

A QUALITATIVE STUDY OF THREE OUTDOOR ENVIRONMENTAL EDUCATION
PROGRAMS IN PASCO AND HILLSBOROUGH COUNTIES IN FLORIDA

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Abstract

Research and literature support the notion that environmental literacy requires a depth of knowledge and skills that go beyond simply being aware of or knowledgeable about the environment and environmental issues. Environmental literacy requires the learning of a skill set that builds a sense of empowerment and the attitudes that enable a person to adopt pro-environmental behaviors and to be able to take action by participating in the decision-making process on behalf of the environment. Two frameworks of instruction that have been recommended to develop the environmental literacy of students are Awareness to Action (A to A) continuum strategies and Place-based Education (PBE) models. The purpose of this qualitative study was to examine the environmental education (EE) programs of three exemplary outdoor EE sites to determine to what extent each program incorporates the two frameworks in their EE programs. Three forms of data were collected from each EE site, including interviews with instructors, observations of program delivery, and an analysis of the written curriculum. These data were then coded for the inclusion of both A to A continuum strategies and PBE models. The major findings of the study indicated a high concentration of the written curricula focused on the lower end of the A to A continuum, at primarily the awareness and knowledge levels. The findings showed a moderately-high rate of inclusion of PBE models which helps to build a sense of place and connect students to their local environment. The moderate inclusion of the higher levels of the A to A continuum occurred as a result of the skill and talent of the EE instructors at each site. The significance of this study is that it identifies an area of opportunity through which EE programs and curricula could be mindfully-designed to more fully develop the environmental literacy of students through learning the skills necessary for adopting pro-environmental behaviors.

Dedication

I dedicate this research study to my dearly departed father who was always a wonderful model for the power of education, perseverance, and love, and to my loving mother who has always been my greatest supporter and my best friend.

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Chapter I

Introduction

Background

Modern environmental problems arise from the way humans relate to the biosphere and everything within it, including each other. Close contact and genuine connections to the natural world and environment are mutually beneficial to both children and adults. This relationship with the environment is equally beneficial to the well-being and quality of the environment. An innate understanding that all organisms, including humans, are an integral part of the natural world has always been ingrained in Native American and other indigenous cultures throughout the world (An Iroquois perspective, 2008). Unfortunately, as society has become increasingly urbanized, industrialized, and digitized by technology, generations of children and adults are further removed from understanding how they, too, are connected to the natural world. The consequence of losing their understanding of their role in the environment is that people do not develop a realization that it is their own decisions and actions that can either preserve or degrade the environment.

The Senegalese environmentalist, Baba Dioum (1968), once eloquently stated during a speech in New Delhi, “In the end we will conserve only what we love; we will love only what we understand; and we will understand only what we have been taught.” (Wilderness workshop, 2014). His speech was made at a time of a collective awakening that marked the beginning of the modern environmental movement. In *Silent Spring*, Rachel Carson, spurred on by the destruction and degradation of the environment by pesticides and other chemical use, painted a devastatingly grim potential picture of the future for all species in her seminal book. Later, the need to modify human behaviors in order to assure a sustainable future for the Earth became a global concern.

Several environmental and sustainability summits and international conferences convened to find workable solutions. However, in just a few decades since the dawn of the environmental movement, the level of connections to and concern for the environment has seemingly diminished or is nonexistent in the consciousness of many adults and children in post-modernist, industrialized and urbanized nations (Louv, 2005). Wendell Berry, in his book *In the Presence of Fear* (2001), describes the disconnections common in far too many children and adults:

Most of us cannot imagine the wheat beyond the bread, or the farmer beyond the wheat, the farm beyond the farmer, or the history beyond the farm. Most people cannot imagine the forest and the forest economy that produced their houses and furniture and paper; of the landscapes, the streams, and the weather that fill their pitchers and bathtubs and swimming pools with water. Most people appear to assume that when they have paid their money for these things they have entirely met their obligations. (Berry, 2001, p.48)

Richard Louv (2006) points out that the environmentalists of the past, predominantly white, are now grayed and much older. The movement to preserve the environment for future generations is in need of a younger group of environmentalists infused with the same level of passion as their predecessors. Speaking from the perspective of the increasing diversity and changing faces of the United States, there is a profound need to develop programs that nurture the future environmentalists and stewards of the environment who are more reflective of the diversity of this nation's population. As a result of environmental summits and conferences, education is seen as the key that will unlock the desire to be involved and to develop an environmentally-literate populace (NAAEE, 2011). The problem is that environmental education is either on the periphery or non-existent in most school curricula in the United States in favor of what is deemed core subject matter (Sobel, 1996). Curiously, many children are more aware and

knowledgeable of the plight of polar bears in the Arctic or the problems with the deforestation of tropical rainforests throughout the world, than they are with or about the plants, animals, and condition of the environment right outside the school door or in their own backyards and neighborhoods (Sobel, 1996). Far too many children, as well as far too many adults, lack any sense of place because they lack contact and opportunities to be outside and interacting with the environment. Many children's only contact with or view of the natural world is what they see on a computer or passively watch on televisions. Others view what they think are natural settings behind glass in artificially-contrived versions of the environment in zoos and theme parks, but rarely ever get the chance to be immersed in the environment in a way that develops a deeper understanding and sense of place (Sobel, 2005).

After students are given opportunities that help to educate them about the environment and develop their sense of place, they also need to be given opportunities to develop their sense of empowerment (NAAEE, 2011). According to the North American Association for Environmental Education (NAAEE, 2011), for people to be truly environmentally-literate, they must have opportunities that will help develop their sense of empowerment to take action, make decisions, and do things on behalf of the environment. Environmental education has to take children beyond just knowing about things to a place of active, empowered doing. The 14th Dalai Lama (Kielburger et al., 2010) observed that the greatest challenge facing our time is that we are raising a generation of passive bystanders. Environmental education is key for students to develop environmental literacy that can help to empower learners to make pro-environmental decisions and take actions that help ensure a sustainable future for the environment.

Statement of Purpose

The goal of this study was to explore the storylines, cultures, and curricula that guide the instructional delivery and practices of the educators and their respective environmental education programs at three outdoor nature education centers located along the Hillsborough River in both Hillsborough County and Pasco County, Florida. The intent of the study was to determine if the respective programs incorporate both Place-based Education curricula and Awareness to Action models of instruction that foster student empowerment and pro-environmental behaviors. The study also sought to ascertain the congruence between the written curricula, the instructor reports, and the program delivered to the students at each of the sites. Using a checklist of each educational activity I documented if and when Place-based Education (PBE) and Awareness to Action (A to A) continuum strategies were used to connect what was being done or experienced on-site to the students' everyday lives in their local environment. By observing and comparing the three forms of data, I gained insight into whether transformative experiences and connections were being made for students that can be carried from site to school and applied in their local community.

Significance of the Study

In this study I sought to determine if the environmental educational experiences were being connected to their everyday lives. In this thesis, I evaluated the data and I developed a narrative story and view of the environmental education being offered to students. I illuminated the extent to which students are receiving instruction that has the potential to take them beyond just knowing to developing proactive behaviors and feelings of empowerment to make decisions that can have a positive impact on the environment.

Chapter II

Literature Review

The goal of this literature review was to provide a broad philosophical framework and historical context for the development of environmental education programs in the twenty-first century. It provides a context of comparison and evaluation of three outdoor environmental education programs that are conducted along the Hillsborough River in both Hillsborough County and Pasco County in central Florida. In this literature review, there is a brief overview of why the planet is in need of an environmentally and ecologically aware and literate populace. There is an examination of the scholarly works of several environmental education organizations which delineate the concept of environmental literacy and the behaviors of an environmentally literate person. This delineation was used as a guide to determine how each of the programs in the study fit in or diverge from the overall concept of environmental literacy.

In addition, I reviewed the governmental mandates and legislation that have had an impact on environmental education in the United States and specifically Florida. Also included are seminal historical events that provided the impetus to propel the importance of environmental education into the public consciousness. In the literature I also examined legislative and funding issues that have impeded or redirected the eventual acknowledgement of the importance of EE for the development of the whole child.

