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Elementary Teachers' Views of Environmental Education

Rose M. Hotchkiss
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ELEMENTARY TEACHERS' VIEWS OF ENVIRONMENTAL EDUCATION

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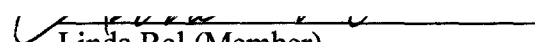
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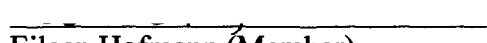
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ABSTRACT

ELEMENTARY TEACHERS' VIEWS OF ENVIRONMENTAL EDUCATION

Rose M. Hotchkiss
Old Dominion University, 2011
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The purpose of this research is to examine teachers' views of environmental education (EE) at the elementary level. The study addresses teachers' attitudes toward the EE at the elementary school level and their self-efficacy in teaching EE.

The study's sample consisted of 201 randomly selected kindergarten through fifth grade United States public school teachers. The participants completed an on-line survey with eight percent of the respondents participating in follow up interviews. The questionnaire measured two constructs; *Teachers Attitudes Toward EE* and *Teacher Efficacy in EE*. *Teachers Attitudes Toward EE* had 3 subscales; *Advocacy for EE*, *Stewardship in EE*, and *Using the Outdoors*. *Teacher Efficacy in EE* had two subscales; *Confidence in Knowledge of Issues and Resources* and *Perception of Training and Support*. Interview questions were aligned with the questionnaire subscales.

. Frequency percentages and means were examined for each subscale and items within each. ANOVA was conducted to examine possible relationships between subscale means and four independent variables; school demographic (rural suburban, urban), currently teaches science, years of teaching experience, and grade level taught. Interview data were audio recorded, transcribed verbatim, and coded. Coding categories were aligned with questionnaire subscales. All data were examined in context of the literature and the research questions.

Results indicate that elementary teachers have positive attitudes toward EE and believe that EE concepts can be integrated into core content subjects. Teachers agree that stewardship is important to teach as part of elementary EE, but expressed caution when dealing with controversial topics and issues. Additionally, although teachers are aware of the importance of the child-nature connection, they did not advocate for the inclusion of outdoor lessons and activities in EE. Teachers' confidence in their knowledge of EE and environmental issues was low; however they were mostly confident that they could locate appropriate resources. Teachers in this study reported that they had received little or no training in EE and do not receive encouragement for EE from their administrators.

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*"If a child is to keep his inborn sense of wonder,
he needs the companionship of at least one adult who can share it,
rediscovering with him the joy, excitement, and mystery of the world we live in."
~ Rachel Carson ~*

~ I dedicate this to the strong Scottish women from whom I am descended ~

Edith Shaw Scott, my grandmother;

Barbara Scott Knowles, my mother, and

Freda Scott Eddy, my aunt.

From them I inherited both my love of nature and my love of learning.

May heaven be all that you believed it to be.

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CHAPTER I

INTRODUCTION

Mankind's relationship with the environment is an issue of great importance as well as considerable controversy. Public schools have nearly always been viewed as a panacea for the ills and issues of society and it would be surprising, and indeed irresponsible, if our schools did not address environmental education in their curricula. In fact, according to a recent national Roper Poll, 95 percent of adult Americans support environmental education in our schools (2001). Sadly, a later report, *Environmental Literacy in America: What 10 Years of NEETF/Roper Research and Related Studies Say About Environmental Literacy in the U.S.* (Coyle 2005), reported that the American citizenry is generally uninformed and misinformed on environmental concepts that underlie current issues. The need for an environmentally literate society is clear and well supported, and yet in the current educational atmosphere where standards accountability and high stakes testing reign, environmental education (EE) in the elementary school is generally relegated to interested and committed teachers if and when they find time in an already overcrowded curriculum. "Despite its popularity, [environmental education] is still mostly considered an educational "extra" – grafted on to a core syllabus as an enhancement. After 35 years of effort, the environment has yet to achieve 'core subject' status in our schools" (Coyle 2005, p. 51).

Environmental education (EE) has a multifaceted history and its evolution, along with countless educational reform movements, has created obstacles, tensions, and controversy that still exist today (Marcinkowski 2010). Debate continues among experts and researchers leaving classroom teachers to sort out what constitutes EE and how and when it should be taught. In addition to disagreements among the ‘experts,’ teachers are bombarded with confusing and ever-changing terminology; a wide range of unit and activity guides, often designed to promote the point of view of a particular agency, organization, or corporation; and a school structure that is often in direct conflict with the goals and aims of EE. Today’s environmental issues present a sense of urgency, a need for immediate workable solutions, and yet there is no sense of urgency within state departments of education to seriously implement education for the environment. EE in public schools is left to the discretion of administrators and teachers within individual school settings.

So where does this leave the classroom teacher? The research refers to the “environmental educator,” however, other than high school courses in earth and environmental science, few, if any schools employ an “environmental educator.” Within the elementary school setting you will not find such a designated teacher. Elementary school teachers generally are responsible for all, or several, content areas. Even in cases where an elementary teacher may teach science exclusively, they are responsible for concepts in physical, biological, life, and earth sciences as outlined by state and national standards. Teacher education programs seldom prepare teachers to teach EE and they often lack understanding of what constitutes EE and appropriate strategies for teaching it.

Problem Statement and Research Questions

Environmental education, with all its complexities, remains an under-researched area as compared to other disciplines, particularly with respect to teacher perceptions of EE-based teaching and learning. Much of the research that has been done focuses on the learners and the educational outcome of specific environmental programs and activities (Short 2010). While studies have also been conducted on teachers attitudes toward the environment (Flogaitis & Agelidou 2003, Moseley & Utley 2008, and Ozden 2008), research on their views about *teaching* EE to their students is less prevalent. This study addresses this gap as it strives to answer the following research questions:

1. What are elementary teachers' attitudes toward teaching EE at the K-5 level?
2. To what extent do elementary teachers think stewardship and pro-environmental behaviors should be taught?
3. To what extent do elementary teachers think that using the outdoors is necessary to teaching EE?
4. What degree of confidence do elementary teachers have in their ability to teach EE?
5. To what extent are elementary teachers aware of and have access to quality EE resources?
6. How well do elementary teachers think they are trained and supported in teaching EE?
7. Do elementary teacher attitudes and efficacy vary as a function of demographic characteristics?

Overview of the Proposed Study

The proposed study will utilize a non-experimental, descriptive survey design with both quantitative and qualitative data collection strategies. Using both quantitative and qualitative data provides greater depth to the data collected and enhances the credibility of the findings. A closed-ended questionnaire and semi-structured interviews will be used to collect data on teachers' attitudes and efficacy concerning environmental education at the elementary school level. The 37 item questionnaire, which utilizes a five point Likert scale, was created and validated by the researchers and was administered in an on-line format.

Qualitative data were collected through semi-structured interviews with selected participants following completion of the questionnaire. The interview protocol consists of eight open-ended questions which included additional probing questions as needed. Interview data was mechanically recorded, transcribed, and coded. Multiple raters were employed to enhance reliability and validity of the findings. Both data collection methods are discussed in greater detail in Chapter III. Also included are the results of the pilot study conducted to develop and validate the questionnaire used in this study.

Overview of Proposed Chapters

Chapter II provides an overview of the research literature that pertains to, and provides background for this study. It begins with a brief historical overview of EE and a description of terms and issues. It then moves in to a review of empirical research published in top tier, peer reviewed journals. The literature review provides an overview of the research that has been done in the environmental education field as it pertains to

the research questions for this study and provides a rationale for the current research as we examine EE from the practitioners' point of view.

Chapter III details the methodology used for this study. An in-depth description is provided of the methods, participant selection process, measures and procedures to be used. The data analysis methods are also defined and limitations are addressed.

Chapter IV presents the data obtained from the Views of EE questionnaire and the semi-structured interviews. Respondent demographics are reported and summarized. Descriptive and inferential data are detailed for each scale and subscale of the questionnaire along with supporting interview data and are presented to answer the research questions.

Chapter V summarizes the findings of the study. Conclusions are drawn and implications are discussed in context of the literature. Recommendations derived from the study findings are presented.

CHAPTER II

REVIEW OF THE LITERATURE

A Brief History of Environmental Education

The roots of EE date back to the late 19th and early 20th century when Nature Study was first introduced into education. Nature study placed focus on the scientific study of nature and natural objects. It was the Nature Study movement that first placed a focus on science education in the elementary schools and some of its key elements, such as hands-on discovery learning, remain an important component of elementary science education today. In the 1930's the "Dust Bowl" gave rise to the Conservation Education movement as the need to conserve natural resources became apparent. Conservation Education focused on the environmental problems of the time. Outdoor Education, in the 1950's, changed the focus to learning *in* as well as *about* the natural environment. It was an approach that advocated for learning outdoors and was not restricted to the sciences or study of nature. Art, music, mathematics, history etc. were all subjects that could be taught outside of the school building. The term "Environmental Education" was first used in 1948 by Thomas Pritchard, Deputy Director of the Nature Conservancy in Wales, as he addressed a meeting of the International Union for the Conservation of Nature. However, what we commonly think of as environmental education emerged in the 1960's as the term for the educational dimensions of the environmental movement which was becoming very popular and widespread at that time. The environmental movement of the 1960's was concerned with air and water quality, the growth in world population, continuing depletion of natural resources and environmental degradation (Gough,

Annette, and Gough, Noel., in press). The publication of Rachel Carson's *Silent Spring* in 1962 is often considered to be the event that marked the beginning of the organized environmental movement of the 1960's and 1970's. The first photograph of our Earth, suspended in space, taken by Apollo 17 (NASA 1972) further fueled the environmental movement through its powerful image of Earth as a fragile planet with finite resources.

The two most significant founding documents for the contemporary field of environmental education are the Belgrade Charter (UNESCO-UNEP, 1976) and the Tbilisi Declaration (UNESCO, 1978). The Belgrade Charter provides this goal statement for environmental education:

“The goal of environmental education is 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 (pg. 3)”

The Tbilisi Declaration built upon the Belgrade Charter and provides three broad goals for environmental education:

- 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 behavior of individuals, groups and society as a whole towards the environment.

Additionally, the National Environmental Education Act of 1970 reflected a national commitment to environmental education and put the focus on schools as the place for it.

This act stated that environmental education:

“is intended to promote among citizens the awareness and understanding of the environment, our relationship to it, and the concern and responsible action necessary to assure our survival and to improve the quality of life (p.10).”

These documents clearly state the need, not just for education *in* and *about* the environment, but education *for* the environment. Additionally, these early documents and the more recent *Excellence in Environmental Education—Guidelines for Learning (K-12)* (NAAEE 1999) all state or imply a hierarchy of EE objectives: knowledge and awareness, sensitivity, attitudes, skills, and participation (personal and civic action).

The evolution of EE through Nature Study, Outdoor Education, and Conservation Education to Environmental Education continues as many in the field are now proponents the newer and more ‘politically correct’ Education for Sustainable Development (ESD). Throughout this evolution the debate continues over the different philosophies, definition, scope, purpose, programs, and approaches. Hungerford (2010) points out that over the decades the varied approaches and philosophies have made it difficult to adequately define EE and determine its direction. Environmental education and environmental education research have become increasingly more complex and controversial. In K-12 education, and particularly in the elementary schools setting, there is a gap between EE theory and research and EE practice by teachers in the classrooms. Environmental education may not be the same in the eyes of the practitioner as it is in the eyes of the experts and researchers in the field. Educators wanting to include EE concepts in their

teaching are faced with a myriad of complex issues and obstacles. Marcinkowski (2010) points out that researchers and writers in the field of EE have been describing and discussing challenges for the past forty years and yet, many of the same challenges exist today. Controversy and change continue to be characteristic of EE and the field of education in general.

Advocacy for Environmental Education

The research literature leaves little doubt as to the need for environmental education in our K-12 schools. While there is a great deal of support for EE from various stakeholders, there is also a considerable amount of debate as to what exactly constitutes EE and how, where, and when it should be taught. The controversy and change that have been characteristic of EE throughout its history presents a myriad of challenges for its implementation in our schools.

The factors associated with the extent to which environmental education is, or is not, implemented in K-5 schools are numerous and varied, both external and internal. Teachers often cite a lack of sufficient knowledge, a restrictive, compartmentalized curriculum, and state testing as barriers (Sous, McWilliam, & Gray, 2008). In addition to these, the current research indicates that urbanization of society, the controversial and political nature of EE, and the structure of today's schools, are major obstacles as well.

A recent study found that the standards and accountability movement and the emphasis on state testing comprise the number one barrier to environment based education (Ernst, 2007). High-stakes testing drives curricular and instructional decisions. With the focus placed on reading and math test scores, the curriculum gets significantly narrowed. With the No Child Left Behind Act of 2001 (NCLB) there is increasing

pressure on teachers to raise test scores. Teachers are often torn between higher test scores and the teaching of EE (Mueller & Bently 2009). While some states now test science as well as reading and math, and have science curriculum standards that in some way address environmental education, they are too often simply knowledge based standards, such as: “distinguish between renewable and nonrenewable sources,” or “describe the flow of energy in natural systems, citing the sun as the source of energy on the earth” (Wisconsin DPI, 1998), that do nothing to promote responsibility, thoughtful decision making, or civic action. Even within the *National Science Education Standards* (1996), environmental education is not represented as a central focus, but rather is infused in the form of knowledge based standards within several content areas. Only two of the National Science Standards, (students should be able to: “use appropriate scientific processes and principles in making personal decisions” and “engage intelligently in public discourse and debate about matters of scientific and technological concern” p. 13). contain wording that implies responsible decision making. They do not, however, make clear the need to include stewardship or positive action in the realm of education for the environment. Even in the science content area, testing and accountability mandates push EE to the back burner.

In March 2010 the National Governors Association Center for Best Practices and the Council of Chief State School Officers released a draft of the K-12 standards as part of the Common Core State Standards Initiative. The Core Standards currently address math and language arts only. While they state that these subjects provide skills upon which other subjects are built and that other subjects are critical to success, they also

contend that they are also the subjects most frequently assessed for state and district accountability purposes; thus reinforcing the narrow focus on math and reading. Additionally, Nelson (2010) states that “as reflected in the contemporary content standards movement and the call for increased accountability among educators and students at all grade levels, emphasis continues to be placed on curricula rooted in the idea that knowledge is both fixed and external to the learner (p.4).” Schools are designed to present standardized knowledge within established and departmentalized disciplines to be assessed through multiple choice standardized tests. According to the National Governors Association Center for Best Practices (2010), “these standards build upon the goals articulated in the college- and career-readiness standards... [to] ensure our students are prepared to compete and succeed in a global economy).”

