources drive Earth processes (e.g., solar energy drives weather patterns; internal heat drives plate tectonics).	**12.E.5** Analyze the processes involved in naturally occurring short-term and long-term Earth events (e.g., floods, ice ages, temperature, sea-level fluctuations).

Table B2

Illinois Learning Standards Goal 13 Science

Learning Standard	Early High School	Late High School
B. Know and apply concepts that describe the interaction between science, technology and society.	**13.B.4c** Analyze ways that resource management and technology can be used to accommodate population trends.	**13.B.5c** Design and conduct an environmental impact study, analyze findings and justify recommendations.
	13.B.4d Analyze local examples of resource use, technology use or conservation programs; document findings; and make recommendations for improvements.	**13.B.5d** Analyze the costs, benefits and effects of scientific and technological policies at the local, state, national and global levels (e.g., genetic research, Internet access).

Table B3

Illinois Learning Standards Goal 15 Social Science

Learning Standard	Early High School	Late High School
B. Understand the impact of government policies and decisions on production and consumption in the economy.	**15.E.4b** Describe social and environmental benefits and consequences of production and consumption.	

Table B4

Illinois Learning Standards Goal 16 Social Science

Learning Standard	Early High School	Late High School
B. Understand the development of significant political events.	**15.E.4b** Describe social and environmental benefits and consequences of production and consumption.	**16.B.5b (US)** Analyze how United States political history has been influenced by the nation's economic, social and environmental history. **16.B.5c (W)** Analyze the relationship of an issue in world political history to the related aspects of world economic, social and environmental history.
C. Understand the development of economic systems.		**16.C.5b (US)** Analyze the relationship between an issue in United States economic history and the related aspects of political, social and environmental history. **16.C.5b (W)** Describe how historical trends in population, urbanization, economic development and technological advancements have caused change in world economic systems. **16.C.5c (W)** Analyze the relationship between an issue in world economic history and the related aspects of political, social and environmental history.

(Continued on following page)

Table B4 (continued)

Learning Standard	Early High School	Late High School
D. Understand Illinois, United States and world social history.		**16.D.5 (US)** Analyze the relationship between an issue in United States social history and the related aspects of political, economic and environmental history. **16.D.5 (W)** Analyze the relationship between an issue in world social history and the related aspects of political, economic and environmental history.
E. Understand Illinois, United States and world environmental history.	**16.E.4a (US)** Describe the causes and effects of conservation and environmental movements in the United States, 1900 - present. **16.E.4b (US)** Describe different and sometimes competing views, as substantiated by scientific fact, that people in North America have historically held towards the environment (e.g., private and public land ownership and use, resource use vs. preservation). **16.E.4a (W)** Describe how cultural encounters among peoples of the world (e.g., Colombian exchange, opening of China and Japan to external trade, building of Suez canal) affected the environment, 1500 - present. **16.E.4b (W)** Describe how migration has altered the world's environment since 1450.	**16.E.5a (US)** Analyze positive and negative aspects of human effects on the environment in the United States including damming rivers, fencing prairies and building cities. **16.E.5b (US)** Analyze the relationship between an issue in United States environmental history and the related aspects of political, economic and social history. **16.E.5a (W)** Analyze how technological and scientific developments have affected human productivity, human comfort and the environment. **16.E.5b (W)** Analyze the relationship between an issue in world environmental history and the related aspects of political, economic and social history.

Table B5

Illinois Learning Standards Goal 17 Social Science

Learning Standard	Early High School	Late High School
B. Understand and explain characteristics and interactions of the Earth's physical systems.	**17.B.4a** Explain the dynamic interactions within and among the Earth's physical systems including variation, productivity and constructive and destructive processes**.**	**17.B.5** Analyze international issues and problems using ecosystems and physical geography concepts.
	17.B.4b Analyze trends in world demographics as they relate to physical systems.	
C. Understand relationships between geographic factors and society.	**17.C.4a** Explain the ability of modern technology to alter geographic features and the impacts of these modifications on human activities.	**17.C.5a** Compare resource management methods and policies in different regions of the world.
	17.C.4b Analyze growth trends in selected urban areas as they relate to geographic factors.	**17.C.5b** Describe the impact of human migrations and increased urbanization on ecosystems.
	17.C.4c Explain how places with various population distributions function as centers of economic activity (e.g., rural, suburban, urban).	**17.C.5c** Describe geographic factors that affect cooperation and conflict among societies.
D. Understand the historical significance of geography.	**17.D.4** Explain how processes of spatial change have affected human history (e.g., resource development and use, natural disasters).	**17.D.5** Analyze the historical development of a current issue involving the interaction of people and geographic factors (e.g., mass transportation, changes in agricultural subsidies, flood control).