As well, a discussion of the benefits of environmental education far beyond just the awareness and understanding of nature is included. Researchers support the thesis that the absence of children interacting with nature and natural, living elements has had detrimental effects on their mood, feelings of empowerment, attention, abilities and feelings of connection or

sense of place (Louv, 2005; NEETF, 2000; Sobel, 2005). These researchers illustrate that contact with nature can help ameliorate many of the psychological issues of at-risk youth from anxiety and depression to the lack of motivation and sensitivity for others and nature. They also suggest that contact with nature and natural elements actually has profound psychological benefits not just for children but for people of all ages. These researchers provide supporting evidence for the necessity and benefits of EE that range from academic achievement and enrichment, to the psychological well-being and feelings of connectedness to place, to preparing learners who are both knowledgeable and capable of making decisions and taking action in their lives conducive to preserving and protecting the quality of the environment.

In the final section of the literature review, there is a discussion of the characteristics and components of excellence in EE from three nationally respected outdoor EE programs. The programs provide EE curriculum from varying perspectives of the environment, and include Project Learning Tree (PLT) for a perspective for the knowledge of trees and forests, Project WILD (PW) for a perspective of EE focused on the preservation of animals and their habitats, and from Project WET (WET) which provides a perspective of EE that focuses on the protection and preservation of the world's water resources. In addition, there is a review of the concept and importance of Place-based Education strategies in environmental education programs, as well as characteristics of Awareness to Action models of instruction. Both help to serve as templates for the review of the three local outdoor EE programs in this study.

Historical Foundation for Environmental Education

The current conceptualizations of environmental literacy and environmental education have their roots in the educational movements of the late 19th and 20th centuries related to nature, conservation, and outdoor education (NAAEE, 2011). This connection to land and the rise of an

environmental movement in the United States has a long history, during which people became increasingly concerned with the wilderness, pollution, and human health. A prime example is that of Liberty Hyde Bailey (1858-1954), who was a trained botanist who distinguished between informal nature study and technical studies of natural history and biology (Kohlstedt, 2005). The late 1960s and early 1970s were a time of increasing concern about the quality of the environment in the United States. Public sentiment had deep roots in the preservationist and conservationist movements from earlier in the century, but also drew from traditions such as Native American land ethics and stewardship by landowners. These movements took on a greater sense of urgency with increasing signs of environmental degradation such as flammable rivers, major oil spills, clear-cutting of forests, and other attacks on the environment. The clarion call for action was sent out by Rachel Carson, who described in her 1962 book, *Silent Spring*, how the rampant and virtually unseen use and overuse of chemicals like DDT and other chemical pesticides were wiping out bird species and insects and could be responsible for the same level of poisoning of all species including human populations. In the United States, it was on April 22, 1970, the first recognized Earth Day, that a national teach-in was held about environmental problems. This date is recognized as the birth of the modern environmental movement. This brought into focus for a whole new generation the impending consequences for human health for all living things, and that as humans we are directly responsible, individually and collectively, for the quality of the environment in which they live. It was an era of upheaval and activism during the Vietnam War which included struggles to end the war. It was a space in time during which the fight for civil rights and women's equality gained speed. It was a time of growing awareness that emphasized that humans are an integral part of the environment, and highlighted how human activity can negatively affect the environment (Archie & McCrea, 2013; Lasso de la

Vega, 2004). These struggles in the conscientiousness of society contributed directly to the collective sense of empowerment and the responsibility of individuals to take action. These changes in perspective prompted the call for educational institutions to foster a citizenry with the willingness and ability to participate in maintaining a clean and healthy environment for all living things on the planet (Archie & McCrea, 2013; Lasso de la Vega, 2004). There was a lesson to be learned about the disappearing natural connections and environmental literacy that could be developed or regained by learning from indigenous cultures that it is our responsibility to live sustainably for future generations (An Iroquois perspective, 2008). This is known as Seven Generation Sustainability, an ecological principle that urges the current generation of humans to live sustainably and work for the benefit of the seventh generation into the future. It originated with the Iroquois, who's Great Law of the Iroquois holds that it is appropriate to think into the future and decide whether the decisions you are making today will benefit children for seven generations (An Iroquois perspective, 2008). Unfortunately, the terms environmentalist and environmentalism has been politicized as an affront to prosperity and the economic future. Far from the truth, preserving and protecting the quality of the environment, and having an educated populace able to analyze environmental issues and take appropriate actions, both individually and collectively, on behalf of the environment is an asset that protects the health of the citizens and economic future of the country (Dennis & Knapp, 1997).

A need for Environmental Literacy

Environmental education not only builds our collective environmental and ecological literacy, it is absolutely essential to the development of physically and mentally healthy children who are confident and knowledgeable to be the future decision-makers and stewards (Dennis & Knapp, 1997). In the zeal to compete and win on a global scale, with the philosophy that this

makes us a greater economic force, too many children have been wholly removed from any contact from the outdoors as a learning tool (Glenn, 2000). Clearly environmental literacy is necessary to protect the environment, but research is showing that students are making significant gains academically, socially, and in their personal well-being when the environment is the integrative foundation from which all other subject matter is connected (Glenn, 2000).

Humans seem to be at a precipice as far as the detrimental impact we are having on the planet. The future of this country and world, from our air quality, to humanely- and sustainably-produced safe food supplies, to water free of toxins and abundant in supply, to production of clean and dependable sources of energy, to diversity of all species and habitat protection, and ultimately the entirety of all the living systems of Earth are dependent on a knowledgeable populace (Coyle, 2005). The ideal would be to have a majority of the public and decision-makers able to understand and be sensitive to nature, purposefully-informed and empowered and motivated to be active stewards of the environment (NAAEE, 2010). In January of 2003, the NSF released a report of its advisory committee for environmental research and education which found that “in the coming decades, the public will more frequently be called upon to understand complex environmental issues, assess risk, evaluate proposed environmental plans and understand how individual decisions affect the environment at local and global scales” (Coyle, 2005). However, studies cited by Campaign for Environmental Literacy revealed that the United States public suffers from a tremendous environmental literacy gap that appears to be increasing instead of decreasing (Elder, 2007). The studies showed 66% of the public failed a basic environmental quiz and that over 88% failed a basic energy quiz. The studies also showed that 45 million Americans think the ocean is a source of fresh water, and 130 million believed that hydropower is America’s top source of energy (Elder, 2007). Research conducted by National

Environmental Education Task Force (NEETF) and Roper Research, (Coyle, 2005), showed that most Americans believed they know far more about the environment than they actually do. Americans are increasingly connected to nature solely through a computer or television screen or through a thick pane of glass in museums, where nature is seen as something apart from us (Louv, 2005). Many children see nature only as a two-dimensional image in a picture or in a book. Coyle's report showed that, while many Americans have a sufficiently high overall sense of environmental topics, the public's comprehension of more complex environmental issues is very limited (Coyle, 2005). In the NEETF/Roper research, Coyle reported there was indication that very few people have sufficient environmental knowledge and skill to be considered environmentally literate, with the best estimate ranging from only 1% to 2% of adults in the United States. Discouragingly, the report confirmed that widespread environmental illiteracy persists, citing that a majority of the public surveyed at random in the United States did not know the leading causes of water pollution, air pollution, nor were aware of problems associated with solid waste. However, the most encouraging part of the research findings showed that there was increasing public concern for pollution of the environment and that the majority (85%) endorsed government programs to protect water and air from pollution, and to provide people with the education to understand environmental issues. Coyle reported that over 95% of the public supported environmental education in schools and they also wanted environmental education to continue into their adult lives. What they were asking for and what is needed are programs designed to develop and improve the public's level of environmental literacy. Bogan (1992) used a measurement instrument called the Florida Environmental Literacy Survey to explore the ecological attitudes and behaviors of 18 year old high school students surveyed in two Florida counties. The results of this study showed that persons with ecological knowledge did not tend to

behave in an ecological manner unless filtered through positive ecological attitude. The study indicated that the students could not define what it meant to be ecologically literate. The study supports the premise that EE programs are necessary to build environmental literacy beyond simply the awareness and knowing stages--to the active and advocacy levels of environmental literacy.

Environmental literacy is a skill base that is built and developed over time (Sobel, 2005). It begins best by giving children a sense of place beginning right outside their own back door (Sobel, 2005). This newly developed environmental literacy, with an increasing sense of awareness and affinity for nature, can then be extrapolated to a level of empowerment and activism for the preservation and protection of the environment (Sobel, 1996). It is literacy nurtured, and expressed by Rachel Carson in her book *Sense of Wonder* (Louv, 2005, p. 12). “if a child is to keep his or her inborn sense of wonder, he or she needs the companionship of at least one adult who can share it, rediscovering with him or her the joy, excitement, and mystery of the world we live in.” Environmental literacy can also be developed in older children and adults with exposure to well-designed EE programs (Louv, 2005).