This supports Stevenson’s (2007) argument that the ideological, structural, pedagogical, and curricular practices of schools are in direct conflict with the aims and goals of EE. He contends that public schools participate in and prepare students for the ideology of economic growth and maintenance of the social order through pedagogy of passive students as recipients of teachers’ knowledge presented through a fragmented, pre-defined curriculum. The interdisciplinary nature and vision of EE described in the Tbilisi Declaration are not easily attained. Even at the elementary level where self-contained classrooms and ‘generalist’ teachers have traditionally been the norm, due to increasing accountability demands more schools are moving to departmentalization at the upper elementary level (Delviscio & Muffs, 2007). Chang, Muñoz, & Koshewa, (2008) point out that in spite of the lack of research to support departmentalization at the elementary level, it is often advocated in an effort to improve reading and math scores on

state testing. In these departmentalized settings, EE, if taught at all, becomes the responsibility of the science teacher, who often sees it as an add-on to her already crowded curriculum. More likely environmental education becomes a collection of mini-lessons and activities taught only on special occasions such as Earth Day and Arbor Day. This is particularly the case in the early elementary setting where traditions, holidays, and celebrations are part of the curriculum. According to Knapp (2000), EE has taken the easy way out as associated agencies and organizations have published a large amount of curricular units and activity guides which, he contends, further promotes a fragmented, piecemeal EE curriculum. Although many are of good quality, “those short and sweet strategies have negated the use of substantial models that encourage long term issue investment and, most important, long term thinking and responsible citizenship behavior on the part of the students (p. 34).”

Gruenewald & Manteaw (2007) discuss two distinct ways that environmental educators are working within confines of the current educational system: accommodation and resistance. Accommodation involves the recent practice of “selling” EE as a way to raise state test scores. While many see this as the only way to get EE into the school curriculum, these authors assert the outcome is that EE “gets muted, distorted, and absorbed by the culture of schooling (p.176).” and educators become distracted from the actual aims of EE. Resistance on the other hand takes place as creative teachers find ways to develop pedagogies and curriculum that give justice to the goals and aims of EE (Gruenewald & Manteaw 2007).

Stewardship in Elementary EE

Much of the environmental education literature supports the role of EE as being one of changing attitudes and behaviors and engaging students in critical thinking, problem solving, and taking action on environmental problems and issues. Stewardship is included in much of the literature as well as published curricula. The Environmental Protection Agency (EPA) provides a broad definition of stewardship that includes both values and practices, or behaviors (EPA 2005). They list 3 simple values:

1. Respect for the environment, on which life depends;
2. Acceptance of personal and organizational responsibility for environmental quality; and
3. Recognition of the need to sustain the environment for future generations.

Environmental stewardship practices, or behaviors, include:

1. Protects natural systems and uses natural resources effectively and efficiently;
2. Makes environment a key part of internal priorities, values and ethics, and leads by example;
3. Holds oneself accountable;
4. Believes in shared responsibility;
5. Invests in the future; and
6. Exceeds required compliance.

Pro-environmental behaviors are an integral part of stewardship. Pro-environmental behaviors differ from ‘action’ in that pro-environmental behaviors are ‘benign’ where actions become political. As an example, students picking up Styrofoam plates and cups on their school grounds is pro-environmental behavior whereas starting a campaign to

prohibit their use in the school cafeteria is environmental action. There seems to be little doubt that instilling ideals of stewardship in elementary students is worthy, and there are an abundance of curricular units and activities devoted to gardening, composting, conserving water and energy, recycling, and cutting down on waste. Environmental action, as the term is used here, has the potential for controversy and it is here that teachers most need to be wary of the charge of indoctrination. Educating students for the environment should provide them with the knowledge and skills to consider all perspectives and make informed decisions.

Since the signing of the Tbilisi Declaration in 1978, one of the consistent goals of education for the environment is to teach students to think critically about the environment and become active participants in environmental issues resolution. However, these components of ‘active participation’ and ‘issues resolution’ have brought on some criticisms particularly at the elementary level. One of these criticisms centers around the potential of teacher bias and an indoctrination style of teaching (Marcinkowski, 2010). The concern is that teachers will advance their own particular ideology rather than assist students in looking at an issue from a variety of perspectives and coming to their own conclusions. At one end of the continuum is the belief that cultural, social, and economic needs of humans should take precedence over environmental protection and the needs of nature. At the opposite end is the belief that the environment should be preserved and protected at all costs, regardless of economic issues and the needs of humans. While most people likely fall somewhere between these opposing views and would view bridging that gap as a role of EE, there is still room for much debate. Teachers, and the students they teach, come from a wide range of

backgrounds in terms of culture, socioeconomics, and political and religious beliefs. Often, teachers' beliefs are in direct opposition to those of parents and/or the majority of the community they serve. Education is inherently a values-laden endeavor and teachers who teach EE have a daunting task of presenting complex and controversial issues to their students free of their own, or others' biases. This can be problematic for a number of reasons.

Firstly, this requires that teachers be acutely aware of their own beliefs and attitudes. However, teachers often lack sufficient knowledge and depth of understanding to have formulated concise views on local and global environmental issues. At the same time teachers may be unaware of the ways in which their own values, beliefs, and attitudes are transmitted through their teaching. Cotton (2006) found that even when teachers had strong beliefs about balance and neutrality in teaching, their environmental attitudes had a greater influence on their teaching than they intended, and possibly even realized. As noted by Eisner (1985), there are three types of curricula teachers knowingly or unknowingly teach: 1) the overt or explicit curriculum – that which is written and purposefully taught; 2) the hidden or implicit curriculum – that which is conveyed or implied by the behaviors and actions of educators as well as the routines and the structure and nature of schools; and 3) the null curriculum – that which is not taught. “Schools have consequences not only by virtue of what they teach, but also by virtue of what they neglect to teach. What students cannot consider, what they don't process, they are unable to use... (p.103).” David Orr (2004) states that “all education is environmental education. By what is included or excluded, students are taught that they are part of or apart from the natural world (p.12).”

Accordingly, while EE does have an important role in the elementary school, what does it look like in terms of stewardship? Grant and Littlejohn (2005), in an introduction to *Teaching Green - The Elementary Years: Hands-on Learning in Grades K-5*, state

“even young children should have opportunities to take action to improve local environments. When students act on environmental problems, they begin to understand their complexity, to learn the critical thinking and negotiating skills needed to solve them, and to develop the practical competence that democratic societies require of their citizens. At the same time, educators have a responsibility not to burden children with catastrophic and complex environmental problems that are beyond their ability to help remedy — or, as environmental educator David Sobel has expressed it, there should be ‘no tragedies before fourth grade’” (Grant & Littlejohn 2005, Introduction).

Orr (2004) agrees that at the elementary school level, students should not have to be subjected to the “doom and gloom” of large scale environmental issues. He states that before children deal with taking action on environmental issues, they should first experience nature through their senses and be immersed in some component of the natural world. He proposes that “we aim to fit the values and loyalties of students to specific places before we equip them to change the world” (p. 97).

Advocacy for Using the Outdoors

As our society moves increasingly towards a technological and urban based environment, today’s teachers and students have less and less contact with the natural world. There is also a substantive body of research literature related to the beneficial

effects of nature on children's mental and physical health, behavior, and academic progress functioning (Hartig, Mang, & Evans, 1991; Kuo and Taylor, 2004; Tennesenn & Cimprich, 1995; Wells, 2000). More important to this study is the research concerning the effect of childhood experiences in the outdoors on the development of an appreciation of nature and pro-environmental attitudes and behaviors. Childhood interaction with the natural world has been shown to be a significant factor affecting people's long term concern for the environment (Ableman, 2005; Henley & Peavy, 2006; Louv, 2006; Tanner, 1998). It is commonly believed that how people feel about the environment is more significant than their knowledge of it. People will not work to protect that which they do not love. (Cachelin, A., Paisley, K., Blanchard, A., 2009; Chawla, 1998; Louv, 2006). Wray-Lake, Flanagan, and Osgood (2010) analyzed trends over three decades of high school seniors' environmental concerns and found a steep decline in pro-environmental behaviors since 1990. This coincided with a decrease in the amount of time children and young adults spend out-of-doors. Content focused education in a classroom setting, while it may provide knowledge of the environment and environmental issues, does not necessarily lead to pro-environmental behaviors. It does not provide the necessary opportunities for developing affective bonds with the natural world.

Developing in young children a sense of place is a critical first step in educating for the environment. Teaching children about the rainforest destruction, holes in the ozone, and oil spills before they have had an opportunity to connect with and appreciate the natural world in their own backyards and school grounds, leads to what Sobel (1996) terms 'ecophobia,' a fear of ecological problems and of the natural world. By trying to get young children involved in saving distant, unknown rainforests or dealing with such

abstract ideas as ozone depletion, educators create unnecessary anxiety and fear of the future. Educators must consider the developmental appropriateness of the environmental curricula that they teach. Prematurely involving children in trying to solve the world's environmental problems may cause them to feel overwhelmed and instill a sense of hopelessness. Many in the field of EE believe that, as Rachel Carson (1956) said, we must, at the start, build a “sense of wonder and love for the earth” through positive experiences in the natural world before children can be expected to consider complex global issues (Orr, 2004; Palmberg & Kuru, 2000; Simmons, 1998; Smith, 2007; Sobel, 1990; Sobel, 1996; Wells & Lekies, 2006).

A number of studies have been conducted to examine the relationship between childhood experience in nature and adult environmental behavior (Wells & Lekies, 2006). Based on interviews with approximately 2000 adults across the United States, Wells and Lekies (2006) found childhood outdoor experiences had significant positive effects on adult environmental attitudes and behaviors. “When children become truly engaged with the natural world at a young age, the experience is likely to stay with them in a powerful way—shaping their subsequent environmental path (p. 14).”

In addition to the effects of nature experiences on environmental attitudes and pro-environmental behaviors, there are numerous studies that indicate other important effects on children including academic, emotional, and psychological. Cronin-Jones (2000), S. C. Martin (2003), and Fisman (2005) all found positive effects of outdoor instruction on knowledge and awareness of environmental concepts and issues among elementary students as compared to traditional classroom instruction. Additionally, studies have found that outdoor education improves student performance in other subjects

and content areas.(Leiberman & Hoody, 1998) In their “Closing the Achievement Gap” report, the State Education and Environment Roundtable proclaim the benefits of using the environment as an integrating context for learning (EIC). They state that EIC increases students’ standardized test scores in reading, writing, math, science, and social studies; reduces discipline problems, increases student engagement and enthusiasm, and creates pride and ownership in learning (Lieberman & Hoody 1998). Other studies have also found time spent in nature improves children’s cognitive functioning (Hartig, Mang, & Evans, 1991; Tennesenn & Cimprich, 1995; Wells, 2000). Kuo and Taylor (2004) found attention deficit symptoms were reduced in children who participated in after school and weekend activities in natural settings. Additionally, stressful life events can be buffered by the proximity of natural areas to the child’s home, as shown in a recent study by Wells and Evans (2003). This study found stressful life events have less impact on psychological distress when children are able to spend time in natural areas.

In spite of the abundance of research that supports outdoor experiences for children, for a variety of reasons, teachers tend not to include outdoor activities in their instruction. Simmons (1998) found six specific barriers using outdoor settings to teach: appropriateness of teaching setting, teacher confidence, worries, need for training, hazards, and difficulty of teaching EE. Areas such as woods, ponds, streams, and marshes were deemed more appropriate for teaching than city parks and urban nature yet also raised the most concerns for teachers in terms of confidence, worries, and safeties. Teachers in the Simmons (1998) study expressed concern about students’ safety in terms of exposure to poisonous plants, insects, and getting lost. They also expressed their lack of confidence in effectively teaching in these setting as well as their own comfort level in

such environments. City parks and urban nature were not viewed as particularly suitable places for teaching EE, but carried far less worry and greater confidence. Other researchers found similar results. Rickinson, Dillon, Teamey, Morris, Choi., Sanders, *et al.* (2004), in a review of the literature on outdoor learning identified specific barriers to using the outdoors for teaching and learning which include concern for student health and safety, teacher confidence and expertise, curricular requirements, and lack of time resources and support. Similar results were reported by Dymont (2005), although in this study student safety did not emerge as a factor. Time, resources, and support also did not emerge as a factor, although it is likely due to the fact that the participating schools all had green areas on the school campus and field trips were not necessary.

Knowledge of Issues and Resources

It is a widely held belief that teachers' environmental attitudes play a critical role in their *willingness* to teach environmental education. (Cotton, 2006), and numerous studies have been conducted that attempt to measure teachers' attitudes towards the environment and environmental issues (Flogaitis & Agelidou, 2003; Moseley & Utley, 2008; Özden, 2008; Taylor, Doff, Jenkins, & Kennelly, (2007). However, while it is important to understand teachers' attitudes toward the environment, this understanding does not provide enough insight into the reasons environmental education is not an integral part of the elementary school curriculum. Having a positive environmental attitude does not ensure that a teacher will feel confident in her ability to teach EE and integrate environmental concepts into the curriculum, nor that she will promote, and develop in her students, positive stewardship skills. In order to ensure effective teaching of environmental concepts and issues, teachers also need a strong knowledge base and

confidence in their ability to teach EE. Teachers' lack of knowledge and confidence in the field are among the most often cited barriers to implementation of EE in the elementary classroom (Ernst, 2007; Plevyak, Bendixen-Noe, Henderson, Roth, & Wilke, 2001). A number of studies have been conducted to assess environmental knowledge and perception of pre-service teachers. Desjean-Perrotta, Moseley, and Cantu (2008) found that pre-service teachers lacked sufficient knowledge to be considered environmentally literate using the guidelines set forth by the North American Association of Environmental Educators (NAAEE). These findings were supported by Zak & Munson (2008) and Pe'er, Goldman, and Yavetz (2007). Studies on in-service teachers have had similar results (Groves & Pough, 1999; Summers, Kruger, & Childs, 2000; Zak & Munson, 2008).

Inadequate knowledge has been a strong criticism of EE. Critics contend that teachers are not content specialists and are not experts in all areas of the curriculum necessary to lead students in understanding multifaceted environmental issues (Hungerford, 2010). Environmental issues have many sides and perspectives and in order to accurately, fairly, and effectively teach EE according to the accepted definitions and hierarchy of knowledge, skills, attitudes, and behaviors, a teacher needs to have a wealth of knowledge in a range of disciplines, including natural science, economics, geography and culture, sociology, civics, and political science. She must also stay abreast of current and ever-changing research. It is an awesome task for which many teachers will admit they are ill-equipped. Where EE is not required content and teachers lack efficacy in teaching EE, it is unlikely that it will be taught at all.