Table B6

Illinois Learning Standards Goal 18 Social Science

Learning Standard	Early High School	Late High School
A. Compare characteristics of culture as reflected in language, literature, the arts, traditions and institutions. the economy.		**18.A.5** Compare ways in which social systems are affected by political, environmental, economic and technological changes.

APPENDIX C

ILLINOIS COUNTY LIST BY GEOGRAPHIC REGION

Illinois County List by Geographic Region

Northern Region

- Boone
- Carroll
- Cook
- Dekalb
- Dupage
- Grundy
- Jo Daviess
- Kane
- Kendall
- Lake
- Lee
- McHenry
- Ogle
- Stephenson
- Whiteside
- Will
- Winnebago

Central Region

- Adams
- Brown
- Bureau
- Calhoun
- Cass
- Champaign
- Christian
- Clark
- Coles
- Cumberland
- Dewitt
- Douglas
- Edgar
- Ford
- Fulton
- Greene
- Hancock
- Henderson
- Henry
- Iroquois
- Jersey
- Kankakee
- Knox
- La Salle
- Livingston
- Logan
- Macon
- Macoupin
- Marshall
- Mason
- McDonough
- McLean
- Menard
- Mercer
- Montgomery
- Morgan
- Moultrie
- Peoria
- Piatt
- Pike
- Putnam
- Rock Island
- Sangamon
- Schuyler
- Scott
- Shelby
- Stark
- Tazewell
- Vermilion
- Warren
- Woodford

Southern Region

- Alexander
- Bond
- Clay
- Clinton
- Crawford
- Edwards
- Effingham
- Fayette
- Franklin
- Gallatin
- Hamilton
- Hardin
- Jackson
- Jasper
- Jefferson
- Johnson
- Lawrence
- Madison
- Marion
- Massac
- Monroe
- Perry
- Pope
- Pulaski
- Randolph
- Richland
- Saint Clair
- Saline
- Union
- Wabash
- Washington
- Wayne
- White
- Williamson

APPENDIX D

SURVEY INSTRUMENT

Status of Environmental Education in Illinois

Welcome

Initially this survey may appear to be lengthy. This is because there are specific pages at the end of the survey that you will be directed to depending on the course(s) that you teach. Therefore, you will only be responding to a few of all the remaining pages at that point.

You may finish this survey all in one sitting, or you may work on it in segments. If you elect to work on it in segments, please click "next" after answering the questions on the last page you choose to work on. Then you may exit the survey. To return to the survey, you must click on the link in your **original** email notice and it will take you to the point in the survey where you left. Forwarding the email to another address will not work.

If you teach **both** junior high and high school science and/or social studies classes, please answer questions as they pertain to your **high school classes only**.

If you teach **both** special education courses and regular division courses, please answer questions as they pertain to your **regular division courses only**.

Everyone who finishes the survey will be entered into a drawing for a $25 Barnes and Noble gift card which may be used online or in the store. There will be 8 winners. If you are selected, I will notify you by email to obtain your name and mailing address.

Status of Environmental Education in Illinois

Level of Implementation of Environmental Education Part One

Environmental education (EE) means different things to different educators. The following description of environmental education enables you, the teacher, to understand my concept of environmental education and where I think environmental education might be located within your curriculum. You may have different concepts of environmental education, but this description will hopefully help in establishing a similar frame of mind for the completion of this questionnaire. Please note that EE is not the same as environmental science.

For this survey, environmental education encompasses the following topics: biodiversity, ecology, energy, environmental economics, environmental ethics, environmental health, environmental lifestyles, environmental politics, environmental values, global environmental impacts, human population, local and regional environmental impacts, natural resources, resource management, socio-cultural environment, species loss, sustainable development, technology, and waste management.

The purpose of this section is to assess the extent of implementation of the following topics related to EE into your curriculum.

Implementation can be defined as the process of carrying out, or putting into practical effect.

Status of Environmental Education in Illinois

Level of Implementation of EE

The extent I implement the following topics related to EE into the curriculum is:

1. Biodiversity - For example, but not limited to: diversity of animal and plant life on Earth, diversity of habitats, genetic diversity of organisms, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Biodiversity	◯	◯	◯	◯	◯

2. Ecology - For example, but not limited to: communities; habitats; natural cycles (e.g. water cycle); patterns in nature; producers, consumers, and decomposers; seasons, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Ecology	◯	◯	◯	◯	◯

3. Energy - For example, but not limited to: forms of electricity, energy needs of the world, energy conservation, non-renewable energy sources (e.g. gas, minerals, oil), renewable energy sources (e.g. hydropower, solar, wind), etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Energy	◯	◯	◯	◯	◯