Environmental literacy, according to Campaign for Environmental Literacy (2007), is the capacity of an individual to act successfully in daily life on a broad understanding of how people and societies relate to each other and to natural systems, and how they might do so sustainably. This idea is accomplished with sufficient awareness, knowledge, skills, and attitudes in order to incorporate appropriate environmental considerations into daily decisions about consumption, lifestyle, career, civics, and to engage in individual and collective action (Elder, 2007). The Campaign for Literacy (Elder, 2007), also notes that, in addition to being a process that takes time, environmental literacy cannot be achieved without progressively achieving all of the stages

in the environmental literacy ladder. The first stage in the literacy ladder is to acquire a general awareness of the relationship between the environment and human life, followed by acquiring a knowledge and understanding of human and natural systems and the processes and connections within. It is from this stage where the learner must then develop attitudes of appreciation and concern for the environment, followed by the development of problem-solving and critical thinking skills. This leads to the final stage, the capacity for personal and collective action and civic participation. Again, loving and being literate about the environment must go beyond the awareness and knowing stages and into the attitudinal and pro-environmental behavior stages for a person to be environmentally literate.

Coyle (2005) cites a framework of environmental literacy derived from the compilation of work from environmental experts and educators and is composed of three basic levels of learning. It is somewhat hierarchical like the environmental literacy ladder proposed by the Campaign for Literacy. This framework is echoed by the NAAEE (2011). In the NEETF/Roper research on environmental literacy in America, the findings revealed that between 50% and 70% of adults heard of most major environmental subjects, and they can be characterized as having simple familiarity but little real understanding of issues in depth. The research demonstrated that environmental awareness by itself has limited lasting effects on environmental stewardship attitudes and by itself has little effect on “environmentally-friendly” behaviors. The next level is personal conduct knowledge, and involves a slightly deeper level of environmental knowledge. This level involves a limited combination of awareness and action that encourages people to engage in immediate personal conduct that contributes to environmental improvements such as saving electricity, gasoline, water, and buying environmentally-friendly products as well as recycling and reducing solid waste, and reducing individually-caused run-off pollution. The final

level in the framework is environmental literacy, and it is distinct from simple awareness and immediate personal conduct instruction because of its depth of information and the actual skills (thinking and doing) that are used on behalf of the environment. As was stated earlier, the framework for true environmental literacy is a set of skills that develop over time. Environmental literacy starts out with framed information, builds an understanding of the underlying principles of the subject, and continues to develop the skills needed to investigate the subject, with an understanding of how to apply that information (NAAEE, 2011).

In noted environmentalist and educator William Hammond's keynote address to the 1988 League of Environmental Educators of Florida's annual conference (Bogan, 1992), he defined environmental literacy as (a) knowing scientific principles of ecology, (b) being aware of the potential magnitude of human impact on the biosphere, (c) showing concern for all living species, (d) valuing responsible environmental behaviors (through the process of values clarification), and (e) participating in political action strategies that lead to planetary well-being. In the 1990 document entitled *Conceptual Frameworks for Environmental Education for the State of Florida*, an environmentally literate individual was defined as one who (a) commands cognitive and affective knowledge about his or her biological and physical surroundings, (b) possesses political know-how (Bogan & Phillips, 1989, as cited by Bogan, 1992), and (c) displays a willingness to engage in responsible environmental behaviors (Hines, 1987, as cited by Bogan, 1992). Bogan and Kromrey (1996) define environmental literacy as knowing ecology, being attitudinally predisposed to the environment, valuing responsible environmental behaviors, participating in responsible environmental behaviors, and knowing proper political action strategies to take on behalf of the environment or environmental issues. Another and more recent attempt to determine the current level of environmental literacy is a baseline study

conducted with middle grade (sixth and eighth grades) students (McBeth, 2008, as cited by Owens, 2012). The National Environmental Literacy Assessment (NELA) 2008 Baseline Study included participants chosen from across the United States. This study included environmental education goals of the North American Association for Environmental Education (NAAEE), and the Environmental Protection Agency (EPA), and the National Oceanic and Atmospheric Administration (NOAA). The NELA 2008 Baseline Study used *The Middle School Environmental Literacy Survey (MSELS)*, developed by leaders in the field of environmental education, including Hungerford, Volk, Bluhm, McBeth, Meyers, and Marcinkowski (Owens, 2012). The researchers sought to measure what they determined to be the four critical components of environmental literacy – ecological knowledge, environmental affect, cognitive skills, and behavior. The MSELS instrument provided a status study of the level of environmental literacy of middle school students in the United States, and it can be used to assess program effectiveness in the hope of raising environmental literacy across the nation (McBeth et al, 2008). In the Maryland Partnership for Children in Nature, April 2009, an environmentally literate person was defined as one who possesses the knowledge, intellectual skills, attitudes, experiences and motivation to make and act upon responsible environmental decisions. Environmentally literate students understand environmental processes and systems, including human systems. They are able to analyze global social, cultural, political, economic and environmental relationships, and weigh various sides of environmental issues to make responsible decisions as individuals, as members of their communities, and as citizens of the world (NAAEE, 2011).

This need for environmental literacy applies on a global scale (Brundtland, 1989). At risk are the ecological issues of environmental degradation, decline and loss of species diversity,

population growth, consumption and conflicts over limited resources, environmental changes including global warming, natural hazards, and extreme weather events, and the need for clean and adequate sources of energy (NAAEE, 2011). The planet is a system of interlocked and interacting biotic and abiotic elements, and the increased pressure on the natural environment are issues that must be addressed as a global society (NAAEE, 2011). As pointed out by NAAEE (2011), there are many parts of the world where people are in need of basic human rights which far outweigh environmental concerns, but it is posited that increased environmental literacy may in fact help in the understanding of the conditions that need to be met in order to alleviate many of these concerns either directly or indirectly. The understanding of environmental issues and the acquisition of the requisite knowledge to do so, the development of environmental affect (caring, concern, responsibility, motivation) and the ability to use critical thinking skills to analyze environmental issues are prerequisites to making decisions about appropriate individual and collective action strategies. These understandings and skills have the potential to build levels of participation in the resolution of local, regional, and global environmental problems that may, in turn, help ameliorate the issues related to human rights (NAAEE, 2011).

Environmental Education on a Local Level

In Florida, environmental literacy takes on even greater meaning in light of Florida's fragile, unique ecosystems and rate of change. People move into the state at a staggering pace; they build communities, and then rebuild again after hurricanes or other weather events have damaged the communities; they enjoy the beaches, the weather and the wildlife. But they also pollute, consume, commute, and contribute to the growth that is negatively impacting the resources that make Florida an ecological gem (Lasso de la Vega, 2004). In 1989, the Florida Legislature mandated that the public schools act as the primary delivery system to create

environmentally literate citizens Florida Statutes, 229.8055, section 30, paragraph 2, 1989; Bogan & Kromrey, 1996). However, in 2000 the Florida Senate repealed statutes 229.8055, 229.8056, and 229.8058 (funding and maintenance relating to the Florida Environmental Education Act, the Office of Environmental Education, and the Advisory Council on Environmental Education) under SB 1738, 26-1042A-00 (HB 4003 is the related House Bill) (Owens, 2012). The state-level survey results from the 2004-2005 NEEAP/EETAP survey of Florida reported that the overall status of environmental education declined since 1995. The report indicated that support for EE programs and state EE associations, funding, and evidence of moves toward legislation to improve EE could be described as minimal to zero. On the federal level, the Obama Administration budget request for FY2014 cut the EPA budget by more than \$296 billion which was below the EPA's budget for FY2012. The language of the budget subsumed the environmental education funding under the new Science, Technology, Engineering, and Mathematics (STEM) initiatives. It remains to be seen if future support for the environment and the need for education for environmental literacy efforts merely become another political rhetoric. Schools and other institutions have been mandated with or have as their goal and mission to keep people of all ages, and in particular young learners, the Earth's future stewards, connected and concerned with the environment (Jenkins, 2010). This is done partly by building their knowledge and awareness of the special qualities and their place within of their local ecologies. Building a local connection can help to develop a person's awareness and knowledge of the local environment, and is best derived from positive learning experiences and numerous contacts with nature. These meaningful contacts with nature help to build a continually developing understanding of the interactions humans have through all the systems, as

well as to develop a personal understanding of one's place in the environment and the weight of their own ecological foot prints (Louv, 2005).