To supposedly make teaching EE easier, there are a plethora of published units and activities readily available for classroom use. But these too are an area of tension and debate as a number of corporations and organizations on both sides of the debate create curricula intended to promote their specific point of view and market them to teachers. Environmental education units are sold by large oil, chemical, and coal companies, such as Shell Oil, DuPont, American Chemical Society, and American Coal Foundation; logging and forestry companies, such as International Paper and the Temperate Forest Foundation; environmental advocacy organizations, such as Greenpeace, Sierra Club, and Nature Conservancy; as well as professional science organizations such as National Science Teachers' Association. As can be deduced from this list, which barely scratches the surface, the opinions and environmental views promoted in curricular materials vary widely. Teachers do not always have the knowledge, time, or motivation to sift through these materials and evaluate those which present factual information in a fair and balanced manner. Accordingly, there is considerable concern and debate in the field of EE as to whether students receive accurate information.

Teacher Training and Support

Many researchers agree that the lack of pre-service and in-service teachers' training and lack of preparation during pre-service programs are high on the list of barriers to the effective implementation of EE in elementary schools (Ernst, 2007; McKeown-Ice, 2000; Miles and Harrison, 2006; Plevyak, Bendixen-Noe, & Powers, 2004). It is unlikely that many teachers have been exposed to environmental education in their pre-service preparation programs. Although this trend is being challenged with the inception of The Association for Science Teacher Education's (ASTE) Environmental

Education Committee, environmental education is still generally infused into science and science methods courses, thus lessening its significance and making it less likely that that new teachers would integrate environmental concepts and positive environmental attitudes into their lessons (Miles & Harrison, 2006; Plevyak, Bendixen-Noe, Henderson, Roth, & Wilke, 2001). Additionally, Plevyak, et al (2001) found even where pre-service teacher programs included EE content and methods, there was little continued in-service support.

Just as there are issues and barriers that limit implementation of EE in the elementary schools, there are issues and barriers to including EE in teacher preparation programs. Universities are bound by state legislatures and state boards of education in terms of what courses must be offered and what courses are required for students seeking teaching licensure. Because of this university faculty cite similar barriers as do classroom teachers. Powers' (2004) findings indicate the most significant barriers to infusion of EE into pre-service teacher education are:

- Limited time
- Standards and accountability pressures
- Political, controversial nature of EE
- Lack of in-service teacher role models
- Competition of other "special groups"
- Disposition of pre-service teachers (aversion to science, aversion to the outdoors)
- Faculty knowledge

A national study of teacher education programs (Heimlich, Braus, Olivolo, McKeown-Ice, & Barringer-Smith, 2004). was undertaken with findings similar to Powers (2004).

Regardless of the perceived value of adding EE to the teacher education program, internal and external demands in terms of required courses and content, in addition to perceived lack of faculty expertise, were the primary barriers to EE implementation.

CHAPTER III

METHODOLOGY

Research Design

This study utilized a non-experimental, mixed-method, descriptive design with both quantitative and qualitative data collection strategies (Creswell, 2009). A closed-ended questionnaire and semi-structured interviews were used to collect data on teachers' attitudes and self-efficacy concerning environmental education at the elementary school level. Participants for the questionnaire were randomly selected from K-5 public schools throughout the United States. Interview participants were volunteers from the questionnaire respondents.

Participants

Participant Selection

The participants for this study were drawn from the United States elementary school teacher population through random sampling. Using the United States regions designated by the US Census Bureau (West, Midwest, South, and Northeast), the states within each region were listed and numbered. Although some U.S. Census maps show Alaska and Hawaii as comprising a separate region, for this sample selection they were included with the western region. Using an on-line random number generator (<http://www.random.org>), five states were selected from each region. Lists of all elementary schools for each selected state were acquired, through on-line searches and from the state education departments. For each state, the schools were listed and again numbered beginning with one. Using the on-line random number generator, five schools

were selected from each of the 20 states. Principals at each of the selected schools were contacted via e-mail (see Appendix 1 for principal letter) to request permission for teachers to participate in this study. Follow-up emails were sent as needed. In each case where a principal refused participation or failed to respond after a third email notice and/or phone call, another school was randomly selected from that same state, again using the same numbered list and on-line random number generator. As compensation, principals were informed that all participating schools would be entered into a drawing for a two year subscription to *The Green Teacher*, an environmental practitioner journal for K-12 teachers. After securing principal permission, the K-5 regular education classroom teachers at each of the participating schools were contacted via e-mail, invited to participate, and provided a copy of the questionnaire cover letter (see Appendix B) and a link to the on-line questionnaire. In some cases, principals provided the teachers' email and in other cases the email addresses were secured from the school's webpage. A follow up email was sent to all teachers thanking them if they had already completed the questionnaire and asking them again to participate if they had not. Of the final sample of 609 teachers, 33% completed the questionnaire ($n = 201$). While this response rate seems low, Cook, Heath, and Thompson (2000) found, in an analysis of 49 web-based survey studies an average response rate of 39.6%. Overall, it has been reported that web-based survey response rates are 10% to 20% lower than traditional mail surveys (Leece et al., 2004; Mavis & Brocato, 1998). Accordingly, the sample size was adequate for this study.

Participants - Questionnaire

Questionnaire participants were all regular education teachers in grades kindergarten through fifth. The sample was predominantly female (92%) with teaching

experience that ranged from first year teacher to more than thirty years of experience. There was a relatively even distribution of teachers across the K-5 grade levels, with 67.7% teaching the primary grades (K-2) and 73.2% in intermediate grades (3-5). As these percentages show, approximately 41% of the participants taught two or more grade levels across both primary and intermediate grades. The percentages therefore do not add to 100%. The majority of the participants work in either rural or suburban schools in self contained classrooms, meaning they teach all the core content subjects. Just 25.4% work in a departmentalized setting, teaching only select subjects. Overall 71.6% currently teach science, either exclusively or with other core subjects. Two thirds of the schools at which the participants work are Title I schools with 83.5% having met AYP status in the most recent year for which the data was available. Demographic data collected concerning characteristics of the teachers and the schools at which they work are summarized in Table 1.

Table 1: Participant and School Demographic Data

		Response Percent	Response Count
Gender	Male	8%	16
	Female	92%	185
Years Teaching Experience	0-10	37.3%	75
	11-20	25.4%	51
	21-30	21.4%	43
	31+	15.9%	32

Table 1: continued

		Response Percent	Response Count
Current Grade Level*	K-2	67.7%	136
	3-5	73.2%	147
Currently Teach Science	Yes	71.6%	144
	No	28.4%	57
Grade Level Organization	Self Contained	74.6%	150
	Departmentalized	25.4%	51
School Setting	Rural	47.3%	95
	Suburban	39.3%	79
	Urban	13.45	27
Title I School	Yes	66.7%	134
	No	33.3%	67
AYP Status Most Recent Year	Met	83.5%	168
	Not Met	16.5	33

* Totals do not add to 201 or 100% as some teachers teach multiple grade levels.

Additionally, at the end of the questionnaire, participants were given the option to provide contact information if they were willing to participate in a follow-up interview.

Participants - Interviews

Twenty-four questionnaire respondents provided contact information and volunteered to be interviewed. All were contacted by email and/or phone to schedule the interviews. Of the 24 teachers only 16 (8% of total sample population) gave final agreement to be interviewed. The demographics of this group are summarized in Table 2.

Demographics of the interviewees are proportionately similar to entire sample. While this does not allow for generalizability of results, neither will the data be skewed.

Table 2: Interviewee and School Demographic Data

		Response Percent	Response Count
Gender	Male	0%	0
	Female	100%	16
Years Teaching Experience	0-10	37.5%	6
	11-20	31.25%	5
	21-30	25%	4
	31+	6.25%	1
Current Grade Level	K-2	37.5%	6
	3-5	62.5%	10
Currently Teach Science	Yes	75%	12
	No	25%	4
Grade Level Organization	Self Contained	56.25%	9
	Departmentalized	43.75%	7
School Setting	Rural	37.5%	6
	Suburban	56.25%	9
	Urban	6.25%	1
Title I School	Yes	56.25%	9
	No	43.75%	7

Table 2: continued

AYP Status Most Recent Year	Met	87.5%	14
	Not Met	12.5%	2

Instrumentation

This study employed a mixed-method research design. Quantitative data were collected through an on-line questionnaire. Qualitative data were collected through semi-structured interviews.

Views of EE Questionnaire

A 37 item Likert-type scale questionnaire was created and validated by the researchers for this study. The response categories used in the Likert-type scale were: 1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, and 5 = strongly agree. The questionnaire measures two constructs: 1) Teachers' Attitudes toward the Implementation of EE at the Elementary Level and 2) Elementary Teachers' Self Efficacy in Teaching EE. The first construct, *Attitudes*, has three subscales; *Advocacy for EE*, *Stewardship in Elementary EE*, and *Advocacy for Using the Outdoors*. This construct is measured with a total of 22 items. The second construct, *Self-Efficacy*, has two subscales, *Knowledge of Issues and Resources* and *Perceptions of Training and Support* and is measured with 15 items.

The validation process included an expert panel review, pilot testing (n = 12), and a field study (n = 201). A factor analysis was performed on the test data to establish construct validity. To establish reliability, multiple items were written for each construct

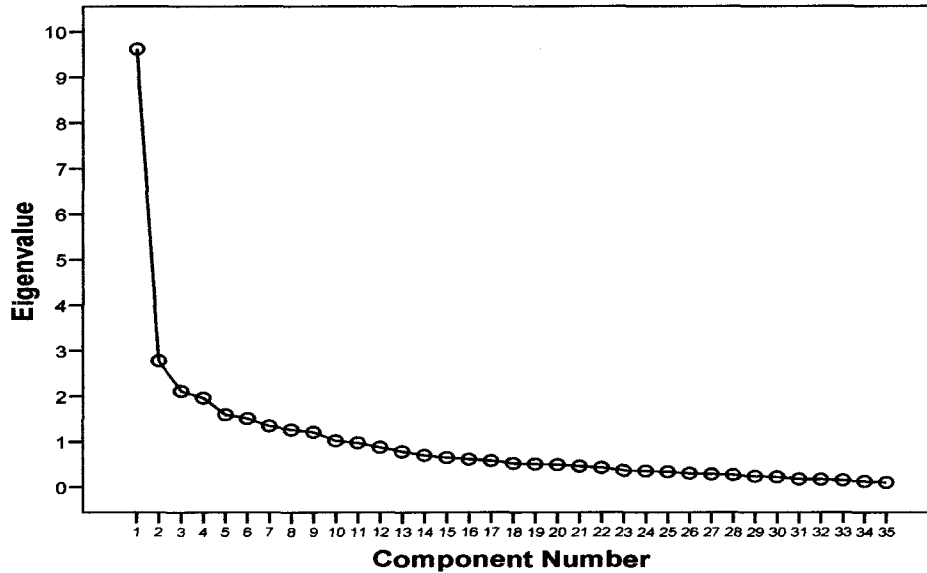
measured and internal consistency was estimated by Cronbach's alpha correlation coefficient on clusters of related items. Reliability was established for each of the scales.

The expert review panel consisted of: an Associate Professor of Teaching, Learning, and Technology Program and Lehigh Environmental Initiative and an Associate Professor of Science Education, both of whom have many publications in top tier environmental education and science education journals and have held leadership positions in professional organizations regarding environmental education on the national level; a Professor of Educational Foundations with expertise in survey development and an Assistant Professor of Science Education with expertise in K-12 science education, both of whom also have many publications in top tier journals; and a high school Honors Environmental Education teacher who has a wealth of experience in both secondary and undergraduate environmental education. Recommendations were made in regards to rewording, deleting, or adding other items that would enhance both the reliability and validity of the instrument. After suggested revisions were made, to further assess face validity, the questionnaire was then administered to a convenience sample of twelve K-5 teachers. Follow-up group interviews were conducted to assist in eliminating any ambiguous items or unfamiliar terminology.

The questionnaire was then administered to 201 randomly selected K-5 teachers. Using this field study data, a factor analysis was preformed to establish validity. A factor analysis was run separately for each of the two constructs; *Teachers' Attitudes* and *Self Efficacy*. The Attitudes section of the questionnaire consisted, at that point, of 36 items. Eigenvalues were plotted in their decreasing order. The resulting scree plot (Figure 1) indicates that there may be as many as ten factors, as ten eigenvalues are greater than one.

However, after the fourth or fifth component the line begins to flatten out and less and less variance is indicated.

Figure 1. Scree Plot for Teachers Attitudes



The analysis was run using four factors. In the analysis, eight items (items 5, 6, 12, 13, 18, 26, 30, and 33) did not clearly load on only one factor with a score $>.40$ and were therefore dropped. Table 3 provides the rotated component matrix. At this point in the questionnaire design, the first construct, *Attitudes*, had four subscales; *Advocacy for Environmental Education*, *Stewardship in Elementary EE*, *Advocacy for Environmental Protection*, and *Advocacy for Using the Outdoors*.