4. Environmental Economics - For example, but not limited to: cost-benefit analysis, cost effectiveness analysis, incentive-based regulation, marginal cost of pollution, marginal cost of pollution abatement, risk-benefit analysis, sustainable economic development, tradable permits, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Environmental Economics	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

5. Environmental Ethics and Values - For example, but not limited to: animal rights and welfare, management of sustainable resources, ownership of natural resources, reflection on personal beliefs about the environment and critical analysis of the dimensions of environmental issues, uneven distribution of global resources, world hunger, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Environmental Ethics and Values	◯	◯	◯	◯	◯

6. Environmental Health - For example, but not limited to: climatic factors (e.g. humidity, precipitation, temperature, global warming), environmental contamination (e.g. agriculture, manufacturing, mining, transportation), nutritional deficiencies, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Environmental Health	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

Level of Implementation of EE

The extent I implement the following topics related to EE into the curriculum is:

7. Environmental Lifestyles - For example, but not limited to: personal decision-making based on the total environment; environmental citizenship; issues investigation; participation in local, national, or global environmental issues; etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Environmental Lifestyles	◯	◯	◯	◯	◯

8. Environmental Politics - For example, but not limited to: environmental legislation (e.g. Clean Air, Water and Environmental Education acts), international environmental problems, United Nation's conferences (e.g. the Climate Change Conference in Copenhagen, 2009), United Nation's treaties (e.g. the Kyoto Protocol, 1997), etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Environmental Politics	◯	◯	◯	◯	◯

9. Global Environmental Impacts - For example, but not limited to: burning of fossil fuels (e.g. coal, oil), deforestation/clear cutting, global warming, Earth processes (e.g. earthquakes, hurricanes, volcanoes), etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Global Environmental Impacts	◯	◯	◯	◯	◯

10. Human Population - For example, but not limited to: limits to growth, population density, population growth, urban sprawl, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Human Population	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

11. Local and Regional Environmental Impacts - For example, but not limited to: air quality (e.g. emissions released into the environment through automobiles, smog, etc.), water pollution, soil pollution, pesticide use, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Local and Regional Environmental Impacts	◯	◯	◯	◯	◯

12. Natural Resources - For example, but not limited to: consumption of resources/resource depletion, human dependence on natural resources (water, soil, minerals, species, land), non-renewable resources (coal, gas, oil), potentially renewable resources (air, trees, water), etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Natural Resources	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

Level of Implementation of EE

The extent I implement the following topics related to EE into the curriculum is:

13. Resource Management - For example, but not limited to: fisheries management, food production, forestry management, wildlife management, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Resource Management	◯	◯	◯	◯	◯

14. Socio-cultural Environment - For example, but not limited to: cultural perspectives, dependency of humans on natural systems, Earth Day, environmental aesthetics, environmental & social justice, media coverage of the environment, history of people/environment interactions, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Socio-cultural Environment	◯	◯	◯	◯	◯

15. Species Loss - For example, but not limited to: adaptation to change, agriculture, suburban and urban development's impact on species loss, endangered and threatened species, Endangered Species Acts (1966, 1969, and 1973), land use planning (e.g. wildlife reserves), poaching, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Species Loss	◯	◯	◯	◯	◯

16. Sustainable Development - For example, but not limited to: concept of sustainability, sustainable agriculture productivity, sustainable use of resources, poverty reduction, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Sustainable Development	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

17. Technology - For example, but not limited to: built (human-made) environments, genetic engineering, industrialization, interdependence of countries who rely on technology, medical discoveries from the environment, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Technology	◯	◯	◯	◯	◯

18. Waste Management - For example, but not limited to: composting, hazardous wastes (e.g. chemical and radioactive), incineration of waste, industry recycling processes, landfills, ocean dumping, product packaging (reusable or waste), reduce, reuse, recycle, solid waste, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Waste Management	◯	◯	◯	◯	◯

End of Part One. Please continue to Part Two.

Status of Environmental Education in Illinois

EE Personal Goals and Attitudes

The purpose of this section is to assess general attitudes and information regarding the environment and environmental education (EE). Please indicate the extent to which you agree or disagree with each of the following statements:

19. I am an environmentally aware person.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

20. I am not sure what integrating EE into the curriculum involves.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

21. All teachers should receive instruction in EE prior to receiving their teacher certification.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

22. I am a supporter for the integration of EE into the curriculum.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

23. I believe that traditional subjects should have a priority over EE.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

24. I enjoy/would enjoy teaching EE.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

EE Personal Goals and Attitudes

25. I have the resources necessary to carry out my desired level of EE instruction.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

26. Integrating EE into my teaching is important to me.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

27. With my present education I feel capable of teaching EE.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

28. Integrating EE into the curriculum would enable teachers to more effectively meet the needs of all students.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