Foundation of the Development of Environmental Education Curricula

Bailey (1903, 1908, 1913, and 1915) developed elementary and secondary school texts to help familiarize rural students with the outdoors. His efforts in educational design were to help the students migrating from rural to urban settings during the United States agricultural depression in the 1890s (Comstock, 1986, as cited by Owens, 2012). Preservationists, like John Muir and Aldo Leopold, believed in a land ethic that stated, "The greatest good for the greatest number of people (Leopold, 1949 as cited Louv, 2005)." This led to nature study programs which emphasized learning through an academic approach of observation, inquiry, and discovery (Roth, 1978, as cited by Stoss, 2008). These nature study programs subsequently integrated with outdoor educational programs that used the outdoor environment as a learning setting. Outdoor education, a forerunner of environmental education, grew out of the extended nature study excursions and was carried on by organizations such as the Boy Scouts and Girl Scouts of America and the Campfire Girls, which were founded in the beginning of the 20th century (Owens, 2012). Changes in science and education in the 1920s lead to revisions in curricula, prompting progressive educators, such as John Dewey (1891, 1980) in his work, *The School and Society*, to advocate for experiential learning and immersing students in the local environment: "Experience [outside the school] has its geographical aspect, its artistic and its literary, its scientific and its historical sides. All studies arise from aspects of the one earth and the one life upon it" (p. 91). The progressive education movement emphasized life-long learning and holistic, interdisciplinary approaches to education (Archie et al. 2013). The education system phased out nature study in the schools and replaced it with science-based curriculum.

This was the beginning of a new approach of environmental education that was ultimately designed to reach citizens of all ages, and was defined and published by renowned environmental educator, William B. Stapp, in his 1969 work, *The Concept of Environmental Education*. Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward a solution (Stapp, 1969). The major objectives are to help individuals acquire (Stapp, p.2):

1. A clear understanding that [humans] are an inseparable part of a system, consisting of [humans], culture, and the biophysical environment, and that [humans] have the ability to alter the interrelationships of this system.
2. A broad understanding of the biophysical environment, both natural and man-made, and its role in contemporary society.
3. A fundamental understanding of the biophysical environmental problems confronting humans, and how these problems can be solved, and the responsibility of citizens and government to work toward their solution.
4. Attitudes of concern for the quality of the biophysical environment which will motivate citizens to participate in biophysical environmental problem-solving.

Attitude in this context implies more than simply knowledge of a body of factual information. It implies, instead, a combination of factual knowledge and motivating emotional concern which result in a tendency to act. Stapp (1969) pointed out that in order for environmental education to have its greatest impact, it must provide factual information to building an understanding and awareness of the biophysical environment, develop a concern for environmental quality which will motivate citizens to work toward solutions to biophysical

environmental problems, and inform citizens as to how they can play an effective role in achieving the goals derived from their attitudes. In their classic article on research into responsible environmental behavior, Hungerford and Volk (1990) point out that the aim of education is the shaping of human behavior and that cultures throughout the world establish educational systems in order to develop citizens who behave in desirable way. One of many desirable behaviors is responsible citizenship, which Hungerford and Volk hypothesized could be effectively promoted by environmental education (1990). Stoss (2008) also states that the essence of environmental education is: to study and explore the living and nonliving natural resources that surround us and to better understand the complexities of their interactions, to quantify their existence, and assure their viability; all the while fostering a sense of responsibility and respect for all those resources. The best way to promote that responsibility and respect is with the development of environmental education programs in the context of providing a greater understanding of the scientific basis of those natural resources in settings to demonstrate the socioeconomic, political, and cultural relationships that will forge a better understanding for environmentally responsible and sustainable behaviors (Stoss, 2008).

During the 1970s and the early 1980s, international and national summits were convened to establish a framework of goals and objectives for environmental education (Archie et al. 2013; Lasso de la Vega, 2004). Environmental education gained recognition internationally when the United Nations conference on the human environment which was held in Stockholm Sweden in 1972, declared that environmental education must be used as a tool to address increasing global environmental problems. The United Nations Education Scientific and Cultural Organization (UNESCO), and the United Nations Environmental Program (UNEP) created three major declarations that have guided the course of environmental education. The first declaration was

the drafting of Stockholm Declaration of 1972, which was developed after having considered the need for a common outlook and for common principles to inspire and guide the peoples of the world in the preservation and enhancement of the human environment (UNEP, n.d.).

The second environmental declaration was the outcome of an international workshop on environmental education held in Belgrade, Yugoslavia on October 13-22, 1975, and known as the Belgrade Charter (UNESCO-UNEP, 1976). The Belgrade Charter built on the Stockholm declaration by further establishing the goals, objectives, and the guiding principles of environmental education programs aimed at an audience that included the general public.

The third declaration of the international environmental education conferences was the Tbilisi international conference on environmental education, which was held in Tbilisi, Georgia, in the former Soviet Union, October 14-26, 1977. It noted a unanimous accord in the importance of environmental education in the preservation and improvement of the world's environment, as well as in the sound and balanced development of the world's communities (UNESCO, 1978). The Tbilisi Declaration refined the Stockholm Declaration and the Belgrade Charter by including new goals, objectives, characteristics, and guiding principles of environmental education. The objectives of environmental education included:

1. Awareness – to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems and issues.
2. Sensitivity – to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems and issues.

3. Attitudes - to help social groups and individuals acquire a set of values and feelings of concern for the environment and motivation for actively participating in environmental improvement and protection.
4. Skills - to help social groups and individuals acquire the skills for identifying and solving environmental problems and issues.
5. Participation - to help social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems and issues.
(Lasso de la Vega, 2004; Hungerford et al., 1990, p. X)

In the United States, provisions for public environmental education began in 1970, when congress passed The National Environmental Policy Act of 1969 (NEPA) under President Richard Nixon, making NEPA law on January 1, 1970 (Bass et al. 2001, Sterling, 1992, as cited by Owens, 2012). Congress passed the Environmental Education Act (Public Law 91-516) in 1970 and established an Office of Environmental Education (OEE) in the Department of Health, Education, and Welfare (United States Department of Education, as cited by Owens, 2012). The goals for the OEE were to:

1. Develop curriculum and initiate and maintain environmental education programs at the elementary and secondary levels.
2. Disseminate information.
3. Provide training programs for teachers and other educational, public, community, labor, and industrial leaders and employees.
4. Provide community environmental education programs.
5. Distribute material dealing with the environment and ecology.

In 1979, Congress moved the OEE to the United States Department of Education (DOE), which was then eliminated during the Reagan administration in 1981 (Bearden, 2007, as cited by Owens, 2012). Under George W. Bush, Congress passed the National Environmental Education Act of 1990 (NEEA), Public Law 101-619 (United States, 1990). The legislation recognized the importance of environmental education with the following language, “effective response to complex environmental problems requires an understanding of the natural and built environment, awareness of environmental problems and their origins (including those in urban areas), and the skills to solve these problems” (United States 1990 on the 101st Congress, Public Law 101-619, Section 2, Nov. 1990, as cited by Owens, 2012). The NEEA then established a program within the Environmental Protection Agency (EPA) to increase public understanding of the environment. Under Section 9 of the act, the EPA established the National Environmental Education Advisory Council (NEEAC) and a federal task force on environmental education which provided reports to Congress on the status of environmental education in the United States in 1996 and 2000 (NEEAC, 2005, Strong, 1991, as cited by Owens, 2012). Section 10 of the act established the National Environmental Education and Training Foundation (NEETF) which was then changed to the National Environmental Education Foundation (NEEF). NEEF is a private, non-profit organization that encourages cooperation between public and private sectors to support environmental education and training (Owens, 2012). Congress did not reauthorize any funding for the NEEA of 1990 when it expired in 1996, but continued to appropriate minimal funding for the programs each year until FY2011 even in light of the Bush administration’s proposal to eliminate all funding for the NEEA-provisioned programs beginning in FY2003 (Lasso

de la Vega, 2004; Bearden 2007, as cited by Owens, 2012). Congress consistently opposed the Bush administration's attempt to completely terminate the program (Stoss, 2008).