Table 3. Principles Component Matrix (Attitudes)

Questionnaire Item	Component			
	1	2	3	4
1. Environmental education should be an important component of the elementary school curriculum.	.314	.552		.368
2. Environmental education should be formally taught throughout the elementary grades, beginning in kindergarten.		.499		.337
3. Environmental education is more appropriate for the middle and high school level and less so at the elementary level.		.753		
4. Environmental education should not be formally taught until at least upper elementary.		.733		
5. Because of its interdisciplinary nature, environmental education is well suited for elementary school.*	.451	.482		
6. Elementary students should be encouraged to become activists for protecting the environment.*	.340	.309	.320	
7. Environmental education should teach only facts about the environment and not attempt to promote environmental stewardship.		.738		
8. Promoting positive stewardship needs to be a part of environmental education at the elementary level.		.767		
9. It is not the role of education to promote environmental stewardship.		.574		
10. The focus of environmental education should be to teach students to make informed decisions about environmental issues.	.489			
11. As part of the elementary curriculum, students should be taught to be environmentally conscious in their own homes (recycling, turning off lights not in use, conserving water, etc.)	.574	.349		

12. Environmental education should be taught primarily through the elementary science curriculum.*				
13. Environmental education should be considered a separate core subject in elementary school.*			-.429	-.425
14. Environmental education concepts should be integrated throughout the elementary curriculum.	.568	.308		
15. Environmental education can be integrated with math.	.695			
16. Environmental education can be integrated with language arts.	.797			
17. Environmental education can be integrated with social studies.	.792			
18. At the elementary level, it is sufficient to teach environmental education concepts only at specific times such as Earth Day and Arbor Day.*	.430	.491		
19. Environmental education should be integrated into both elementary social studies and science curricula.	.633			
20. Environmental education is best taught in an outdoor environment.				.538
21. Environmental education can not be taught effectively without taking students outside.			.309	.673
22. For safety reasons, environmental education instruction should not take place outdoors.	.305		-.505	
23. Teachers can provide appropriate simulations and other 'outdoor' experiences without leaving the classroom.	-.315			.493
24. For environmental education to be effective, students must be provided direct experiences with nature.	.366			.438
25. It is important that elementary students begin to understand their local environment and local environmental issues.	.641	.326		

26. When teaching elementary students about the environment, global and local issues are equally important.*	.376			
27. Students cannot understand global issues without first understanding the environmental issues in their own neighborhoods.	.518			
28. Teaching elementary students about global environmental issues is valuable.	.558	.311		
29. The primary focus of elementary environmental education should be global issues such as global climate change, rainforest destruction, and endangered species.			-.676	
30. The primary focus of elementary environmental education should be local environmental issues.*	-.346			
31. Teaching students about local environmental issues is valuable.	.709			
32. The world's remaining wilderness areas should be protected at all costs.	.369		.554	
33. Development decisions must strike a balance between the economic needs of society and the need for protection of the environment.				
34. The protection of the environment should take precedence over cultural needs.			.551	
35. The protection of the environment should take precedence over economic needs.	.340		.609	

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.
*dropped items

A separate factor analysis was run for the second construct, *Self-Efficacy*.

Although there were three subscales, or factors, hypothesized for this construct, a scree plot (Figure 2) indicated just two. Therefore, a factor analysis was run using two factors.

Table 4 shows that all items loaded clearly on one of the two factors at $>.40$. The resulting two subscales were *Knowledge of Issues and Resources* and *Training and Support*.

Figure 2. Scree Plot for Teacher Efficacy

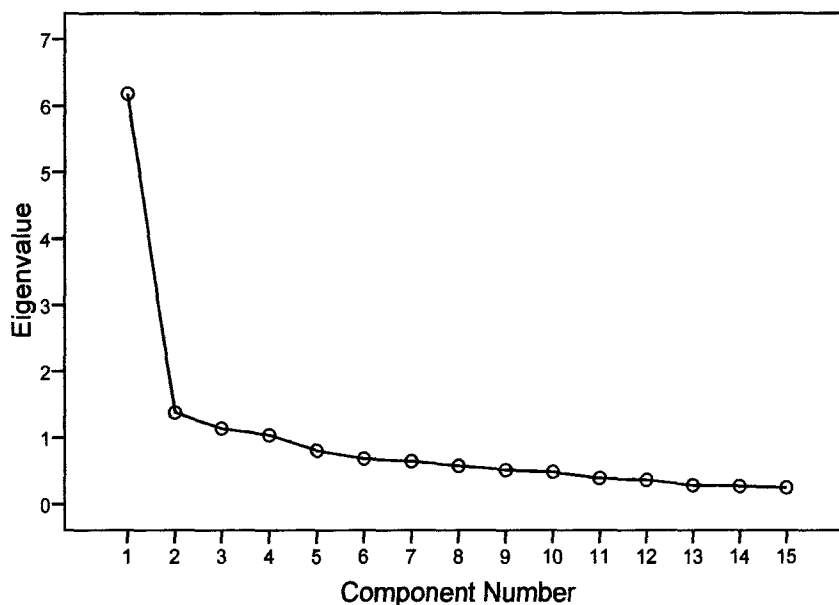


Table 4. Rotated Component Matrix (Efficacy)

Questionnaire Item	Component	
	1	2
36. I believe that I have adequate knowledge to teach environmental education.	.824	
37. I am knowledgeable about current local environmental issues.	.725	
38. I am knowledgeable about current global environmental issues.	.795	
39. I am not well prepared to teach environmental education.	-.683	
40. I know of many ways to integrate environmental education into the core curriculum.	.673	

41. I enjoy teaching students about the environment.	.510	
42. I am confident that I could evaluate environmental education resources for their accuracy and appropriateness.	.715	
43. I am confident in my ability to locate resources necessary for teaching environmental education.	.641	
44. I am unsure of where to find accurate resources to teach about local environmental issues.	.452	
45. I am aware of resources within my community to assist with teaching environmental education.		.665
46. I have received quality training in environmental education.	.587	
47. Teaching environmental education is encouraged by my principal.		.413
48. I have attended staff/professional development related to environmental education.		.779
49. My principal supports taking children outside for lessons related to the environment.		.544
50. I have resources available to me in my school district for teaching environmental education.		.795

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Reliability of the revised instrument was determined using Cronbach's alpha.

Test-retest was not practical for the sample population and the questionnaire was not long enough for a split-half reliability. Additionally there was no parallel form available with which to compare the results. Cronbach's alpha was the most appropriate reliability measure for the research design. The calculated Cronbach's alpha of the subscales for the first construct, *Attitudes*, were: *Advocacy for Environmental Education*, $\alpha = .86$; *Stewardship in Elementary EE*, $\alpha = .84$; *Advocacy for Environmental Protection*, $\alpha =$

.288; and *Advocacy for Using the Outdoors*, $\alpha = .538$. Due to the low reliability score for the *Advocacy for Environmental Protection* subscale ($\alpha = .288$), this subscale and its corresponding five items (# 22, 29, 32, 34, and 36) were deleted from the survey. The reliability coefficients of the subscales of the second construct, *Efficacy*, were: *Confidence in Knowledge of Issues and Resources*, $\alpha = .81$ and *Perceptions of Support and Training*, $\alpha = .73$. In summary, the factor analysis revealed that only 37 of the original items on the questionnaire had acceptable reliability coefficients. The renumbered items resulted in a final questionnaire consisting of 37 items. There are 26 items for construct *Teachers' Attitudes Toward Elementary EE* with an overall reliability score of $\alpha = .85$ and 11 items for the construct *Teachers' Efficacy in Teaching EE* with a reliability score of $\alpha = .78$. See Appendix IV for the final questionnaire.

Semi-Structured Interviews

Semi-structured interviews were used to gather more in-depth information from selected survey respondents. As participants were volunteers from a randomly selected sample from 25 states, it was necessary to conduct interviews by telephone or video conferencing. The opening script informed participants of the purpose of the study, how results would be disseminated and to whom, the promise of an expected level of confidentiality, and their rights as participants (Appendix V). Additionally, participants were read a Consent Narrative (Appendix VI) prior to being asked to consent to audio recording of the interview. With participant permission, all interviews were digitally recorded. Interview data were then transcribed for coding.

Interview questions with probes were developed to provide more in-depth and rich data than could be provided through a closed-ended questionnaire. An interview

protocol was created to ensure that questions aligned to questionnaire subscales and to enhance face validity (Table 5). Broad, open-ended questions were followed by more specific probes in order to explore the participants' frame of reference and gather more in-depth data unconfined by researchers expected answers and possible biases. See Appendix VII for the interview questions developed for this study.

Table 5. Interview Protocol

Subscale	Question numbers
Advocacy for EE	1, 2
Stewardship in EE	3
Advocacy for Using the Outdoors	4, 5
Knowledge of Issues and Resources	6
Training and Support	7, 8

Procedure

Questionnaire Administration

The questionnaire was administered through a secure on-line format using Survey Monkey. Upon receiving principal permission, teachers were contacted through their school e-mail, invited to participate in the study and provided the link to the questionnaire. To improve response rates, follow up emails were sent one week after the initial contact. The questionnaire was designed so that participants were required to answer all questions in order to submit their completed questionnaire, thus eliminating issues with missing data. The estimated time frame needed for completing the

questionnaire was approximately fifteen minutes. At the end of the survey, participants were given the option of providing contact information if they would be willing to participate in a follow up interview. Twenty-four participants provided contact information.

Semi Structured Interviews

Twenty four questionnaire respondents provided contact information. An email was sent to each one asking if they would be willing to be interviewed and to provide a phone number or Skype contact and a date and time which would be convenient for them. For those that provided a phone number with their contact information, a follow up call was made in cases where they did not respond to the email. Sixteen teachers agreed to an interview and a schedule was created. Interviews, which ranged from 25 minutes to an hour and fifteen minutes, were conducted via telephone or Skype and digitally recorded. Average interview time was 40 minutes. Interviews were transcribed verbatim for analysis.

Protection of Participants

In order to protect the privacy of the participants, no identifying information was requested on the questionnaire. A cover letter (Appendix III) was included in the contact e-mail and at the start of the questionnaire providing an explanation of the research purpose and how these data will be used, a description of how confidentiality will be maintained, a statement to the effect that a participant can refuse to participate, and contact information for the primary investigator. Also included in the cover letter was a statement explaining that the researcher will exercise every caution to prevent access by others to questionnaire data in their possession and will use the data for no purposes other

than those of the current study. As completion of the questionnaire provides implicit consent, the cover letter also contained wording that states: “by completing and submitting the questionnaire you have shown your agreement to participate in the study.” Additionally, interviewees were asked for their permission to be mechanically recorded. The audio recordings include their verbal permission as well as the interviewer’s statement concerning confidentiality.

Analysis of the Data

Views of EE Questionnaire

Quantitative questionnaire data were downloaded from Survey Monkey into an Excel spread sheet, coded, and entered into SPSS for analysis. Frequencies were computed on all items to check for missing or inaccurately entered data. However, because the questionnaire was designed so that respondents must answer all questions in order to submit, missing data was not an issue. Data was also spot checked for accuracy of entry into SPSS by a second reviewer. Descriptive statistics were computed for each scale and items within scales. Percentages, means, and distributions of responses were examined. ANOVA was employed to test the differences in attitudes among the independent variables of school demographic (rural, suburban, urban), instructional organization (self contained, departmentalized), teaches science, and years of teaching experience,

Semi-Structured Interviews

Interview data were mechanically recorded and transcribed verbatim. Transcribed interviews were examined for possible themes, patterns, categories, and relationships (Patton 2002, p. 453) within the context of the questionnaire blueprint and the research

questions. The researcher listened to the audio recordings while reading the transcription to check for errors. Mental notes were made of repeated words or phrases and possible emerging themes or patterns. After the transcriptions were checked, a second reading of the interview data provided a general feel for the data as a whole. During this second reading, the initial coding process began with highlighting key phrases and statements to define categories. A third reading, with those initial categories in mind, was completed to assess how well the data fit and whether or not any key ideas had been missed. To guard against researcher bias, a second, independent reviewer was asked to review and code 20% (n=3) of the interview data. Coding was compared, discussed, and an inter-rater reliability of 100% was obtained. Participant statements were selected that were representative of the data categories and were aligned with the research questions.

CHAPTER IV

RESULTS

This chapter presents the results from the Teachers' Views of EE questionnaire and the follow up semi-structured interviews. The study employed a mixed-method design in which elementary teachers (n = 201) responded to a questionnaire and from that group selected teachers (n = 16) participated in follow-up interviews. Such concurrent triangulation analyzes data from different collection methods to develop trustworthiness in research findings (Creswell, 2003). After data collection, the quantitative (questionnaire) and qualitative (interviews) data were analyzed separately. Questionnaire data were analyzed using Statistical Package for the Social Sciences (SPSS) 15.0 software. Descriptive and inferential statistics were utilized. Qualitative data from the interviews were compiled and organized into categories. All data were then analyzed and compared in context of the research questions:

1. What are elementary teachers' attitudes toward teaching EE at the K-5 level?
2. To what extent do elementary teachers think stewardship and pro-environmental behaviors should be taught?
3. To what extent do elementary teachers think that using the outdoors is necessary to teaching EE?
4. What degree of confidence do elementary teachers have in their ability to teach EE?
5. To what extent are elementary teachers aware of and have access to quality EE resources?

6. How well do elementary teachers think they are trained and supported in teaching EE?
7. Do elementary teacher attitudes and confidence vary as a function of demographic characteristics?

Views of EE Questionnaire

The Views of EE questionnaire addressed two constructs; *Teachers' Attitudes Toward Elementary EE* and *Teachers' Efficacy in Teaching EE*. The first construct, *Attitudes*, has three subscales; *Advocacy for EE*, *Stewardship in EE*, and *Advocacy for Using the Outdoors*. The second construct, *Efficacy in Teaching EE*, has two subscales; *Confidence in Knowledge of Issues and Resources* and *Perceived Support and Training*. These subscales align with the research questions. Preliminary data screening revealed that there were no missing or implausible data. Descriptive statistics were computed for each scale and items within scales/ Distributions of responses were examined. Tables 7 through 11 summarize the means and response percentages for each of the five subscales.

Semi-Structured Interviews

Follow-up interviews with approximately 8% (n=16) of the study sample were used to enhance and support the questionnaire findings. The eight interview questions were aligned with the questionnaire subscales and the research questions. Table 6 provides the interview blueprint.

Table 6. Interview Blueprint by Research Question

Subscale	Question numbers
Research question 1: Advocacy for EE	1, 2
Research Question 2: Stewardship in EE	3
Research Question 3: Advocacy for Using the Outdoors	4, 5
Research Question 5: Knowledge of Issues and Resources	6
Research Question 6: Training and Support	7, 8

All sixteen interviews were transcribed verbatim. All interview data were first read through in its entirety to get a sense of the whole. A second read began the coding process as I highlighted and made notes; looking for emerging categories, relationships, vocabulary, and repeated ideas. Transcripts were again read with the categories in mind to further assess the relevance of the categories selected. Data were sorted and reduced. Data relevant to the research questions were sifted from that which was not. Using Microsoft Word, I cut and pasted data into categories and topics. Cases were compared and contrasted to determine if the topics were relevant to all or most cases and would provide a holistic picture. The final coding categories organized by interview question are presented in Table 7. Interviewees' statements were selected that were representative of these categories and organized according to the research questions.