29. Environmental education helps students understand environmental issues.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

30. I understand environmental topics enough to teach about them in the curriculum.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

EE Personal Goals and Attitudes

31. Teachers should provide students with opportunities to gain actual experience in resolving environmental issues.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

32. Environmental education should be integrated into the science curriculum only.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

33. As an individual, I consider myself to be an environmentally responsible citizen.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

34. Integrating EE into the curriculum is difficult.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

35. A goal of my teaching is to increase students' level of environmental responsibility.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

36. As an individual, I consider myself to be an environmentally active citizen.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

EE Personal Goals and Attitudes

37. Environmental topics serve as engaging themes for integrated teaching units.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

38. Environmental education is difficult to teach.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

39. Environmental education should be integrated throughout all subjects in our K-12 educational system.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

40. All pre-service teachers should be required to take an EE methods course.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

41. I am effective at integrating the study of environmental concepts and issues into my subject level.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

End of Part Two. Please continue to Part Three.

Status of Environmental Education in Illinois

Environmental Pre-Service and Inservice Teacher Education Part Three

The purpose of this section is to assess the extent to which the following topics related to EE were addressed in your pre-service teacher education program and inservice programming.

Pre-service teacher education includes general coursework, professional studies, and field experiences taken prior to teacher certification.

Inservice programming includes graduate courses, workshops, seminars, district offerings, or conferences taken after teacher certification.

Please fill out both rows for each topic area.

The extent to which the following topics related to EE were addressed in both my pre-service and inservice teacher education programs is best described as:

42. Biodiversity - For example, but not limited to: Diversity of animal and plant life on Earth, diversity of habitats, genetic diversity of organisms, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

43. Ecology - For example, but not limited to: Communities, habitats, natural cycles (e.g. water cycle), patterns in nature, producers, consumers, and decomposers, seasons, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

44. Energy - For example, but not limited to: Forms of electricity, energy needs of the world, energy conservation, non-renewable energy sources (e.g. gas, minerals, oil), renewable energy sources (e.g. hydropower, solar, wind), etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

45. Environmental Economics - For example, but not limited to: cost-benefit analysis, cost effectiveness analysis, incentive-based regulation, marginal cost of pollution, marginal cost of pollution abatement, risk-benefit analysis, sustainable economic development, tradable permits, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-Service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

46. Environmental Ethics and Values - For example, but not limited to: animal rights and welfare, management of sustainable resources, ownership of natural resources, reflection on personal beliefs about the environment and critical analysis of the dimensions of environmental issues, uneven distribution of global resources, world hunger, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

47. Environmental Health - For example, but not limited to: climatic factors (e.g. humidity, precipitation, temperature, global warming), environmental contamination (e.g. agriculture, manufacturing, mining, transportation), nutritional deficiencies, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

Environmental Pre-service and Inservice Teacher Education

The extent to which the following topics related to EE were addressed in both my pre-service and inservice teacher education programs is best described as:

48. Environmental Lifestyles - For example, but not limited to: personal decision-making based on the total environment; environmental citizenship; issues investigation; participation in local, national, or global environmental issues; etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

49. Environmental Politics - For example, but not limited to: environmental legislation (e.g. Clean Air, Water and Environmental Education acts), international environmental problems, United Nation's conferences (e.g. the Climate Change Conference in Copenhagen, 2009), United Nation's treaties (e.g. the Kyoto Protocol, 1997), etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

50. Global Environmental Impacts - For example, but not limited to: burning of fossil fuels (e.g. coal, oil), deforestation/clear cutting, global warming, Earth processes (e.g. earthquakes, hurricanes, volcanoes), etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

51. Human Population - For example, but not limited to: limits to growth, population density, population growth, urban sprawl, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

52. Local and Regional Environmental Impacts - For example, but not limited to: air quality (e.g. emissions released into the environment through automobiles, smog, etc.), water pollution, soil pollution, pesticide use, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

53. Natural Resources - For example, but not limited to: consumption of resources/resource depletion, human dependence on natural resources (water, soil, minerals, species, land), non-renewable resources (coal, gas, oil), potentially renewable resources (air, trees, water), etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

Environmental Pre-service and Inservice Teacher Education

The extent to which the following topics related to EE were addressed in both my pre-service and inservice teacher education programs is best described as:

54. Resource Management - For example, but not limited to: fisheries management, food production, forestry management, wildlife management, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

55. Socio-cultural Environment - For example, but not limited to: cultural perspectives, dependency of humans on natural systems, Earth Day, environmental aesthetics, environmental & social justice, media coverage of the environment, history of people/environment interactions, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

56. Species Loss - For example, but not limited to: adaptation to change, agriculture, suburban and urban development's impact on species loss, endangered and threatened species, Endangered Species Acts (1966, 1969, and 1973), land use planning (e.g. wildlife reserves), poaching, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

57. Sustainable Development - For example, but not limited to: concept of sustainability, sustainable agriculture productivity, sustainable use of resources, poverty reduction, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

58. Technology - For example, but not limited to: built (human-made) environments, genetic engineering, industrialization, interdependence of countries who rely on technology, medical discoveries from the environment, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

59. Waste Management - For example, but not limited to: composting, hazardous wastes (e.g. chemical and radioactive), incineration of waste, industry recycling processes, landfills, ocean dumping, product packaging (reusable or waste), reduce, reuse, recycle, solid waste, etc.