A resurgence of interest to update and improve national environmental education effort in the United States beginning around 2007 partly received impetus from Richard Louv's (2008) *Last Child in the Woods*, but also from the realization that due to the fervor of the high-stakes, standardized testing and accountability dogma of the No Child Left Behind Act of 2001 (NCLB), environmental education was being put on the shelf to gather dust. Consequently, the concern was that students were being further and further removed from any meaningful contact with nature and the environment in favor of core studies of mathematics and reading. The key elements of NCLI, as part of the reauthorization of the Elementary and Secondary Education Act (ESEA), called for states to develop plans to improve the environmental literacy of elementary and secondary school students as a condition for receiving much sought after federal education funds (Bearden, 2007, as cited by Owens, 2012). This has grown into the NCLI Coalition which is a national partnership of over two thousand business, health, youth, faith, recreational, environmental, and educational groups representing over 50 million Americans (Baynet, 2011, Chesapeake Bay Foundation, n.d., as cited by Owens, 2012). Their efforts and momentum are supported by studies that show that environmental education has a measureable, positive impact on student achievement not only in science but in math, reading, and social studies. Business leaders are realizing that an environmentally literate workforce is critical to a burgeoning green economy (Baynet, 2011, as cited by Owens, 2012). There is an ever-growing environmental consciousness that the future of the

country is dependent on a well-educated, environmentally-literate public to be the wise stewards of the environment. In their report to Congress assessing environmental education and the implementation of the NEEA in the United States, the NEEAC and EPA (1996), asserted that it is environmental education that can best help individuals make the complex conceptual connections among environmental protection, economic prosperity, benefits to society, and their own well-being. The National Environmental Advisory Council (NEEAC) (2005, as cited by Owens, 2012)) again submitted a report to Congress on the status of environmental education in the United States. According to the report, environmental education has achieved national prominence, and every state has made progress towards institutionalizing and prioritizing environmental education. The NEEAC (2005) identified the primary challenge as the need to increase environmental literacy across all age groups for both current and future generations, which will enable individuals and groups to analyze environmental issues and be able to make informed decisions. The NEEAC (2005) report also provided a set of eight recommendations to increase the likelihood of success some of which included updating legislation, measuring results, and providing the support and dependable source of funding necessary to support environmental education initiatives.

It was the National Environmental Education Advancement Project (NEEAP), sponsored by the Environmental Education and Training Partnership (EETAP), which conducted state-level surveys of environmental education in 1995, 1998, and 2005 (Owens, 2012). Their surveys showed that by 1998, more than 21 states had model environmental education programs in place, while 19 states had correlated their state standards with environmental education goals and objectives.

The connections of the environment to real-life issues and to what students actually do outside of the school walls makes learning interesting and relevant. Unfortunately, studies show that far too many students have disengaged and have either mentally or physically removed themselves from the cycle of the pressures of rote learning and high-stakes testing. Allowing students to reconnect with the outdoors and the environment, and using an integrative foundation for learning is seeing significant results in research across the spectrum for the very young through their college years into adulthood.

Americans have been engaged in a quest to find the formula that fixes or creates highly-effective schools in order to produce a competent and literate society in response to the Secretary of Education, T.H. Bell's 1983 dire warnings of the trajectory of the education system in, *A Nation at Risk: The Imperative for Educational Reform* (NEETF,2000). The school reform movement has called for the development of well-educated individuals who have a deep and abiding knowledge of the world in which they live. Society as a whole is in need of citizens who are prepared to take active roles in their communities, and business is calling for a workforce that is skilled in the leadership competencies and critical thinking skills required in an ever-increasing complex global environment. NEETF (2000) also posits that environment-based education is a natural way to integrate curriculum around issues of interest to students and teachers. The schools who have adopted EE as the central focus of their curriculum are cited in the NEETF report have documented that in addition to reaching school reform goals they are seeing students more actively engaged and interested in their own learning, and better able to transfer knowledge.

This idea of having the outdoors and environment as a learning setting is not new as previously discussed in the historical progression of EE. John Dewey (1891) figured that out long ago, when he wrote in *School and Society*:

From the standpoint of a child, the great waste in the school comes from his inability to utilize the experiences he gets outside the school in any complete and free way within the school itself; while, on the other hand, he is unable to apply in daily life what he is learning at school. That is the isolation of the school-its isolation from life. When the child gets into the school room, he has to put out of his mind a large part of the ideas, interests and activities that predominate in his home and neighborhood. So the school, being unable to utilize this everyday experience, sets painfully to work...to arouse in the child an interest in social studies. (Dewey, 1891, p. 52)

It is agreed that the central purpose and mission of schools is to educate young people to participate and civically engage in the community and society (Kaye, 2011). Schools that *green* their curriculum by aligning their standards with the environment as a central focus reap the advantages of creating engaged and empowered students who are proponents of a safer and healthier world (Kaye, 2011). As was stated earlier in the definition and description of true environmental literacy, the study and developed awareness of the environment and its ecological components must go further to ensure students are taught how to take purposeful action and apply what they have learned to the benefit of the environment. A sound education must equip students with the knowledge, skills, understanding, attitudes, and values compatible with a sustainable society, and goes beyond the *green* agenda to increase awareness of the complexity and dynamism of issues that have an effect on the health of the environment (NAAEE, 2011).

Effective EE develops students who have the capacity for collaboration and creativity in problem-solving, critical reflection and systemic and future-thinking, an interdisciplinary orientation that makes the connections, and motivates action for environmental sustainability. Proponents of EE strongly believe it supports current directions in educational reform that emphasize higher-order thinking skills, links to the real world, and integration of knowledge and action skill across disciplines, (Iozzi & Marcinkowski, 1990; Champeau, 1992, as cited by Archie, 2001). Deborah Simmons, director of the National Project for Excellence in Environmental Education, an initiative of NAAEE, is committed to the realization that EE promotes good science, serious debate, and thoughtful action. Largely because of its focus on citizenship, EE is compatible with other educational approaches that are now coming into their own, such as service learning, character education, and education for democratic participation. These educational approaches also share a common commitment to making education relevant to students' lives outside the classroom walls. They extend their reach beyond the traditional knowledge and skills approach to education, with lessons that encompass feelings, beliefs, and actions. This comprehensive approach is a powerful tool for the social, emotional, and intellectual growth of students (Archie, 2001). There are multiple benefits of EE as cited by Archie (2001), when EE and service learning in particular, empower students to take responsibility for the environment and quality of life in the communities around them. An EE-oriented focus engages students' minds and hands, often in real world, relevant investigations that are inquiry-based, interdisciplinary, and supportive of a standards-based curriculum. A future-thinking benefit of EE is that it helps to familiarize students with careers in environmental fields. Career opportunities related to environmental protection range from manual labor to high-tech jobs. Students should be exposed to role models, opportunities, and career information. The

environment-related fields represent a significant source of skilled jobs with good pay for low-income persons, and can help to redress the underrepresentation of minorities and women in careers related to the environment (McCrea, McGlaufflin, & Simmons, 1996, as cited by Archie, 2001). Current evidence (Glenn, 2000, as cited by Archie, 2001), supports the premise that, compared to traditional educational approaches, environment-based education improves academic performance across the board. In a report prepared by the NAAEE (2004), EE demonstrates that it can help improve the overall quality of education which is indicated by:

1. Significant improvements in reading scores.
2. Improvement of math scores.
3. Better performance in science and social studies.
4. Students better able to make connections and transfer their knowledge from familiar to unfamiliar contexts.
5. Students learned to “do science” instead of just passively “learn science.”
6. Classroom discipline was significantly reduced.
7. All students had the opportunity to learn at a high level. (Glenn, 2000, as cited by Archie, 2001, p.5)

In their 1998 study, titled *Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning (EIC)*, Lieberman and Hoody conducted a study of 40 schools that indicated students do indeed learn more effectively within an environment-based context than within a traditional educational framework. An EIC curriculum appears to significantly improve student performance in reading, writing, math, science, and social studies, and enriches the overall school experience. They were able to conclude that a comprehensive educational framework used in an environment-based curriculum appears to have benefits over the traditional

compartmentalized approaches in a majority of formal educational settings. They found that performance on traditional measures of competence as well as student enthusiasm and motivation tends to increase, and that improvement in student performance is often dramatic (1998). They found that students exposed to programs using EIC approaches often become enthusiastic, self-motivated learners (Lieberman & Hoody, 1998). In addition to traditional subject-matter knowledge and basic life skills, EIC students gained a wealth of added educational benefits, including: a comprehensive understanding of the world; advanced thinking skills leading to discovery and real-world problem-solving; and an awareness and appreciation of the diversity of viewpoints within a democratic society (Lieberman & Hoody, 1998).