Table 7: Interview Data Coding Categories by Interview Question

Interview Question *	Categories derived from the data	Number of interviewees
In what ways do you address EE concepts in your teaching (types of lessons, activities)? How often, how long?	<ul style="list-style-type: none"> • Earth Day, Arbor Day • Class gardens • Prepared unit (Project Wild, etc) • Time constraints • Not in curriculum 	12 6 6 13 9
How comfortable are you in your ability to effectively teach about local EE issues? Global EE issues?	<ul style="list-style-type: none"> • Lack knowledge • Lack training • Not in curriculum • Time constraints 	14 11 7 8
Interview Question *	Categories derived from the data	Number of interviewees
In what ways do your values/beliefs appear in your EE lessons? How do you feel about this?	<ul style="list-style-type: none"> • Unavoidable • Caution/cautious • Controversy 	9 13 9
What are your thoughts on taking students outside for lessons concerning the environment? For other activities?	<ul style="list-style-type: none"> • Appropriate environment • Time constraints • Behavior • Not thought about 	9 12 10 8
What are the benefits to children of having direct contact with nature? How important is the nature-child connection?	<ul style="list-style-type: none"> • Health (physical, emotional) • Obesity • Care for environment • Too much technology 	16 7 12 9
What types of resources are available to you for teaching EE? Which ones do you use most and why?	<ul style="list-style-type: none"> • Informal EE (zoos, parks, museums, etc.) • Prepared unit (Project Wild, etc) • Community • Internet 	7 8 8 13
Tell me about training or staff development you have had related to EE. How useful was that training? If quality training was offered, would you take it?	<ul style="list-style-type: none"> • None • Project Wild, Project Wet • GLOBE • Need/want training 	15 4 5 16
Describe your state/district's EE plan, if they have one. How do the administrators in your district demonstrate support of EE?	<ul style="list-style-type: none"> • Don't know • Little/no support • Not discouraged 	12 11 14

Results by Research Question

Research Question 1: What are elementary teachers' attitudes toward teaching EE at the K-5 level?

From the Teachers' Views of EE Questionnaire, the *Advocacy for EE* subscale contained 13 items. Items 1 through 4 addressed the importance of teaching EE at the elementary level, items 10 through 13 examined the extent to which teachers think EE can be integrated into the elementary curriculum, and items 20 through 23 examined the extent to which teachers think elementary students should learn about local and/or global environmental issues. Table 8 provides a summary of the participant responses for these 13 items.

Table 8. Advocacy for EE – Response Percentages and Means

Questionnaire Item	SD	D	U	A	SA	Mean
1. Environmental education should be an important component of the elementary school curriculum.	1.0	2.5	7.0	65.2	24.4	4.1
2. Environmental education should be formally taught throughout the elementary grades, beginning in kindergarten	2.0	10.4	13.4	54.7	19.4	3.8
3. Environmental education is more appropriate for the middle and high school level and less so at the elementary level.*	3.5	15.4	19.4	52.2	9.5	3.5
4. Environmental education should not be formally taught until at least upper elementary.	2.0	20.4	15.4	47.8	14.4	3.5
10. Environmental education concepts should be integrated throughout the elementary curriculum.	2.0	3.0	11.4	67.7	15.9	3.9

11. Environmental education can be integrated with math.	2.0	4.0	19.9	68.2	6.0	3.7
12. Environmental education can be integrated with language arts.	1.5	0	6.0	81.1	11.4	4.0
13. Environmental education can be integrated with social studies.	1.5	1.0	6.0	76.1	15.4	4.0
14. Environmental education should be integrated into both elementary social studies and science curricula.	1.0	5.0	12.4	69.2	12.4	3.9
20. It is important that elementary students begin to understand their local environment and local environmental issues.	1.0	1.0	5.5	70.1	22.4	4.1
21. Students cannot understand global issues without first understanding the environmental issues in their own neighborhoods.	1.0	10.9	21.9	55.2	10.9	3.6
22. The primary focus of elementary environmental education should be global issues such as global climate change, rainforest destruction, and endangered species.*	0.5	26.4	28.4	40.8	4.0	3.2
23. Teaching students about local environmental issues is valuable.	1.0	1.5	1.5	80.1	15.0	4.1

* reverse scored items

While the mean varied between 3.2 and 4.1, for each of the 13 items, the mode for each item was 4 (agree). Along with the percentages of responses as agree or strongly agree, these data indicate teachers think EE has a place in the elementary school curriculum. The high percentages of agreement on items 10 through 14 also indicate teachers think EE concepts can be easily integrated into the elementary curriculum, particularly science, social studies, and language arts. Item 11 addresses integration into

the math curriculum. While it was rated less positively than the other content areas, it was rated 'agree' or 'strongly agree' by nearly two-thirds of the teachers sampled.

Additionally, twelve of the 16 interview respondents, when asked how they address EE concepts in their teaching, readily gave several examples of topics, units, or activities they address with their students. All core content areas were represented. However, while the teachers were generally enthusiastic, the examples provided did not indicate that EE was an integral part of the curriculum, but rather consisted of a scattering of isolated projects or events.

"We do a unit every year for Earth Day. It lasts about a week ending on Earth Day. It's school wide and each classroom takes on a project... stuff like planting a garden, Kindergarten always raises butterflies and turns 'em loose. Some groups go out and pick up trash. We have guest speakers and a bunch of stuff."

"During our soils unit, we visit a local farm and they talk to the kids about conservation..... soil conservation. That's one thing. We have a little garden they take care of. I don't know if that counts. We also just teach things like turning off lights when you're not using them, not letting the water run, just using one paper towel.... Those kinds of things."

"Well, I don't do as much as I'd like to..... I just don't have time. Sometimes Scholastic News will have an article about something and I can spend a little more time on it. Discuss it with the kids. I'm a real advocate, so I sneak it in when I can, but it's not part of the curriculum. Our school always does an Earth Day celebrations.... You know... but that's just one day."

"We talk about pollution, global warming, and stuff when we do our biomes unit..... a little bit. They learn about how we are losing more and more habitat. Um.... What else? Well, just as things come up in the news we talk about it too. But mostly I just try to get some of it into my habitats and biomes unit when I have time"

"Oh, I don't really do much with environmental stuff. I teach 5th grade math and I'm pretty locked in... you know... specific text, timeline, test prep....we have pacing guides we have to follow and it doesn't leave much time. I think it's important though. They might get some in science, but I know it's not in the standards."

Questionnaire items 20 through 24 asked teachers their views on global and local environmental issues. Item 22 which was related to teachers' views of the importance of including global environmental issues (such as global climate change, rainforest destruction, and endangered species) in the elementary curriculum had a low agreement response and 28.4% were uncertain. Item 20, "It is important that elementary students begin to understand their local environment and local environmental issues" had a 92.5% agreement from the survey respondents. Additionally, Item 23 which states, "Teaching students about local environmental issues is valuable" had a 96% agreement rating. Taken together, these three items indicate the majority of the teachers in this sample think local environmental issues were more important to include in the elementary curriculum than global issues. While, this view was supported by interview data, respondents' comments also demonstrated a lack of comfort in their ability to teach about environmental issues.

"I like to talk to them about what's going on in their community. I'm not sure I know as much about local issues as I should. You know, just what I read in the paper and stuff."

"I'm not comfortable with it really. I teach 2nd grade and they're pretty young. And I don't feel all that knowledgeable myself. I don't throw the big issues at my students anyway. Global warming and the plight of polar bears... it's a bit too much. They're not ready for that. ...They're just too young. I think it instills fear."

"I teach environmental concepts all the time, but *issues*? I don't know. I don't do big units on global warming and stuff, but my kids know they should conserve energy and water and the importance of recycling. That's all part of our daily classroom stuff."

Well, I'm not 100% comfortable. It's pretty complex and I not sure of my own understanding. But I don't think my kids are ready for big environmental issues like global warming anyway. It scares me! I'm sure it would worry them..... I don't really get into *issues* at all. Not where there's controversy"

Well, I don't know..... I guess it's not so much an issue of how comfortable I am. I just don't have time. I don't have time to teach it or really to research it like I should in order to teach it."

The overall mean for the *Advocacy for EE* subscale was 3.8., demonstrating a somewhat positive attitude of elementary teachers toward EE. While the interview data generally supports a pro-EE attitude, it is unclear from their statements that teachers are actually integrating EE concepts into their teaching.

Research Question 2: To what extent do elementary teachers think stewardship and pro-environmental behaviors should be taught?

Six questionnaire items measured the extent to which teachers think that stewardship and pro-environmental behaviors should be a part of elementary EE. Table 9 provides the response percentages and means for these items. Items 5 and 7 were reverse scored items.

Table 9. Stewardship in EE - Response Percentages and Means

Questionnaire Item	SD	D	U	A	SA	Mean
5. Environmental education should teach only facts about the environment and not attempt to promote environmental stewardship.*	1.0	14.4	17.4	52.2	14.9	3.7
6. Promoting positive stewardship needs to be a part of environmental education at the elementary level.	0.0	8.0	15.0	61.2	14.9	3.8
7. It is not the role of education to promote environmental stewardship.*	1.5	10	17.4	54.2	16.9	3.8
8. The focus of environmental education should be to teach students to make informed decisions about environmental issues.	0.0	2.0	10.9	62.7	24.4	4.1

9. As part of the elementary curriculum, students should be taught to be environmentally conscious in their own homes (recycling, turning off lights not in use, conserving water, etc.).	0.0	1.0	2.0	63.2	33.8	4.3
24. The world's remaining wilderness areas should be protected at all costs.	2.5	15.9	35.8	32.8	12.9	3.4
25. The protection of the environment should take precedence over cultural needs.	5.0	33.3	44.3	18.9	3.0	2.9
26. The protection of the environment should take precedence over economic needs.	3.0	27.9	46.3	20.9	2.0	2.9

* disagree/strongly disagree for reverse scored items

Items 5, 6, and 7 each state in different ways that environmental stewardship should be taught and promoted at the elementary level. The positive response percentages demonstrate that the majority of the teachers in the sample are in agreement. For each of these items there was a 15 to 20% uncertainty with just 15.5%, 8%, and 11.5% disagreement in the responses for items 5, 6, and 7 respectively.

Items 8 and 9 dealt more specifically with personal decision-making and every day behaviors, such as recycling, turning off lights, and conserving water. Both of these were strongly supported, with 87.1% and 97% agreement.

The final three items in this subscale measured the extent of teachers' pro-environmental attitude. These Items stated: "The world's remaining wilderness areas should be protected at all costs," "The protection of the environment should take precedence over cultural needs," and "The protection of the environment should take precedence over economic needs." These statements represent a more extreme

environmental stewardship view and a lower percentage of positive responses was expected. The uncertainty among teachers on these statements, however, was quite high with 35.8% uncertain on Item 24, 44.3% uncertain on Item 25, and 46.3% uncertain on Item 26. The overall mean for this subscale was 3.6 indicating an agreement that students should be taught stewardship skills..

The interview questions that were aligned with this questionnaire subscale attempted to provide greater insight into teachers' views, not just on promoting stewardship, but how their own personal values and beliefs concerning the environment appear in their lessons and how they felt about that. The following statements are representative of the interview data.

"I consider myself an environmentalist. And I'm sure my students know where I stand - for the most part. But I do have to be careful. Some of the local issues can get pretty heated. I don't want some irate parent coming in accusing me of indoctrinating their child. But I have no problem teaching basic things like conservation of energy, you know, turning off lights when they're not using them, not wasting water, recycling. Those kinds of things"

"Hmmm.. I don't know/... I don't preach or try to make the kids think like I do. It's ok if they know my take on things as long as I present all sides. I would hope that my teaching allows students to make up their own mind."

"I think it's okay for the kids to know how I feel, but..... well... I don't know. I guess issues where there's a lot of controversy I should be less....um, I should probably be careful. I can't imagine, though, that anyone would think it's wrong to teach kids to care for the Earth."

"I'm always cautious about controversial issues. And global warming is a controversial issue,"

"I try to keep my personal views out of it. I stay away from anything that's going to get me in trouble with the parents."

"They [students] definitely know I'm an environmentalist. I don't think that's wrong. I don't push kids to take sides or anything, but I want them to care about the environment."

This data pertaining to research question 2 suggests that while teachers agree that students should be taught to be good stewards of the environment in their everyday behavior (ie. turning off lights, recycling etc.), teachers are less comfortable with promoting a pro-environmental attitude on issues where controversy may exist. Overall, teachers stated they want their students to care about the environment.

Research question 3: To what extent do elementary teachers think that using the outdoors is necessary to teaching EE?

This questionnaire subscale, Items 15 through 19, assessed teachers' views of the importance of using the outdoors in teaching EE. The response percentages and means for these items are presented in Table 10.

Table 10. Advocacy for Using the Outdoors - Response Percentages and Means

Questionnaire Item	SD	D	U	A	SA	Mean
15. Environmental education is best taught in an outdoor environment.	2.5	41.8	32.3	20.9	2.5	2.8
16. Environmental education can not be taught effectively without taking students outside.	4.0	42.3	14.4	34.8	4.5	2.9
17. For safety reasons, environmental education instruction should not take place outdoors.*	0.0	2.5	14.9	64.2	18.4	4.0
18. Teachers can provide appropriate simulations and other 'outdoor' experiences without leaving the classroom.*	4.0	62.2	18.4	14.9	0.5	2.5
19. For environmental education to be effective, students must be provided direct experiences with nature.	1.0	22.4	16.9	50.7	9.0	3.4

* disagree/strongly disagree for reverse scored items

The total mean for this subscale was 3.1. The low percentage of agreement for these items indicates that many teachers do not believe it is necessary to take students outside for quality environmental instruction. The higher positive response percentage for Item 17, however, suggests that safety was not a significant concern.

Interview data provided greater insight into teachers' use of the outdoors. Teachers were asked their thoughts on taking students outside for EE lessons. The following responses are representative of the data collected.

"I like to take my students outside, but it's not always easy. Time is a big factor. Discipline another. They go outside they think it's recess."

"I take them out every so often...not necessarily for lessons on the environment 'cause I teach math. But yeah, I think kids need to get out and they need the chance to move around."

To be honest, I rarely take them outside except for recess. I think kids need to get out to play and I'm sure they don't enough.... Wow, you really got me thinking about it now. I'm pretty quick to agree that kids need to spend more time outside. So why not have some classes outside? I should do that more."

"I remember the questions about that on the survey... thinking I wanted to explain my answer. I think it's really good to do environmental lessons, or any lessons, outside and I do. But I don't really think you *have* to. I think you can still do a good job right in the classroom. You know, because not all schools have the right kind of outdoor space."

: I don't know. I guess I never thought about it too much. My school's in the city so.....I don't know. I probably should take them out more. We have good grass space. You know, they go out for recess. I've never taken them out as part of instruction. I think I will though. Thanks!"

Oh my God, I *love* taking my kids outside! I think teachers should do it more. We go out to read, to write.... there's a zillion math lessons that can be done outside. We actually have a little outdoor classroom area. A garden, benches...we have a pond... I use it all the time!"