	Never	Rarely	Occasionally	Frequently	A great deal
Pre-service Exposure	◯	◯	◯	◯	◯
Inservice Exposure	◯	◯	◯	◯	◯

End of Part Three. Please continue to the **final** section, Part Four.

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics Part Four

The purpose of the following section is to assess the perceived effectiveness of your pre-service and inservice teacher preparation in EE.

Pre-service teacher education includes general coursework, professional studies, and field experiences taken prior to teacher certification.

Inservice programming includes graduate courses, workshops, seminars, district offerings, or conferences taken after teacher certification.

Cognitive education methods are those which can be used to encourage awareness of environmental concepts and problems, to increase knowledge of ecological foundations and environmental issues, and to develop skills which can be used to help resolve environmental issues.

Affective education methods are those which can be used to examine attitudes and values related to environmental issues.

Environmental action strategies are those that can help individuals or groups resolve environmental issues. These strategies can fall into one of five categories: persuasion, consumer action, political action, ecomanagement (any positive physical action taken with respect to the environment), and legal action.

60. Did you receive any pre-service teacher education in EE?

- ◯ yes
- ◯ no

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

61. My pre-service teacher education effectively prepared me in using cognitive education methods to teach students about the environment.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

62. My pre-service teacher education effectively prepared me to use affective education methods to help students examine values relating to environmental issues.

	Disagree very strongly	Disagree strongly	Disagree	Agree	Agree strongly	Agree very strongly
-	◯	◯	◯	◯	◯	◯

63. My pre-service teacher education was effective at providing me with action strategies I can use to give students experience in resolving environmental issues.

	Disagree very strongly	Disagree strongly	Disagree	Agree	Agree strongly	Agree very strongly
-	◯	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

64. Have you taken any inservice or post-graduate courses in EE?

- ◯ yes
- ◯ no

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

65. My inservice or post-graduate courses effectively prepared me in using cognitive education methods to teach students about the environment.

	Disagree very strongly	Disagree strongly	Disagree	Agree	Agree strongly	Agree very strongly
-	◯	◯	◯	◯	◯	◯

66. My inservice or post-graduate courses effectively prepared me to use affective education methods to help students examine values relating to environmental issues.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

67. My inservice or post-graduate courses were effective in providing me with action strategies I can use to give students experience in resolving environmental issues.

	Disagree Very Strongly	Disagree Strongly	Disagree	Agree	Agree Strongly	Agree Very Strongly
-	◯	◯	◯	◯	◯	◯

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

The information requested below will facilitate proper interpretation of the data you have provided in the preceding sections. This information will be treated with the utmost confidentiality.

68. What is your gender?

- ◯ Female
- ◯ Male

69. In total, how many years have you been teaching, including the current year?

- ◯ 1 to 5 years
- ◯ 6 to 10 years
- ◯ 11 to 15 years
- ◯ 16 to 20 years
- ◯ 21 to 25 years
- ◯ Over 25 years

70. What grade level(s) do you teach? (Check all that apply.)

- ☐ 7 - 8
- ☐ 9 - 10
- ☐ 11 - 12

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

What high school subject do you teach? (Please select only one subject at a time. If you teach more than one high school subject, you will have the opportunity to enter this information on another page.)

Please select the subject that **best aligns** with the course you teach. For example, anatomy, botany, and zoology would best align with biology. Astronomy and meteorology would best align with Earth/space science. U.S. history, world history, and European history would all align with history.

If you teach more than one level of the same subject (e.g.) first year chemistry and AP chemistry or U.S. History and AP U.S. History, then please only select one of these for the survey OR select one in the subject and report on the other one in the "other" section.

If you teach two or more courses that need to be classified as "other," then please select only one of those courses for this survey.

This is the final set of questions.

71. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Earth/Space Science
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

Status of Environmental Education in Illinois

72. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ Government
- ◯ History
- ◯ Psychology
- ◯ Sociology
- ◯ World Issues
- ◯ Other (please specify)

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

73. Approximately how long is your environmental unit in biology?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

74. Approximately how much time *on average* per week do you spend teaching about the environment in biology?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

75. Science

- ◯ Chemistry
- ◯ Earth/Space Science
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

76. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ Government
- ◯ History
- ◯ Psychology
- ◯ Sociology
- ◯ World Issues
- ◯ Other (please specify)

77. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

78. Approximately how long is your environmental unit in chemistry?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

79. Approximately how much time *on average* per week do you spend teaching about the environment in chemistry?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

80. Science

- ◯ Biology
- ◯ Earth/Space Science
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

81. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ Government
- ◯ History
- ◯ Psychology
- ◯ Sociology
- ◯ World Issues
- ◯ Other (please specify)

82. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

83. Approximately how long is your environmental unit in Earth/space science?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

84. Approximately how much time *on average* per week do you spend teaching about the environment in Earth/space science?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

85. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

86. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ Government
- ◯ History
- ◯ Psychology
- ◯ Sociology
- ◯ World Issues
- ◯ Other (please specify)

87. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

In environmental science you are obviously teaching about the environment daily. There still is a need for me to ask the second question on this page so that this data will be consistent with the data on other subjects' pages.

88. How long is your environmental science course?

- ◯ 1 semester
- ◯ 1 school year

89. Approximately how much time *on average* per week do you spend teaching about the environment in environmental science?

- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

90. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Earth/Space Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

Status of Environmental Education in Illinois

91. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ Government
- ◯ History
- ◯ Psychology
- ◯ Sociology
- ◯ World Issues
- ◯ Other (please specify)

92. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

93. Approximately how long is your environmental unit in integrated/general science?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

94. Approximately how much time *on average* per week do you spend teaching about the environment in integrated/general science?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

95. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Earth/Space science
- ◯ Environmental Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

96. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ Government
- ◯ History
- ◯ Psychology
- ◯ Sociology
- ◯ World Issues
- ◯ Other (please specify)

97. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

98. Approximately how long is your environmental unit in physical science/physics?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

99. Approximately how much time *on average* per week do you spend teaching about the environment in physical science/physics?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

100. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Earth/Space science
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Other (please specify)

101. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ Government
- ◯ History
- ◯ Psychology
- ◯ Sociology
- ◯ World Issues
- ◯ Other (please specify)

102. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

103. Approximately how long is your environmental unit in science "other"?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

104. Approximately how much time *on average* per week do you spend teaching about the environment in science "other"?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

105. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Earth/Space science
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics

106. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ Government
- ◯ History
- ◯ Psychology
- ◯ Sociology
- ◯ World Issues
- ◯ Other (please specify)

107. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

108. Approximately how long is your environmental unit in civics/political science?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

109. Approximately how much time *on average* per week do you spend teaching about the environment in civics/political science?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

110. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Earth/Space science
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

111. Social Studies

- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ Government
- ◯ History
- ◯ Psychology
- ◯ Sociology
- ◯ World Issues
- ◯ Other (please specify)

112. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

113. Approximately how long is your environmental unit in consumer education/economics?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

114. Approximately how much time *on average* per week do you spend teaching about the environment in consumer education/economics?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

115. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Earth/Space science
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

116. Social Studies

- ◯ Civics/Political Science
- ◯ Geography
- ◯ Government
- ◯ History
- ◯ Psychology
- ◯ Sociology
- ◯ World Issues
- ◯ Other (please specify)

117. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

118. Approximately how long is your environmental unit in geography?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

119. Approximately how much time *on average* per week do you spend teaching about the environment in geography?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

120. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Earth/Space science
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

121. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Government
- ◯ History
- ◯ Psychology
- ◯ Sociology
- ◯ World Issues
- ◯ Other (please specify)

122. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

123. Approximately how long is your environmental unit in government?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

124. Approximately how much time *on average* per week do you spend teaching about the environment in government?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

125. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Earth/Space science
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

126. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ History
- ◯ Psychology
- ◯ Sociology
- ◯ World Issues
- ◯ Other (please specify)

127. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

128. Approximately how long is your environmental unit in history?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

129. Approximately how much time *on average* per week do you spend teaching about the environment in history?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

130. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Earth/Space science
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

131. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ Government
- ◯ Psychology
- ◯ Sociology
- ◯ World Issues
- ◯ Other (please specify)

132. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

133. Approximately how long is your environmental unit in psychology?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

134. Approximately how much time *on average* per week do you spend teaching about the environment in psychology?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

135. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Earth/Space science
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

136. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ Government
- ◯ History
- ◯ Sociology
- ◯ World Issues
- ◯ Other (please specify)

137. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

138. Approximately how long is your environmental unit in sociology?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

139. Approximately how much time *on average* per week do you spend teaching about the environment in sociology?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

140. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Earth/Space science
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

141. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ Government
- ◯ History
- ◯ Psychology
- ◯ World Issues
- ◯ Other (please specify)

142. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

143. Approximately how long is your environmental unit in world issues?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

144. Approximately how much time *on average* per week do you spend teaching about the environment in world issues?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

145. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Earth/Space science
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

146. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ Government
- ◯ History
- ◯ Psychology
- ◯ Sociology
- ◯ Other (please specify)

147. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Teacher Perceptions and Demographics

These directions pertain to the next **two** questions on this page.