The Campaign for Environmental Literacy (Elder, 2007) reported on research that shows enormous benefits from EE, and that when it is integrated into the curriculum, and in particular, the science curriculum, students do demonstrably better in science achievement. They posited that these reported findings are due to the fact that EE connects the classroom learning to the real world. In addition to having a measurably positive impact on core curricula, EE has also had a positive impact in reducing and eliminating classroom discipline and management issues because students are engaged and motivated in their own learning (Elder, 2007). Environmental education and EIC provide students with the critical tools to be a part of the 21st century workforce. Business leaders are becoming increasingly cognizant that an environmentally-literate workforce is critical to their long term success and profitability, with better environmental practices and improved efficiencies impacting positively on the bottom line while helping to better position and prepare their companies for the future (Elder, 2007). Some savvy business leaders understand that the key component of an environmentally sustainable business is a highly educated work force, particularly involving ecological and environmental principles.

The other issue that EE helps address is the growing level of Nature-Deficit Disorder (Louv, 2005), in which students and entire families are increasingly removed and disconnected from the outdoors and natural settings. An ever-growing cadre of researchers supports the premise that the loss of natural habitat, or disconnection from nature even when it is available, has enormous implications for human health and child development. Louv cited research findings that reported children spend an average of six or more hours a day in front of the television or a computer screen but less than four minutes per day involved in any sort of unstructured, outdoor play or contact (2005). Children six to 11 year old spend about 30 hours a week sedentary and in front of a screen of some sort. The time spent passively engaged in front of a television or computer directly correlates with the measures of their body fat (Louv, 2005). The childhood link between outdoor activity and physical health is clear. The Centers for Disease Control (CDC), as cited by Louv (2005), reports that the number of overweight adult Americans increased over 60% between 1991 and 2000. According to the data, the United States population of overweight children between ages two and five increased by almost 36% from 1989 to 1999. In addition to having detrimental effects on their physical health such as increased risk for heart disease and risk for diabetes, another profound negative impact of inactivity is that children get depressed. Nature is often overlooked as a healing balm for the emotional stresses and hardships in a child's life (Louv, 2005). A new surge in research on the impact of nature on human physical and emotional health points to a type of separation anxiety disorder arising from an increasing disconnect between people and the natural world. Research, as cited by Louv (2005) also pointed to the positive effects of involvement in and with nature on health, concentration, creative play, and the development of a bond with the natural world. This helps build the foundation for our future environmental stewards. Louv cited studies that demonstrated the significant positive

effects of contact with nature (2005). One study from the New York College of Human Ecology at Cornell compared the psychological well-being of students who live in high-nature conditions compared with children who live in low-nature, urban settings. The researcher of this study reported that the protective impact of nearby nature is strongest for the most vulnerable children—those experiencing the highest levels of stressful life events (Louv, 2005). It was also reported that children who live in areas with more contact natural settings received more positive ratings on measures of behavioral conduct disorders, anxiety, depression, and attention disorders than children who live in area devoid of natural areas. Another interesting observation reported by Louv (2005) was that of a nature photographer who would make presentations in high schools where he found that students with whom he had contact seemed to display more hyperactivity and an inability to focus. When he began his presentations with images of natural settings, he noticed that students were better able to focus and calm down as if the images had some curative effect. Contact with nature and being allowed to interact and explore outdoor settings helped children in many fundamental ways such as longer attention spans and focus, more creativity and imaginative expression, higher levels of self-confidence and feelings of empowerment, higher standardized test scores, greater academic success, and significant improvements in cognitive development, self-discipline, language skills, and social interactions (Boutis et al. 2010).

In the results of a research study, Taylor, Kuo, and Sullivan (2001), discussed how there are over two million children in the United States alone who were struggling with chronic attentional deficit disorder (ADD), and many who dealt with varying degrees of the same issue. ADD reduces a person's attentional capacity and in doing so, has detrimental effects on many aspects of life from academics, to social and interpersonal relationships, to personal growth. Far too many children receive treatments in which they are medicated with powerful drugs that can and

do have serious and detrimental side effects and limited effectiveness (Taylor et al. 2001). Taylor et al. (2001) were able to conclude that children in their study were able to function better than usual after activities in green and natural settings. They also found that the greener a child's play area, the less severe his or her attention deficit symptoms. They posit that contact with nature and natural settings may support attentional functioning in a population of children who are desperately in need of attentional support.

In another study, Carrier (2009) examined the impact of EE lessons in a study that compared activities conducted in the schoolyard with that of traditional classroom activities involving elementary boys and girls. Carrier cited various research studies on gender differences in students' learning styles that led researchers to identify the traditional classroom environment as a better fit for most girls who were described as verbal-emotive, able to sit still, and multi-task (2009). Boys, on the other hand, in elementary school tend to be impulsive, display special-kinesthetic learning styles, and display far more physical aggression. There continues to be persistent concern that despite opportunities for boys having greater potential to participate in active lessons in science, there is inadequate consideration of boys' learning styles in traditional school settings (Carrier, 2009). The findings from introducing more active learning and EE into the elementary science curriculum improved student learning and offered more opportunities for boy-friendly instruction. Boys in the treatment group in the outdoor setting had higher gain scores than did the boys who participated in the traditional classroom setting. The boys in the treatment group also showed greater gain scores in the measure of environmental attitudes than did the traditional condition, and their scores were also significantly higher than the girls in the outdoor treatment setting (Carrier, 2009). Including both hands-on and minds-on activities in an outdoor setting offered an increase in involvement and engagement for both boys and girls.

The middle school years and adolescence has always been a time of angst and discomfort, but the effects are compounded by being separated from the calming effects of and connection with the outdoors and natural settings. Middle school students and adolescents struggle with the stresses and discomfort of changing from a child to adult, trying to achieve some level of independence but fitting in, and then many of those stresses are compounded by intolerable family situations, violence, poverty, over-sexualized media and pressures, social media, and far too easy access to drugs and alcohol (Hine et al. 2009). On top of all those pressures and stresses that many of them carry around as part of their mental baggage, they are supposed to attend to, comprehend and excel at grade-level or better in their academic lives. Many students are literally just physically at school but completely absent in terms of mental engagement, interest, or motivation to learn and succeed, and consequently end up giving up and dropping out at 16 years of age (Conner, 2007). Wilderness therapy programs (Conner, 2007) are powerful and effective interventions for adolescents with behavioral, mental health and substance abuse disorders, and are part of a broader field called outdoor behavioral health. The purpose is to separate youth from negative influences and place them in environments that are safe, centering, and that will support their growth. In a three-year formative research study by the Mentor Research Institute (Conner, 2007), 53 children were referred to three separate outdoor wilderness therapy programs. Of these children, 63% were admitted with severe mental health problems, 43% had complex diagnostic issues, and 52% of the children were potentially suicidal. An estimated 58% used alcohol or drugs. Nearly 80% were high risk of dropping out of school. Virtually all of them had significant emotional and behavior problems. The results of the three-year study suggested that wilderness therapy programs can have a significant positive impact on adolescents. Nearly 95% of the graduates had no significant problems within 30 days of graduation from being immersed

in natural, wilderness settings. Six months after completing the programs, 62% had no significant problems, with the increase in problems due to a phenomenon known as the post-wilderness crash. By one year after the treatment, with appropriate follow-up care, most graduates of the wilderness program, upwards of 82% had turned their lives around and well doing well. The study also showed a significant reduction in the complexity and severity of problems, and the risks of suicidal behavior, violence, drug abuse, and rate of school drop-outs were significantly lower (Conner, 2007). The wilderness programs studied in the research were successful in initiating many changes in the participating adolescents' health, behavior, and their attitudes to themselves, others and to the natural environment.

In another study about the social, psychological, and cultural benefits of experiences in the natural habitats and wilderness areas, Hine et al. (2009), discussed the emergent body of evidence that continues to demonstrate the health and well-being benefits experienced by individuals after spending time in the natural environment. Health benefits seen as a result of contact with nature include reduced stress levels, improved mood, enhanced psychological well-being, and improved attention and concentration (Hine, et al. 2009). Natural places facilitate stress recovery, encourage exercise participation, stimulate development in children and provide opportunities for personal development and sense of purpose in adults (Health council of the Netherlands, 2004, as cited by Hine et al. 2009). Contact with nature also enables social contact and so builds social capital and a creation of memories of place (Peacock et al, 2008, as cited by Hine et al. 2009).