Among the survey respondents the most often stated reasons for not taking students outside for lessons were transition time, behavior, and they simply had not

thought much about it. Safety, allergies, medical issues, and the like were mentioned by only one interviewee who stated that she had a student allergic to grass.

Interviewees were then asked “What are the benefits to children of having direct contact with nature? How important is the nature-child connection?”

“It’s good for their health, it’s good for their state of mind. I don’t think kids get enough of that anymore. But they mostly need to just go out and play. Use their imaginations. It’s important. They’re not going to care about the environment if they have no connection with it.”

“They understand their world better. I see a difference in kids today that don’t get outside much. There much more high strung. I think nature slows kids down, calms them down.”

“It just makes them healthier all around. Kids who play outside a lot seem to be physically healthier and emotionally.”

It’s critical. I guess I really should take them outside more for class. I don’t know how much they go out after school, but I think not much.”

Although there was a low agreement response for the need to take children outside as part of instruction, interviewed teachers overwhelmingly (100%) indicated spending time outdoors is critical to children’s emotional and physical health. Twelve of the interviewees (75%) also made reference to the connection between time spent in nature and the development of pro-environmental attitudes.

Research Questions 4 and 5: What degree of confidence do elementary teachers have in their ability to teach EE? To what extent are elementary teachers aware of and have access to quality EE resources?

The next subscale of the questionnaire assessed elementary teachers’ self efficacy in teaching EE and provided data for two of the research questions for this study. Items 27, 28, 29, and 30 pertained to teachers’ confidence in their own knowledge and ability to

teach EE. Items 31 – 33 assessed teachers' confidence in locating appropriate resources within their school district and community to teach EE. Table 11 provides a summary of the results for this subscale.

Table 11. Self Efficacy in Teaching EE- Response Percentages and Means

Questionnaire Item	SD	D	U	A	SA	Mean
27. I believe that I have adequate knowledge to teach environmental education.	1.5	22.4	28.4	42.8	5.0	3.3
28. I am knowledgeable about current global environmental issues.	1.0	15.9	22.4	58.2	2.5	3.5
29. I am not well prepared to teach environmental education.*	3.0	35.3	29.4	28.4	4.0	3.0
30. I enjoy teaching students about the environment.	0.0	2.5	4.0	68.2	25.4	4.2
31. I am confident in my ability to locate resources necessary for teaching environmental education.	1.0	13.4	23.4	55.2	7.0	3.5
32. I have resources available to me in my school district for teaching environmental education.	5.0	14.4	47.3	29.4	4.0	3.1
33. I am aware of resources within my community to assist with teaching environmental education.	2.0	20.4	27.4	45.8	4.5	3.1

* disagree/strongly disagree for reverse scored items

Although 93.6% of the teachers surveyed stated they enjoy teaching students about the environment, less than half (47.8%) indicated they believed they had adequate knowledge to do so. Responses to item 29 (reverse scored) indicate only 32.4% think

they have been well prepared to teach EE. Additionally 19.4% state that they do not have EE resources in their school district, An additional 47.3% are uncertain. Knowledge of EE resources available in the community was indicated by 51.3% of the respondents, while only 33.4 knew of available resources within the schools. The total subscale mean was 3.4.

To gain further insight, interviewees were asked "What types of resources are available to you for teaching EE? Which ones do you use most and why?" Responses indicated a much greater use of community resources than resources offered within the school district..

"Gosh, I don't know..... I can't really think of any. Like units and stuff? I just put together my own stuff using internet and books that I have personally."

"We have some units like Project Wild and Project Wet. I think they're kinda old, but they're good. I use those some. Um, let's see.....the local park service, Cooperative Extension Agency..... The zoo. ... I guess I use internet mostly."

"Mostly I access stuff on line. EPA has good resources, NOAA, stuff like that. There are some good books in our library. And a few community resources like the Agricultural Extension Office, and the..... I forget what it's called. A fishery place..... Oh, and the water treatment plant. I've taken kids there. And the zoo. But that's a major field trip. We have to leave at something like 6:00 in the morning."

Actually, our school has a nice outdoor classroom. I use that a lot. There's a butterfly garden, pond, a little trail out in the woods and a creek. It's really nice. We got a grant for it. And then of course the local places like the water treatment plant, local parks. The rangers will come to the school to do something or we can go there. We have a university nearby with a good science department. And there's lots of stuff available on line. I use internet resources all the time."

Of the 16 interviewed teachers , 8 (50%) referred to published unit such at Project Wild, and Project Wet, and a variety of made for teacher resource books. Seven (44%) of them did not name any print resources but spoke only of local places and organizations such as parks, zoos, and water treatment plants. Schoolyard sites such as ponds, gardens, and

outdoor classrooms were identified by 5 of the 16 (31%). Additionally, 13 out of 16 (81%) referred to internet as a resource.

Research Question 6: How well do elementary teachers think they are trained and supported in teaching EE?

The final subscale of the questionnaire *Perception of Training and Support* contained four items that spoke to staff development and administrative support in teaching EE. Questionnaire data are summarized in Table 12.

Table 12. Perception of Training and Support – Response Percentages and Means

Questionnaire Item	SD	D	U	A	SA	Mean
34. I have received quality training in environmental education.	13.0	59.2	13.4	11.4	2.0	2.3
35. Teaching environmental education is encouraged by my principal.	4.0	21.4	44.3	27.9	2.5	3.0
36. I have attended staff/professional development related to environmental education.	15.9	57.2	7.5	16.9	2.5	2.3
37. My principal supports taking children outside for lessons related to the environment.	3.5	3.0	30.8	53.7	9.0	3.6

* disagree/strongly disagree for reverse scored items

Items 34 and 36 were related to EE staff development and training. These data shows that the majority of the teachers surveyed reported they had not received staff development for teaching EE. The means for each of these items was 2.3. For these two items, the percentage of agreement (either agree or strongly agree) was just 13.4% and

19.4% respectively. The mean for these 4 items together was 2.8 indicating a lack of training and support for the majority of the surveyed teachers.

Interview question 7 asked teachers about staff development related to EE. Of the 16 teachers interviewed, 15 (93.75%) stated they have received little or no staff development related to EE either as a pre-service teacher or at any point throughout their career.

“I haven’t had any.”

“I’ve never had any specifically for environmental education.”

“I don’t think I’ve ever had any.”

“Years ago, in the 90’s I think, I took a Project Wild workshop. But it wasn’t through the school system.”

Interviewees were then asked “If quality training was offered, would you take it?” All 16 teachers stated they would.

Items 35 and 37 were related to teachers’ perceptions of support by their principals for EE. More than half of the participants (62.7%) agreed their principals support taking children outside for EE lessons while just 30.4% agreed their principals encourage EE. However, 44.3% of the respondents were uncertain as to whether or not EE was encouraged by their principals.

To gain greater insight, interviewees were asked to describe their state/district’s EE plan, if they have one. Of all 16 teachers who were interviewed, 12 (75%) did not know whether or not their state or district had an environmental education plan. Two of the teachers interviewed stated there was a state EE plan, but they did not think that other teachers or their district administrators were even aware of it. They also admitted they themselves did not know what it entailed. Just two interviewees were able to actually

describe their state's EE plan. They also indicated, however, it was not incorporated or supported within their school district. These 16 teachers were then asked in what ways administrators in their district support EE. It was evident from the responses that, in most cases, while their administrators did not outwardly discourage EE, neither did they do anything to encourage or openly support it. Four of the teachers stated they did not know if administrators supported EE or not.

"I don't see any support at all. Truly..... it's all about test scores."

They don't. Not that I know of anyway. I doubt they even think about it."
They don't really *support* it. But they don't *not* support it either. Does that make sense?

"They would probably support it if they could see how it affects test scores."

"Hmmm..... That's hard to answer. They pretty much support everything we do. But I couldn't really say any way they support environmental education specifically"

These data for this research question clearly indicate the teachers in this sample do not believe that they are well trained for, or supported in, the teaching of EE. .

Research question 7: Do elementary teacher attitudes and efficacy vary as a function of demographic characteristics?

Finally, questionnaire data were analyzed to determine relationships between the five subscales and teacher and school demographics. Four independent variables were examined; school demographics (rural, suburban, urban), years of teaching experience (1-10, 11-20, 21-30, 31+), whether they taught science (yes, no), and their current grade level (K-2, 3-5). Descriptive statistics for each scale by demographic item are summarized in Table 13.

Table 13. Means and Standard Deviations of the five questionnaire subscales with respect to school demographic, years teaching experience, and science teaching

	<u>School Demographic</u>						<u>Currently Teaches Science</u>			
	Rural		Suburban		Urban		Yes		No	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Advocacy for EE	3.73	.49	3.89	.42	3.88	.43	3.83	.47	3.77	.43
Stewardship in EE	3.53	.05	3.67	.05	3.74	.09	3.65	.50	3.47	.45
Using the Outdoors	3.13	.49	3.13	.52	3.07	.55	3.13	.51	3.09	.51
Knowledge of Issues & Resources	3.29	.50	3.49	.48	3.53	.43	3.40	.52	3.41	.41
Support & Training	2.79	.62	2.89	.62	2.69	.74	2.86	.66	2.71	.56

	<u>Years Teaching Experience</u>							
	1-10		11-20		21-30		31+	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Advocacy for EE	3.75	.50	3.74	.42	3.78	.39	4.07	.43
Stewardship in EE	3.56	.48	3.45	.48	3.64	.45	3.87	.49
Using the Outdoors	3.13	.52	3.09	.45	3.20	.59	3.05	.44
Knowledge of Issues & Resources	3.33	.51	3.38	.54	3.38	.44	3.40	.38
Support & Training	2.63	.64	2.80	.70	3.01	.53	2.82	.59

	<u>Current Grade Level</u>			
	K-2		3-5	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Advocacy for EE	3.80	.43	3.82	.49
Stewardship in EE	3.65	.50	3.57	.49
Using the Outdoors	3.09	.48	3.15	.53
Knowledge of Issues & Resources	3.43	.43	3.38	.54
Support & Training	2.77	.64	2.85	.64

For each of the independent variables, means within each subscale show very little difference. Teachers across the school types of rural, suburban, and urban appear to have very similar views in their attitudes toward, and efficacy in, teaching EE. Current grade level taught and whether or not a teacher is currently teaching science would appear to have little effect as well, as the means for these groups are also very similar. There is a greater variance in means among the years of teaching experience groups than the other independent variables with the '31+ years' group showing slightly higher means for the first two subscales, *Advocacy for EE* and *Stewardship in EE*.

A one-way ANOVA was conducted to evaluate possible differences between the questionnaire subscale means and each of the four different independent variables; school demographics (rural, suburban, urban), years of teaching experience (1-10, 11-20, 21-30, 31+), currently teaches science (yes, no), and current grade level taught (K-2, 3-5). An alpha level of .05 was used for all statistical tests. These results are presented in Table 14.

Table 14. ANOVA Results by Independent and Dependent Variables

Independent Variable	Dependent Variable	<i>F</i>	<i>p</i>
School demographics (rural, suburban, urban)	Advocacy for EE	$F(2,198) = 2.938$	.055
	Stewardship in EE	$F(2,198) = 1.895$	.153
	Using the Outdoors	$F(2,198) = .193$	.824
	Knowledge of Issues & Resources	$F(2,198) = 4.615$	.233
	Training & Support	$F(2,198) = 1.152$	.318
Currently Teaches Science (Yes, No)	Advocacy for EE	$F(1,199) = .706$	.402
	Stewardship in EE	$F(1,199) = 5.604$	.019*
	Using the Outdoors	$F(1,199) = .273$	.627
	Knowledge of Issues & Resources	$F(1,199) = .016$	.900
	Training & Support	$F(1,199) = 2.360$	.126
Years Experience (1-10, 11-20, 21-30, 31+)	Advocacy for EE	$F(3,197) = 4.875$	.003*
	Stewardship in EE	$F(3,197) = 5.368$	.001*
	Using the Outdoors	$F(3,197) = .595$	.619
	Knowledge of Issues & Resources	$F(3,197) = 3.053$	.030*
	Training & Support	$F(3,197) = 5.127$	.002*
Current Grade Level (K-2, 3-5)	Advocacy for EE	$F(1,199) = .111$	.739
	Stewardship in EE	$F(1,199) = 1.243$	.266
	Using the Outdoors	$F(1,199) = .831$	.363
	Knowledge of Issues & Resources	$F(1,199) = .572$	.450
	Training & Support	$F(1,199) = .712$	.400

 $\alpha = .05$

Significant differences were not found when participants were grouped by ‘school demographic’ (rural, suburban, urban) or according to ‘current grade level’ (K-2, 3-5) for any of the five questionnaire subscales. Groupings by ‘years of experience’ and ‘teaches science’ did reveal some areas of significant difference. A significant difference was found between teachers who currently teach science and those who were not teaching science on *Stewardship in EE*, $F(1,199) = 5.604, p < .05$. Currently teaches science had higher means (3.65) than teachers not teaching science (3.47). Additionally, years of teaching experience had a significant effect on four of the five subscales: *Advocacy for EE* ($p = .003$), *Stewardship in EE* ($p = .001$), *Knowledge of Issues & Resources* ($p = .030$), and *Training & Support* ($p = .002$). Higher means on these scales were observed among teachers with the greater number of years experience.

CHAPTER V

DISCUSSION

The purpose of this study was to determine teachers' views of EE at the elementary school level. Teachers were surveyed and interviewed to examine their attitudes toward, and their self efficacy in, teaching EE.

This study examined both quantitative and qualitative data. A 37 item Likert-type questionnaire was administered, in an on-line format, to 201 randomly selected kindergarten through 5th grade teachers. Data from the questionnaire were analyzed using SPSS. Analysis included descriptive and inferential statistics. Interview data from 8% of the sample (n = 16) were analyzed using qualitative analysis procedures. The interview transcripts were coded and analyzed for patterns and themes. Interview data were examined in context of the questionnaire data to support and enhance the findings. All data were presented in Chapter IV organized by the research questions.

In this chapter the results pertaining to each of the research questions are discussed. Results associated with the last research question are incorporated into the discussion of the respective scales..

Research Question 1: What are elementary teachers' attitudes toward teaching EE at the K-5 level?