If you teach about the environment only within one unit and **not** throughout the entire year, please answer the **first** question *only*.

If you teach about the environment throughout the year and **not** within a specific unit, please skip the first question and answer the **second** question *only*.

If you teach about the environment within one unit but continue teaching about the environment throughout the year, please answer **both** questions.

148. Approximately how long is your environmental unit in social studies "other"?

- ◯ 5 days or less
- ◯ 6 to 10 days
- ◯ 11 to 15 days
- ◯ 16 to 20 days
- ◯ More than 21 days (but less than 1 semester)
- ◯ 1 semester
- ◯ More than 1 semester, but less than 1 year
- ◯ 1 school year

149. Approximately how much time *on average* per week do you spend teaching about the environment in social studies "other"?

- ◯ none
- ◯ 30 minutes or less
- ◯ 31 minutes to 55 minutes
- ◯ 56 minutes to 110 minutes
- ◯ 111 minutes to 165 minutes
- ◯ 166 minutes to 220 minutes
- ◯ 221 minutes to 275 minutes

Please select another subject that you teach. If you do not teach another science or social studies course, select "no" in the question at the bottom of the page.

Status of Environmental Education in Illinois

150. Science

- ◯ Biology
- ◯ Chemistry
- ◯ Earth/Space science
- ◯ Environmental Science
- ◯ Integrated/General Science
- ◯ Physical Science/Physics
- ◯ Other (please specify)

151. Social Studies

- ◯ Civics/Political Science
- ◯ Consumer Education/Economics
- ◯ Geography
- ◯ Government
- ◯ History
- ◯ Psychology
- ◯ Sociology
- ◯ World Issues

152. Do you teach any other science or social studies courses?

- ◯ No

Status of Environmental Education in Illinois

Thank you

Thank you for taking the time to complete this survey. Winners of the Barnes and Noble gift cards will be notified by mid May.

APPENDIX E

EMAIL TO DEPARTMENT CHAIRPERSONS

Dear Department Chair:

The purpose of this email is to inform you that I will be inviting you and the other members of your department to participate in an online survey regarding the status of environmental education in Illinois public high school science and social studies classrooms. This survey is being done in connection with my dissertation at Northern Illinois University. The survey will give science and social studies teachers the opportunity to report about their level of pre-service and inservice preparation in environmental education. It will also ask about their level of classroom implementation of various environmental education topics as well as personal attitudes about environmental education.

Participation is voluntary and answers will be confidential. No one will be identified in the summarized data in the dissertation. Data will not be disaggregated by school. In one week I will be sending the formal request to participate in the survey to all members of your department. They will be given a link to the survey on Survey Monkey. If anyone would prefer a paper copy, I will include instructions as to how to do that.

I would greatly appreciate it if you would let the members of your department know that this request is forthcoming so that they do not delete the email inadvertently. Teachers who piloted the survey on paper reported on average that the survey took approximately 20 minutes of their time.

The information that will be studied from this survey will help leaders in this state understand the current need for pre-service and inservice teacher education in environmental education.

Thank you in advance for your support in this important project. Feel free to contact me via email or by phone (309-347-4101 x 6267) if you have any questions. You may also contact my dissertation director, Dr. Elizabeth Wilkins at 815-753-8458. If you have questions about your rights as a research subject, you may contact the Office of Research Compliance at 815-753-8588.

Sincerely,
Jill F. Carter
Doctoral Candidate
Northern Illinois University

APPENDIX F

EMAIL TO PRINCIPALS

Dear Principal:

The purpose of this email is to inform you that I will be inviting all science and social studies teachers at your high school to participate in an online survey regarding the status of environmental education in Illinois public high school science and social studies classrooms. This survey is being done in connection with my dissertation at Northern Illinois University. The survey will give science and social studies teachers the opportunity to report about their level of pre-service and inservice preparation in environmental education. It will also ask about their level of classroom implementation of various environmental education topics as well as personal attitudes about environmental education.

Participation is voluntary and answers will be confidential. No one will be identified in the summarized data in the dissertation. Data will not be disaggregated by school. In one week I will be sending the formal request to participate in the survey to all science and social studies teachers at your school. They will be given a link to the survey on Survey Monkey. If anyone would prefer a paper copy, I will include instructions as to how to do that.