In the project, *Place-Based Education and Academic Achievement*, (Chawla, Duffin, Sobel, and Peer Associates, 2005) cited an American Institutes of Research 2005 study in California that was designed to measure the effects of outdoor education programs for children in

California. The design of the study included at-risk sixth graders from four schools to be involved in three hands-on, ecology-oriented outdoor programs. It used a delayed treatment design with 119 students in the treatment group, and a control group of 106 students who participated later in the year. They used student, teacher, and parent surveys administered as pre-test, post-test, and 6-10 week post-test. The goal was to measure social and personal skills, stewardship of the environment, knowledge and understanding of science, and the benefits specifically for English language learners (ELL) (Chawla et al. 2005). The findings showed that, although there were no significant changes in environmental stewardship scores, the treatment group had significantly higher science scores, and teachers reported increases in self-esteem, conflict resolution, better relationships with peers, increased problem-solving, motivation to learn, and better behavior in the classroom.

This idea of place being right outside the back door or a house or school, or in a local creek or stream, or patch of grass, a garden or even in a handful of soil is crucial and essential as a starting point for EE and building environmental literacy (Sobel, 1996). Placed-based education is a philosophy of EE in which the schooling starts right outside the back door with a focus on the elements and components of the neighborhood rather than leaping right into lessons about the solar system or the devastation of rainforests in other countries and continents. If students, especially the very young, are bombarded with the catastrophic elements of EE in places they have no contact with or control over, it begins to make children avoid issues and retract in what David Sobel termed ecophobia which is a fear of ecological deterioration. Sobel (1996) said that in our quest to inform students about ecological issues around the world we cut children off from their roots. If we deprive them of any direct experience with nature and all the incredible things that entails, children begin to associate nature with fear and apocalypse, not with joy and wonder.

If we give students the opportunity to observe and grasp the life cycles of the animals and plants and so many other things that they have close at hand, then the foundation begins to be built upon which an eventual understanding of ocelots, orchids, and faraway places begins to make sense (Louv, 2005). Russell (1990) points out that the best possible facilities for teaching environmental and nature studies are available to all schools, regardless of whether they are urban, suburban, or rural. By using the school grounds effectively, teachers help children begin to build a sense of place where they can observe all the natural forces that relate to their situation. Students can experience and measure temperature changes, precipitation, air currents, pollution, the forces of disintegration and decomposition, plant and animal relationships, and people relationships because they are things that occur everywhere and will vary from one locality to another. Russell (1990) explains that teachers and schools must work to keep the natural spark of curiosity alive in students, and nurture their abilities to think and permit children to grow from a familiar place outward. Russell also explains that the school grounds provide the perfect opportunity for teaching students the three things she believes is needed to foster the development of responsible environmental actions in the future. These are:

1. An awareness and understanding of the interrelationships in the natural world;
2. A concern and empathy about the misuse of the environment;
3. A willingness and ability to initiate and support positive action on the basis of this knowledge. (Russell, 1990, p. 3)

Place-based or environment-based education uses the environment as an integrating context (EIC) across the disciplines. It is characterized by interdisciplinary learning, team teaching, hands-on learning experiences that often center on problem-solving projects. It is a learner- centered model of education that adapts to students' individual skills and abilities as they

explore the local community and natural surroundings and has been shown to increase the environmental literacy of students (Chawla et al. 2005).

Placed-based education initiatives are becoming the model for school reform efforts, with a place-based education paradigm at their core (Sobel, 2005). There are philosophical directions in place-based models that differentiate them from the more narrow-minded traditional school reform initiatives that Sobel illustrates in his text. These new directions are described below:

New direction 1 - From extraction to sustainability as the underlying metaphor:

Traditional school-reform initiatives are grounded in the paradigm of limitless resources and the purposes of an extractive economy determined to dominate nature and increase the material wealth and security of its own species. Instead we need a school-reform model that focuses on the principle of sustainability by figuring out how to live within our means both at a local and global level. Embracing sustainability as an organizing principle means that we accept a concept of limited resources and start to look for ways to simultaneously enhance economic vitality, environmental quality, and school improvement at the local level (Sobel, 2005).

New direction 2 – From fragmentation to systems thinking as a conceptual model: Place-based education foster community ties, and place-based educators are intent on addressing the problem of student alienation from school. John Goodlad in his research estimates that more than two-thirds of all high school students are alienated by the education system with ever-increasing numbers of students from all demographic categories choosing to walk away from something that holds no more meaning to them (Chin, 2001, as cited by Sobel, 2005). The remedy may be in the initiatives of place-based educators advocating for an integrated curriculum that

emphasizes project-based learning, teacher collaboration, and extensive use of community resources and volunteers.

New direction 3 – From here-and-now to long-ago-and-far-away as a developmental guideline for curriculum design: The third commitment of place-based educational reformers is to forge a change that is committed to developmental appropriateness. As was previously mentioned in this literature view, age-level appropriateness is important for building a foundation for environmental literacy. Students should be allowed to learn about the trees in the schoolyard before plunging them into an in depth study of the rainforests in peril. It makes developmental sense to progress from near to far – to begin with the schoolyard, to the local environmental nature center or nearby river or marshlands as a context for learning in grades kindergarten through sixth (Sobel, 2005).

New direction 4 – From mandated monoculture to emergent diversity as a school district goal: Right now the emphasis in most schools, due to the marketing of canned curriculum programs, is for everyone to be on the same page on the same day which Sobel (2005) points out severely hampers a school's abilities to be particularized and adapted to their own unique local communities. Recognizing that there are many interesting ways to go from point A to point B frees up teachers and schools to plan curriculums that uncover and cultivate each child's unique genius. This is reflected in the following by William James (cited by Sobel, 2005) on his theory of change:

I have come to believe that the true path of environmental education lies not in changing mandates, frameworks, curriculum standards, and generic textbooks but in changing the educational structure that currently expends its energy in creating mandates,

frameworks, curriculum standards, and generic textbooks. Rather than require all teachers to teach environmental education, I would rather give teachers the freedom to teach from their hearts and give parents the freedom to choose the teaching approach they want for their children. I then want to help develop and demonstrate that an education that studies the world right around us is superior to a standardized, generic education. If we demonstrate this convincingly, then there will be a growing demand from parents for teachers who teach this way. (Sobel, 2005)

The NAAEE (2011) also indicates that students in the early years are concrete thinkers with a natural curiosity about the world right around them. They contend that EE can build on these characteristics by focusing on observation and exploration of the environment beginning close to home--in their vernacular, *keep it simple and keep it local*. This also helps learners make the important links between conceptual understanding, what is happening in their community, and their own responsibility for the quality of their local environment (NAAEE, 2011). In the NAAEE 2004 publication, they provide six criteria which can be used to determine the level of excellence of EE materials and programs:

1. Fairness and accuracy: EE materials and programs should be fair and accurate in describing environmental problems, issues, and conditions, and in reflecting the diversity of perspectives on them.
2. Depth: EE materials and programs should foster awareness of the natural and built environments, an understanding of environmental concepts, conditions, and issues, and an awareness of the feelings, values, attitudes, and perceptions at the heart of environmental issues, as appropriate for different developmental levels.

3. Emphasis on skills building: EE material and programs should build life-long skills that enable learners to prevent and address environmental issues.
4. Action orientation: EE materials and programs should promote civic responsibility, encouraging learners to use their knowledge, personal skills, and assessments of environmental issues as a basis for environmental problem-solving and action.
5. Instructional soundness: EE materials and programs should rely on instructional techniques that create an effective learning environment such as learner-centered instruction, differentiated delivery, and making connections to students' everyday lives.
6. Usability: EE materials and programs should be well-designed and easy to use with characteristics that include clarity and logical progression, user-friendly, log-lived and adaptable to the situation and environment while still meeting national, state, and local requirements. (NAAEE, 2004, p. 50)

Educators and researchers have worked hard to demonstrate the relevance of EE to the larger field of K-12 formal education (Archie, 2001). Strengthening this connection is one of the goals of EETAP, funded the EPA's Office of Environmental Education (OEE) authorized under the NEEA of 1990. In collaboration with over 20 partner organizations across the United States, they have promoted the link between EE and traditional subject areas and provided the tools that help educators realize the potential of EE to positively impact educational reform initiatives (Archie, 2001). The three largest national EE projects, Project WET, Project Learning Tree (PLT), and Project WILD have correlated their curriculum materials to national and state

standards, and have incorporated these curricular links for teacher workshops that aid teachers in developing EE programs adapted to their own specific needs (Archie, 2001).