The research literature provides many reasons for the lack of quality EE being taught in our nation's elementary classrooms. The most often cited reasons are insufficient knowledge, a compartmentalized curriculum, and state testing (Ernst, 2007; Mueller & Bently, 2009; Sous, McWilliam, & Gray, 2008). This is supported by data from this study. While data from this study demonstrate a generally positive attitude for

EE among elementary teachers, with 89.6% stating that EE should be an important component of the elementary school curricula, it also suggests EE is not well integrated into the curricula. Interview data support researchers' contention that EE is taught as a piecemeal collection of activities that do not give justice to the goals and aims of EE. Other researchers have reported similar findings (Gruenwald & Manteaw, 2007; Knapp, 2000; Nelson, 2010; Stevenson, 2007). When teachers were asked about the types of EE activities and lessons they teach, most were very enthusiastic and anxious to tell how they implement EE. The most common answers, however, were related to Earth Day or a focus on daily behaviors such as conserving water and energy. As was pointed out by 69% of the interviewees, "it's not in the curriculum." The teachers' descriptions of their EE lessons and activities led me to question whether they were fully aware of what constitutes quality EE instruction and the need for it to be an integral part of the curriculum as opposed to special add-on activities.

Closely connected with curriculum issues are time constraints as EE is treated as an add-on to the required units of study, for which teachers say there is already limited time. Of the teachers interviewed, 81% stated that they did not have time for appropriate teaching of EE. This indicates a strong need for curriculum revisions which include EE concepts and encourage responsible decision making and citizenship behaviors.

Teachers in this study generally felt that EE should focus more on students' local environment than on larger global issues. Additionally, they indicated that young students should not be subjected to "doom and gloom" scenarios for which they are helpless to change. This attitude is supported in the research (Grant & Littlejohn, 2005; Orr, 2004) By trying to get young children involved in saving distant, unknown rainforests or

dealing with such abstract ideas as ozone depletion, educators create unnecessary anxiety and fear of the future. Sobel (1996) refers to this as ‘ecophobia,’

Among the independent variables of school demographic, teaches science, years of experience, and current grade level, only years of experience had an effect on teacher’s attitudes toward EE at the elementary level. This study suggests that teachers with greater years of experience advocate more strongly for EE. This may be due to several reasons. It may be that their experience provides them a greater familiarity of the curriculum and therefore enables them to more easily integrate EE into the curriculum. Since the higher mean scores were observed in the 31+ years experience range, it may also be that these teachers are less anxious about test scores and state accountability. This could be due to the fact that they are eligible for retirement, or simply that a greater share of their teaching experience was prior to the Standards and Accountability movement. A third possible reason is these teachers were raised in a time when outdoor play and connections to nature were more prevalent. Research points to a connection between early experiences in nature and concern for protection of the environment (Ableman 2005, Henley & Peavy 2006, Louv 2006, Tanner 1998). Further research would need to be done to pinpoint these or other reasons.

Research Question2: To what extent do elementary teachers think stewardship and pro-environmental behaviors should be taught?

Environmental education, by definition, includes a component of stewardship; the attitudes and commitment for pro-environmental behaviors (EPA, 2005; NAEA, 1970; UNESCO, 1978; UNESCO-UNEP, 1976). One of the goals of EE is to teach students to think critically about the environment and become active participants in resolution of

environmental issues. In the world of public education, however, this can become problematic. Critics express concern for the potential of teacher bias and indoctrination of students to a particular way of thinking (Marcinkowski, 2010). This idea is evidenced in this study as well. Teachers expressed concern about teaching anything that had the potential to be controversial. Questionnaire and interview data demonstrate teachers' caution with teaching both local and global environmental issues. Of the teachers interviewed, 89% expressed this caution. Questionnaire data suggested that a strong majority of the participants agreed that students should be taught stewardship and pro-environmental behavior. While 63% of the teachers interviewed expressed this same belief, all but one also expressed the worry of teaching students about issues that could be controversial within their own community.

A common view in EE is that students should be taught the critical thinking skills that would allow them to make responsible decisions and to take action to improve local environments (Grant & Littlejohn, 2005), and it is of concern if teachers are not doing so. "All education is environmental education. By what is included or excluded, students are taught that they are part of or apart from the natural world" (Orr, 2004, p.12).

Inferential data analysis revealed teachers who currently have a science teaching assignment had mean scores for *Stewardship in EE* that were significantly higher than teachers not currently teaching science. The data do not provide sufficient information to determine whether their pro-stewardship views translate into increased teaching of environmental issues. Additionally, teachers who have taught for 31+ years also have a significantly higher mean for this subscale. Again, the data only allows one to

speculate on the reason or how this translates into actual practice as only one of the interviewed teachers had been teaching for 31+ years.

In both the questionnaire and interview data teachers also stated they felt they lacked sufficient knowledge to teach students about the issues and did not have time to adequately research them in order to be better prepared. Lack of knowledge is one of the most often cited barriers to implementation of EE in the elementary classroom (Ernst, 2007; Plevyak, Bendixen-Noe, Henderson, Roth, & Wilke, 2001) and is discussed further under Research Question 4.

Research Question 3: To what extent do elementary teachers think that using the outdoors is necessary to teaching EE?

As stated in Chapter III, the *Advocacy for Using the Outdoors* subscale of the questionnaire had a questionable reliability coefficient. Those items were not deleted from the questionnaire as I felt it was important to my research and represented a gap in the literature. Two interview questions were created to further explore this issue. This limitation must be taken into account when discussing the findings related to this research question.

Although studies indicate a positive relationship between childhood experience in nature and pro-environmental behavior (Cronin-Jones, 2000; S.C. Martin, 2003; Fisman, 2005; Wells & Lekies, 2006), the questionnaire data did not support the view that EE should include lessons and activities outdoors. The total mean for this subscale was just 3.1. and there was no statistical difference in means for the independent variables of school demographic, teaches science, years of teaching experience, or current grade level. It was interesting that 59.7% of questionnaire respondents agreed with the statement “for

EE to be effective students must be provided direct experiences with nature,” while 66.2% also agreed with the statement “teachers can provide appropriate simulations and other ‘outdoor’ experiences without leaving the classroom.” These two findings seem at odds with each other. There are several possible explanations. Teachers may feel that parents should provide the outdoor nature experiences. Or there may be a differing idea of the terminology “experiences with nature.” Might a teacher view raising plants on a windowsill a nature experience? Or watching the *Planet Earth* videos? There are no data in the current study or in the literature to provide definitive answers to these questions.

During interviews, teachers were asked their feelings about taking students outside for EE and other lessons. Only four of the 16 (25%) gave an immediate and enthusiastic response that was pro-outdoor instruction. The majority of the teachers spoke hesitantly and admitted to rarely taking students outside for instruction. Research (Simmons, 1998) points to six specific barriers to using the outdoors to teach; appropriateness of teaching setting, teacher confidence, worries, need for training, hazards, and difficulty of teaching EE. Similar results were found in this study. The most prominent reason stated by interviewees (75%) was time; time to prepare, transition time, and the extra time that any lesson took when taught in an outdoor setting.

The second most often stated reason (63%) was student behavior. Teachers felt that students were harder to control outside of the classroom. Student behavior was not cited per se in the literature, but could possibly fall under the “worries” category. It may also point to a need for training, as preparing lessons that engage students appropriately would minimize adverse behaviors. Interestingly, 50% stated that they really had simply

not thought to take students outside for lessons other than for isolated activities, such as those for Earth Day.

Appropriateness of the outdoor setting was also cited as a reason for not extending EE lessons to the outdoors. Teachers noted that the more urban the setting, the less appropriate for EE lessons. A study by Simmons (1998) found teachers believed areas such as woods, streams, marshes, and ponds were more appropriate than city parks or other urban nature areas, yet these settings also raised the most concern for safety. Teachers in this study did not cite safety as a reason for not taking students outside.

A critical first step in teaching children to care for the environment is to develop a sense of place (Sobel, 1996). There is a good deal of research to support the child-nature connection for positive effects on academic, emotional, and psychological functioning and behaviors (Hartig, Mang, & Evans, 1991; Leiberman & Hoody, 1998; Tennesann & Crimprich, 1995; Wells, 2000) in addition to affecting long term concern for the environment (Ableman, 2005; Henly & Peavy, 2006; Louv, 2006; Tanner, 1998). Teachers in this study gave similar responses when asked about the benefits of the nature-child connection. All sixteen interviewed teachers (100%) stated that children's physical and emotional health benefits from being in nature and outdoor play. Twelve respondents (75%) also stated that connecting children with nature also promotes a caring attitude for the environment.

It would appear, from the results of this study, that teachers understand the benefits of getting kids involved in outdoor play and learning. However, results also indicate that there is a gap between teachers' beliefs and their practice. There is work to be done in the field of EE and in teacher education to bridge this gap.

Research Question 4: What degree of confidence do elementary teachers have in their ability to teach EE?

Another barrier to implementation of EE in the elementary classrooms is classroom is teachers' lack of knowledge and confidence (Ernst, 2007; Plevyak, Bendixen-Noe, Henderson, Roth, & Wilke, 2001). Even when teachers are strongly pro-environment, having this attitude does not ensure that she will feel confident in her ability to teach EE. Inadequate knowledge has been a strong criticism of EE in the literature (Hungerford, 2010). Results of this study indicate that elementary teachers are not confident in their ability to teach EE believing they do not have adequate knowledge. Questionnaire data for this subscale had a mean of 3.5. There was a marginally significant difference for teachers with greater years experience in their confidence for teaching EE, which may indicate a level of confidence that comes with experience.

Only 32.4% of the questionnaire respondents felt they were well prepared to teach EE. On another item, however, 47.8% of respondents stated that they have adequate knowledge to teach EE, indicating that being well prepared requires more than knowledge. In response to the statement "I enjoy teaching students about the environment," 93.6% either agreed or strongly agreed. These data indicate a rather large gap between teachers' desire to teach EE and their perceived ability to do so. I contend that a good first step in bridging this gap would be the inclusion of quality EE instruction in pre-service teacher education programs. The issue of teacher confidence in teaching EE is explored further in reference to results pertaining to Research Question 6.

Research Question 5: To what extent are elementary teachers aware of and have access to quality EE resources?

There are an abundance of ‘ready-made’ units, activities, and lessons available for teachers. Many of these, marketed for teachers, are from less than environmentally friendly corporations, such as oil, chemical, and coal companies. Units and lessons are also available from a large variety of environmental advocacy groups and organizations, and still others are from science organizations. All promote a particular point of view. There is no shortage of print EE resources, but it can be a time consuming task for a teacher to sift through, evaluate them, and make appropriate selections. There are a variety of informal education centers, such as parks and zoos, but availability varies by location. Many communities also have local environmental groups that might serve as educational resources.

A majority of teachers (62.3%) in this survey generally felt confident in their ability to locate resources for teaching EE, however only 33.4% stated that there were resources provided by their school district. Additionally there was some uncertainty about available resources, with 27.4% indicating they were uncertain about community resources and 47.3% uncertain about the availability of school resources. This uncertainty would seem to indicate that these teachers had not attempted to search out or to tap into those resources that are available. When interviewed 50% or fewer even made mention of community or district resources. While more than a third of the teachers interviewed made reference to print resources, published units (ie. Project Wild, GLOBE) or teacher resource books, none indicated that they actually use those resources on a regular basis.

As one teacher said, “We have some units like Project Wild...I think they’re kinda old.”

Internet was given as a widely used resource by 81% of those interviewed.

These results could be useful in determining strategies to improve teacher confidence in teaching EE. Connecting teachers with quality resources and reputable organizations within and near their communities could boost confidence and improve teachers’ preparedness in teaching EE.

Research Question 6: How well do elementary teachers think they are trained and supported in teaching EE?

Many researchers agree that lack of pre-service and in-service teachers’ training are high on the list of barriers to the effective implementation of EE in elementary schools (Cutter McKenzie 2003; Ernst, 2007; Henderson, Roth, & Wilke, 2001; McKeown-Ice, 2000; Miles and Harrison, 2006; Plevyak, Bendixen-Noe, & Powers, 2004). Findings from this study support that contention. The Views of EE Questionnaire contained two statements concerning training and staff development. For each one of these, less than 20% agreed that they have received training or attended staff development related to the EE. Additionally, of the 16 teachers interviewed, 93.75% stated that they had received little or no related staff development either as a pre-service teacher or throughout their career. It is little wonder that elementary teachers lack confidence in teaching EE concepts. The data show a relationship between years of teaching experience and training. Means are higher for teachers with greater experience. Five of the interviewed teachers stated that they had received training for *Project Wild*, *Project Wet*, or *GLOBE* “years ago.” These teachers have been in the field long enough

to have experienced teaching prior to the standards and accountability movement when there was greater curriculum flexibility.

This questionnaire subscale also contained two statements related to administrative support. Distribution of responses along with interviewee statements suggest that while principals do nothing to encourage their teachers to teach EE, they generally support those who take the risk and add EE activities to their lessons.

The final interview question for this subscale asked teachers to describe their state or district's EE plan. Seventy-five percent of them were not aware as to whether or not one existed. Most also speculated if there was one, their principals were not aware either.

Although additional research needs to be done, this study suggests that teachers have positive attitudes towards the implementation of EE at the elementary school level. Teachers in this study believe that EE belongs in elementary school and that it can be integrated into all core content subjects. That is certainly a good starting point.

Limitations

Survey research poses threats to internal validity as a survey provides only a 'snapshot' of a point in time and can be influenced by a variety of extraneous variables such as current events, personal experiences, and even mood. The data gathered through a survey may not hold true over time or place. Interviews, while providing rich, in-depth data may not be generalizable due to the smaller sample size and lack of a random selection method. Additionally, self-report data limits internal validity. Dangers of self reported data include: (a) social desirability, respondents providing answers they think the researcher is looking for or that may make them 'look better,' (b) responding to items on

issues for which they have not given any previous thought, or (c) providing responses that are not truthful or that intentionally misrepresent their views.

Sample size

A specific limitation to this study is the low Cronbach's alpha for the questionnaire subscale '*Advocacy for Using the Outdoors*' ($\alpha = .538$). When interpreting the Cronbach's alpha reliability score, the following rule of thumb applies: $> .9$ – Excellent, $> .8$ – Good, $> .7$ – Acceptable, $> .6$ – Questionable, $> .5$ – Poor, and $< .5$ – Unacceptable (George and Mallery, 2003). *Advocacy for Using the Outdoors* was in the questionable range. Following the factor analysis, there were just five items representing this subscale. Increasing the value of alpha is in part dependent upon the number of items in a scale and this improvement for the questionnaire has been recommended. This subscale however was not dropped for this study as it is an important concept not addressed elsewhere on the questionnaire or in the literature. Follow-up interviews included questions to further explore this concept and increase the reliability of the responses.