I would greatly appreciate it if you would let your science and social studies teachers know that this request is forthcoming so that they do not delete the email inadvertently. Teachers who piloted the survey on paper reported on average that the survey took approximately 20 minutes of their time.

The information that will be studied from this survey will help leaders in this state understand the current need for pre-service and inservice teacher education in environmental education.

Thank you in advance for your support in this important project. Feel free to contact me via email (jcarter@pekinhigh.net) or by phone (309-347-4101 x 6267) if you have any questions. You may also contact my dissertation director, Dr. Elizabeth Wilkins at 815-753-8458. If you have questions about your rights as a research subject, you may contact the Office of Research Compliance at 815-753-8588.

Sincerely,
Jill F. Carter
Doctoral Candidate
Northern Illinois University

APPENDIX G

EMAIL TO PARTICIPANTS

Dear Educator:

The purpose of this email is to invite you to participate in an online survey regarding the status of environmental education (not environmental science) in Illinois public high school science and social studies classrooms. This survey is being done in connection with my dissertation at Northern Illinois University. The survey will give you the opportunity to report about your level of pre-service and inservice preparation in environmental education. It will also ask you about the level of classroom implementation of various environmental education topics as well as personal attitudes about environmental education.

Participation is voluntary and answers will be confidential. No one will be identified in the summarized data in the dissertation. Data will not be disaggregated by school. You may skip items that you are not comfortable answering. The survey will take approximately 20 minutes of your time.

The information that will be studied from this survey will help leaders in this state understand the current need for pre-service and inservice teacher education in environmental education.

Thank you in advance for your support in this important project. Feel free to contact me via email or by phone (309-347-4101 x 6267) if you have any questions. You may also contact my dissertation director, Dr. Elizabeth Wilkins at 815-753-8458. If you have questions about your rights as a research subject, you may contact the Office of Research Compliance at 815-753-8588.

The link to the survey on Survey Monkey is below. Submitting a completed copy of the survey implies consent to participate in the research. Please complete the survey by [date will be inserted]. If you would prefer a paper copy to fill out and return, please reply to this email to request one. You will need to include your mailing address.

[Insert link to survey.]

Sincerely,
Jill F. Carter
Doctoral Candidate
Northern Illinois University

APPENDIX H

REMINDER EMAILS TO COMPLETE SURVEY

First reminder

Dear Educator,

I just wanted to remind you to participate in my doctoral dissertation survey regarding environmental education (EE) in Illinois. Remember that no answers are tied to an individual or to a school district. Please don't be concerned if you don't have much or any EE in your courses. The survey is not judgmental and it is just as helpful to me to know where EE is NOT being taught as to where it IS being taught. Environmental education is not the same as environmental science, so you may be surprised to find that you do teach some components of EE.

When you click on the link that takes you to my survey, you will see that there will be a drawing for some gift cards for those who complete the survey. Thanks in advance for taking the time to contribute to this research project. If you have questions, you may contact me at jcarter@pekinhigh.net (or see the previous email notice for additional contact information). Please complete the survey by Tuesday, March 27, 2012.

Sincerely,

Jill F. Carter
Doctoral Candidate
Northern Illinois University

Second reminder

Dear Educator,

I know that some of you are on break this week and some will be on break next week. Please take a little time and participate in my doctoral dissertation survey regarding environmental education (EE) in Illinois. The deadline has been extended. Remember that no answers are tied to an individual or to a school district.

When you click on the link that takes you to my survey, you will see that there will be a drawing for some gift cards for those who complete the survey. If you have questions, you may contact me at jcarter@pekinhigh.net (or see the first email notice for additional contact information). Please complete the survey by Thursday, April 12, 2012. I truly appreciate your time!

Sincerely,

Jill F. Carter
Doctoral Candidate
Northern Illinois University

Third and final reminder

Dear Educator,

I know that some of you are on break this week and some were on break last week. Please take a little time and participate in my doctoral dissertation survey regarding environmental education (EE) in Illinois.

The deadline has been extended. Remember that no answers are tied to an individual or to a school district. My research is examining the status of EE in the state as a whole. Don't be concerned if you don't have much or any EE in your courses. The survey is not judgmental and it is just as helpful to me to know where EE is NOT being taught as to where it IS being taught. Reminders are not sent to people who have responded.

There will be a drawing for some gift cards for those who complete the survey. If you have questions, you may contact me at jcarter@pekinhigh.net (or see the first email notice for additional contact information). Please complete the survey by Thursday, April 19, 2012. I truly appreciate your time!

Sincerely,

Jill F. Carter
Doctoral Candidate
Northern Illinois University