Data from the proposed study needs to be examined with caution and treated as the study intends – as preliminary, exploratory research to assist in identifying challenges and opportunities to implementation of EE within the elementary school curriculum.

Implications for Practice

Outdoor education has been shown in multiple studies to benefit students both academically and psychologically. Results of this study indicate that few teachers take students outside for instruction on a regular basis. It would be beneficial for elementary school teachers and administrators to incorporate outdoor classrooms on their campuses.

Outdoor classrooms provide teachers with nature environments in which to teach without the worry and extra time involved in off campus trips to natural areas. Specific training in the use of outdoor spaces should be included as well.

It is also clear from the results of this study that there is a need for staff development related to EE and integration of EE into the elementary curriculum. Teachers indicated pro-environmental attitudes and stated that they enjoy teaching EE, but feel unprepared to do so. With training and support teachers could integrate EE concepts throughout the elementary curriculum without sacrificing test scores. Interested and committed educators should take a leadership role in requesting and promoting staff development for EE. Ongoing support is needed as teachers begin to integrate their new learning.

Recommendations for Further Research

Research on teachers' views of EE are limited, yet under the pressures of No Child Left Behind and state Standards and Accountability mandates, EE is dependent upon the commitment and motivation of our nations' classroom teachers. Results from this study reveal several areas where additional research could prove worthwhile and would enhance understanding of the complexity of issues surrounding the implementation of EE in the elementary school. The results of this study indicate a positive view of integrating EE concepts into the elementary curriculum. By all accepted definitions, however, stewardship and pro-environmental behaviors are integral to EE. Data from this study show this an area of concern and uncertainty for elementary teachers and is worth further examination

A second area that should be further explored is teachers' attitudes towards using the outdoors to teach EE. The child-nature connection is an important one, not just for developing pro-environmental attitudes and behaviors, but also in terms of children's physical, mental, and psychological development and well being. Teachers in this study did not feel strongly about the need to take children outside as part of their lessons. This attitude would be interesting to explore further.

Finally, further research could be done to address one of the limitations of this study. The Views of EE Questionnaire was developed to gather data on several specific points of concern related to EE at the elementary school level. Following the factor analysis, the calculated Cronbach's alpha of the subscales were low for *Advocacy for Environmental Protection* ($\alpha = .288$) and *Advocacy for Using the Outdoors* ($\alpha = .538$). The *Advocacy for Environmental Protection* subscale was dropped, but the *Advocacy for Using the Outdoors* was kept because it was a concept deemed important to the present study. A revision and revalidation of the questionnaire used in this study would be beneficial for future research pertaining to teachers' views of EE.

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APPENDICES

APPENDIX I

IRB Exemption



DARDEN COLLEGE OF EDUCATION
OFFICE OF THE DEAN
NORFOLK, VIRGINIA 23529-0115
PHONE (757) 683-5928
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May 31, 2011

Proposal Number 201002099

Professor Dickerson:

Your proposal submission titled, "Elementary Teachers' Views of Environmental Education" has been deemed EXEMPT from IRB review by the Human Subjects Review Committee of the Darden College of Education. If any changes occur, especially methodological, notify the Chair of the DCOE HSRC, and supply any required addenda requested of you by the Chair. You may begin your research.

We have approved your request to pursue this proposal indefinitely, provided no modifications occur. Also note that if you are funded externally for this project in the future, you will likely have to submit to the University IRB for their approval as well.

If you have not done so, PRIOR TO THE START OF YOUR STUDY, you must send a signed and dated hardcopy of your exemption application submission to the address below. Thank you.

Edwin Gómez, Ph.D.
Associate Professor
Human Subjects Review Committee, DCOE
Human Movement Studies Department
Old Dominion University
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APPENDIX II

Principal Letter

Dear Principal _____,

I am a doctoral student seeking a PhD in Curriculum and Instruction, with a focus in science education, at Old Dominion University in Norfolk, Virginia. My dissertation research, under the direction of Dr. Daniel Dickerson (www.odu.edu/~ddickers/), examines elementary teachers' views of environmental education. I understand that it is a very busy time of year, but I really need your help.

What I am asking of you:

- Your permission to send an e-mail to your K-5 classroom teachers asking if they would be willing to participate in the study by completing a 10 minute online survey.
- A list of your K-5 classroom teachers' email addresses if they are not already available on your school's website.

What I am asking of your K-5 classroom teachers:

- To complete a 10 minute on-line questionnaire within the next week or two. The questionnaire can be accessed at <https://www.surveymonkey.com/s/XL9FD97> . For your perusal, a copy of the questionnaire is attached.

How you stand to benefit:

- Your school will be entered in a drawing to win a two year subscription to Green Teacher for your professional library. You may view a sample issue of this teacher resource at this link: <http://www.greenteacher.com/freeissue83.html>. Several subscriptions will be awarded. Your chances of winning depend on the number of schools that participate but will be at least as good as 1 in 50.

Addition Information:

All responses will be kept confidential and will not in any way be identified with your school, you, or your teachers. I am the only one who will have access to the original surveys that contain any type of identifying information. Any identifiers will be removed when the data are entered and analyzed. This study has been reviewed and deemed 'exempt' by the Human Subjects Review Committee of the Darden College of Education at Old Dominion University (Proposal # 200901038). Upon request I will be glad to provide you a summary of my findings. If you have any questions or concerns about this questionnaire, please feel free to contact me. My contact information is provided below.

Thank you for assisting me in this research. I look forward to hearing back from you.

Rose Hotchkiss

rhotc001@odu.edu

252-337-5466

APPENDIX III

Questionnaire Cover Letter

Dear Participant,

I am a doctoral student seeking a PhD in Curriculum and Instruction, with a focus in science, at Old Dominion University in Norfolk Virginia. My dissertation research examines elementary teachers' views of environmental education.

The survey you are about to take was designed to gather data for my dissertation. Your views and perspectives are central to my study. In addition, your responses will assist me in determining the instrument's reliability and validity and how it might be improved to increase the accuracy of this important information..

The survey will take approximately 20 minutes to complete. All your responses will be kept confidential and will not in any way be identified with you or your school. Any identifiers will be removed when the data is entered and analyzed. Completion of this survey indicates voluntary consent to participate in this study.

If you have any questions or concerns about this questionnaire, please feel free to contact me. Upon request I will be glad to provide a summary of my findings. My contact information is provided below.

Thank you for taking the time to assist me in this research.

Rose Hotchkiss

rhotc001@odu.edu

252-337-5466

APPENDIX IV

Views of EE Questionnaire

Demographic Data

1. Gender

1 = male

2 = female

2. Total Years Teaching Experience

1 = 0-5 yrs.

2 = 6-10 yrs.

3 = 11-15 yrs.

4 = 16-20 yrs.

5 = 21-25 yrs.

6 = 26-30 yrs.

7 = 31+ yrs.

3. Grades Currently teaching

1 = K-2

2 = 3-5

4. Teaching science

0 = no

1 = currently

2 = previously

5. Instructional organization at current grade level

1 = departmentalized

2 = self-contained

3 = other

6. School demographic

1 = rural

2 = suburban

3 = urban

7. Title I school

1 = yes

2 = no

8. Met AYP most current year

1 = yes

2 = no

Survey Data

1. Environmental education should be an important component of the elementary school curriculum.

1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree

2. Environmental education should be formally taught throughout the elementary grades, beginning in kindergarten.

1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree

3. Environmental education is more appropriate for the middle and high school level and less so at the elementary level.

1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree

4. Environmental education should not be formally taught until at least upper elementary.

1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree

5. Environmental education should teach only facts about the environment and not attempt to promote environmental stewardship

1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree

6. Promoting positive stewardship needs to be a part of environmental education at the elementary level.

1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree

7. It is not the role of education to promote environmental stewardship.

1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree

8. The focus of environmental education should be to teach students to make informed decisions about environmental issues.

1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree

9. As part of the elementary curriculum, students should be taught to be environmentally conscious in their own homes (recycling, turning off lights not in use, conserving water, etc.)

1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree

10. Environmental education concepts should be integrated throughout the elementary curriculum.

1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree

11. Environmental education can be integrated with math.

1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree

12. Environmental education can be integrated with language arts.

1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree

13. Environmental education can be integrated with social studies.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
14. Environmental education should be integrated into both elementary social studies and science curricula.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
15. Environmental education is best taught in an outdoor environment.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
16. Environmental education can not be taught effectively without taking students outside.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
17. For safety reasons, environmental education instruction should not take place outdoors.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
18. Teachers can provide appropriate simulations and other 'outdoor' experiences without leaving the classroom.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
19. For environmental education to be effective, students must be provided direct experiences with nature.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
20. It is important that elementary students begin to understand their local environment and local environmental issues.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
21. Students cannot understand global issues without first understanding the environmental issues in their own neighborhoods.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
22. The primary focus of elementary environmental education should be global issues such as global climate change, rainforest destruction, and endangered species.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
23. Teaching students about local environmental issues is valuable.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
24. The world's remaining wilderness areas should be protected at all costs.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
25. The protection of the environment should take precedence over cultural needs.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree

26. The protection of the environment should take precedence over economic needs.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
27. I believe that I have adequate knowledge to teach environmental education.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
28. I am knowledgeable about current global environmental issues.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
29. I am not well prepared to teach environmental education.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
30. I enjoy teaching students about the environment.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
31. I am confident in my ability to locate resources necessary for teaching environmental education.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
32. I have resources available to me in my school district for teaching environmental education.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
33. I am aware of resources within my community to assist with teaching environmental education.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
34. I have received quality training in environmental education.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
35. Teaching environmental education is encouraged by my principal.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
36. I have attended staff/professional development related to environmental education.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree
37. My principal supports taking children outside for lessons related to the environment.
1 = strongly disagree 2 = disagree 3 = uncertain 4 = agree 5 = strongly agree

Appendix V

Interview Opening Script

Thank you for taking time for this interview. As you know, I am currently working on a PhD at Old Dominion University.

There are no right or wrong answers and all of your thoughts and ideas are relevant to the study. Anything you say will remain confidential in that your name or other identifying information will not be divulged throughout this study.

I have an Informed Consent Narrative that I would like you to listen to prior to giving your verbal consent. Please read it carefully and let me know if you have any questions.

Appendix VI

Interview Consent Narrative

This consent narrative outlines your rights as a participant in this study, Elementary Teachers' Views of Environmental Education, conducted by Rose Hotchkiss, Department of Curriculum and Instruction, Old Dominion University. The interview will explore your views of environmental education at the elementary school level. The interview will last approximately thirty minutes. Please understand that

1. Taking part in this study is entirely voluntary.
2. It is my right to decline to answer any question that I am asked.
3. I am free to end the interview at any time.
4. I may request that the interview not be taped, understanding that notes will be taken instead.
5. My name and identity will remain confidential in any publications or discussions.
6. My name will not appear on any tapes or transcripts resulting from the interview.

You may decline to participate in this study. You may end your participation at any time. Maintaining your anonymity is a priority and every practical precaution will be taken to disguise your identity. There will not be any identifying information on audiotapes or transcripts of this interview. I will not allow anyone other than the research advisor to hear any audiotape of your voice or review a transcript of this interview. All materials generated from your interview (e.g., audiotapes and transcripts) will remain in my direct physical possession.

Do you understand this consent narrative? Do you have any questions concerning your consent?

Do I have your consent to digitally record this interview?

Thank you.

Appendix VII

Interview Questions

- 1 In what ways do you address EE concepts in your teaching (types of lessons, activities)? How often, how long?
 - a If you don't: What are the reasons you don't address EE concepts in your teaching? What (if any) teachers do you think should be responsible for teaching EE (grade/subject, etc)?
- 2 How comfortable are you in your ability to effectively teach about local EE issues? Global EE issues?
- 3 In what ways do your values/beliefs appear in your EE lessons? How do you feel about this?
- 4 What are your thoughts on taking students outside for lessons concerning the environment? For other activities?
 - a Probe: How often do you take your students outside? What types of activities do you do outside?
 - b Probe if students do not go out: What are your reasons for not taking students outside?
- 5 What are the benefits to children of having direct contact with nature? How important is the nature-child connection?
- 6 What types of resources are available to you for teaching EE? Which ones do you use most and why?

- 7 Tell me about training or staff development you have had related to EE. How useful was that training? If quality training was offered, would you take it?
- 8 Describe your state/district's EE plan, if they have one. How do the administrators in your district demonstrate support of EE?

CURRICULUM VITA

Rose M. Hotchkiss

Education

Ph.D Curriculum & Instruction 2011- Old Dominion University

Dissertation: Elementary teachers' Views of Environmental Education

Masters in Elementary Educ. 2002 - Elizabeth City State University; Elizabeth City, NC;

National Board Certification 1999 - Middle Childhood Generalist; Renewed 2009

Bachelor of Science in Elementary. Educ. 1983 - Elizabeth City State University; Elizabeth City, NC

Refereed Publications

Hotchkiss, R. & Dickerson, D.L. (2008). Fifth grade remote sensing earth science mission. *Science and Children*, 45 (5), 44-49.

Stewart, C.O., Dickerson, D.L., & **Hotchkiss, R.** (2009). Beliefs about science and news frames in audience evaluations of embryonic and adult stem cell research. *Science Communication*, 30, 427-452

Hotchkiss, R., Dickerson, D.L., & Bol, Linda (under review). Development and Validation of an Instrument to Assess Elementary Teachers' Views of Environmental Education. *Journal of Environmental Education*

Professional Conference Presentations

Hotchkiss, R. & Dickerson, D.L. (2007, November). Remote sensing earth science mission. Presented at the annual meeting of the North Carolina Science Teachers Association, Greensboro, NC.

Hotchkiss, R. & Dickerson, D.L. (2007, November). Studying local wetlands through remote sensing. Presented at the annual meeting of the Virginia Association of Science Teachers, Williamsburg, VA.

Dickerson, D.L., Horne, P., & **Hotchkiss, R.** (2007, November). Groundwater in karst, sand, and stone. Presented at the annual meeting of the Virginia Association of Science Teachers, Williamsburg, VA.

Dickerson, D.L., **Hotchkiss, R.**, & Horne, P. (2007, November). Introducing the ProScope to secondary science students. Presented at the annual meeting of the Virginia Association of Science Teachers, Williamsburg, VA..

Dickerson, D.L., Stonier, F., **Hotchkiss, R.**, & Horne, P. (2007, November). Using the tablet pc in science class. Presented at the annual meeting of the Virginia Association of Science Teachers, Williamsburg, VA.