The Project WET program was established in 1984 by the North Dakota State Water Commission in the agency's planning division to educate the public about water resources and its management. Based on significant interest from teachers and young adults, the commission focused part of its education efforts on reaching children through teachers and informal educators. Project WET's mission, goal, core beliefs and first activities were created in North Dakota. Currently, Project WET provides worldwide water education with the credo to educate, empower, and act reflective of the necessary components of EE designed to promote environmental literacy. The mission of Project WET is to reach children, parents, educators and communities of the world with water education by educating children about the most precious resource on the planet — water. Project WET is an interdisciplinary water education program that's interactive, hands-on, and easy for teachers to use when designing and delivering EE related to water resources. In 2010, The Project WET curriculum was updated and correlated to reflect the newer common core state standards for English language arts and literacy in history and social studies, science, and technical subjects, as well as the common core standards for mathematics in grades K-12 (NAAEE, 2010).

The conceptual framework of Project WET according to NAAEE (2010) focuses on the following:

1. Water has unique physical and chemical characteristics.
2. Water is essential for all life to exist.
3. Water connects all Earth systems.

4. Water is a natural resource.
5. Water resources are managed.
6. Water resources exist within social constructs and cultural contexts.

The affective framework of Project WET (NAAEE, 2010) focuses on the following points:

1. People's awareness of and sensitivity toward water and water-related concepts and issues.
2. People's attitudes (opinions, likes, and dislikes) toward water and water-related concepts and issues.
3. People's values (consideration of worth, need to cherish, importance) toward water and water-related concepts and issues.
4. People's behavior toward and expression of water and water-related concepts and issues, influenced by awareness and sensitivity, attitudes, and values.

The skills framework of Project WET (NAAEE, 2010) centers on the following skill development with acquired information: the gathering, organizing, analyzing, interpreting, application, evaluation of the application, and finally the presentation of evidence learned from the application and evaluation skill levels.

The Project WILD curriculum is an interdisciplinary program written by the Western Regional Environmental Education Council (WREEC) in 1986 in cooperation with the Western Association of Fish and Wildlife Agencies (WAFWA). The WILD program integrates subject-specific curriculum into an interdisciplinary program with the goal of moving learners from awareness to action (Bogan, 1992). Project WILD is one of the most widely-used conservation and EE programs used by educators of students in grades K-12. The program emphasizes

wildlife because of their intrinsic, ecological value as well as their role in helping teach students about how ecosystems function. The Project WILD curriculum addresses the need for students to develop into responsible citizens of the planet, and is based on the premise that young people have a vital interest in learning about the natural world. The framework of Project WILD covers the following topics: (a) awareness and appreciation of wildlife, (b) human values and wildlife, (c) wildlife and ecological systems, (d) wildlife conservation, (e) cultural and social interaction with wildlife, (f) wildlife issues, trends looking at alternatives and consequences, and (g) wildlife, ecological systems, and responsible human actions (Bogan, 1992; NAAEE, 2010).

WILD activities are designed to develop the ecological and environmental literacy of students and are organized around the conceptual framework of the awareness to action (A to A) continuum based in part on the original objectives in the 1978 Tbilisi Declaration (Barnes, 2013). The continuum represents sequential, cumulative sets of skills and a framework that will develop the ecological literacy of students. The five phases include awareness and appreciation, knowledge and understanding, attitudes and values, problem-solving skills, and personal responsibility and action (Barnes, 2013).

Project Learning Tree Environmental Education (PLT) is an EE program begun in 1976 which teaches the principles of diversity, systems, structure and scale, and patterns of change from a perspective of forests and trees. The program also teaches the principles and history of forestry in the United States, and stresses the interdependency of plant and animal life in a forest as well as viewing the tree as a renewable resource that needs to be carefully managed and valued (NAAEE, 2010). PLT uses trees and forests as windows on the world to inspire a lifetime of environmental stewardship by helping students learn how to think as opposed to what to think. The goals of PLT include: (a) to develop students' awareness, appreciation, skills, and

commitment to address environmental issues, (b) to provide a framework for students to apply scientific processes and higher order thinking skills to resolve environmental problems, (c) to help students acquire an appreciation and tolerance of diverse viewpoints on environmental issues and develop attitudes and actions based on analysis and evaluation of available information, (d) to encourage creativity, originality, and flexibility to resolve environmental problems and issues, and (e) to inspire and empower students to become responsible, productive, and participatory members of society.

Summary

In this literature review, I provided a philosophical framework and historical perspective of the need for environmental literacy. I conclude from this review that environmental literacy is needed if we are going to be able to meet the challenges we will inevitably face in the future as the pressures and demands on limited resources continues unabated and without planning and foresight. The concern for the environmental quality and preservation is deeply rooted in the history of this country, and is now a prominent global concern with the acknowledgement that the Earth is an interconnected and closed system in which individual actions impact the whole. In this literature review, I provide the conceptual framework that in order to achieve acceptable levels of environmental literacy as a nation we are in need of high-quality and thoughtful environmental education programs that take learners from levels of simple awareness to levels of empowerment and action on behalf of the environment. One of the best ways of engaging children in issues concerning the environment is to build upon the natural curiosities and interests in the world around them with a place-based education model. The benefits of EE go far beyond developing the environmental stewards and decision-makers of future, indicated by research that shows allowing children to be connected to the natural world has curative powers

over the stresses of childhood and adolescence. The three national EE programs – Project WET, Project WILD, and Project Learning Tree provide a perspective of excellence in EE from which to compare other outdoor environmental education programs. Additionally, PBE strategies are also important components to include in environmental education programs to assure students and learners are able to develop a sense of and connection to place--the thought being that when someone has awareness and appreciation for the richness of the environment right outside their own back door, they are far better equipped and far more likely to be able to extrapolate those lessons and behaviors from a local scale outward to a global scale.

Chapter III

Research Method

Introduction

The purpose of this study was to explore the cultures and curricula that guide the instructional delivery and practices of the educators and their respective environmental education programs at three local outdoor nature education centers located along the Hillsborough River in both Hillsborough and Pasco County, Florida. The observed program components were observed through a critical lens of the Awareness to Action continuum (A to A) strategies and Place-based Education (PBE) models. As I showed through the literature review, solid environmental literacy is achieved when students are engaged in problem-solving and action. The goal of environmental literacy is to develop a sense of confidence and empowerment in students beyond the lower A to A phases of awareness and knowledge into upper phases or levels of attitude development, problem-solving skills, and then provide the support students need to test their skills for taking action and adopting pro-environmental behaviors. The intent of the study was to determine the levels each program includes in the A to A strategies and PBE models of instruction. A to A strategies or PBE models were deemed to be included in these programs if they were mentioned at any degree in spoken words from the interviews, were observed during the delivery of the program, or were included as applicable benchmark standards in the written curriculum.

Participants

The three environmental education sites in the study are located along the Hillsborough River and, beginning upstream on the river, include the Crystal Springs Preserve Education Center located in Pasco County, Nature's Classroom in Hillsborough County, and Lettuce Lake and Audubon Resource Center (ARC) also located in Hillsborough County, Florida.

Crystal Springs Preserve Education Center, located in Pasco County, is at the head waters of the spring system that feeds the Hillsborough River, which provides 90% of the water that forms the river. The preserve is a privately owned site, operated by the Thomas family. The curriculum program services more than 50,000 students annually, and incorporates activities from both Project Wild and Project Wet, but is also customized with a set of environmental experiences depending on the needs of any particular group. Their program is not bound by specific curricular benchmarks because they are privately owned, enabling them to customize their program based on the developmental and curricular needs of students of all ages and grade-levels. The preserve is only accessible to individuals or groups who have made a reservation. The EE center has an experiential indoor classroom, as well as a rich outdoor areas devoted to having students interacting with plants and animals, and building their understanding of the value of our water resource bubbling up in the spring and feeding the Hillsborough River that eventually becomes their drinking water. The activities are intended to help students make important connections between themselves and the watershed and aquifers.

The Nature's Classroom, located in Hillsborough County, and is funded by grants from Southwest Florida Water Management District (SWFMD). The site and program serve as an environmental education center for a three-day experiential learning excursion annually for 14,500 Hillsborough County School District (SDHC) 6th grade public school students as well as for private and charter school students. It is located on 365 acres of land adjacent to the Hillsborough River in Thonotosassa, Florida. The land is owned by SWFMD, one of five agencies in Florida responsible for maintaining the quantity and quality of water for the state. The focus of the three-day program is to take 6th grade students through a birds of prey aviary and native animal compound, interacting with and learning about reptiles with a focus on gopher

tortoises, hiking through upland and lowland habitats, orienteering, taking a boat excursion, and netting and identification of aquatic organisms.

The third environmental site in the study is Lettuce Lake and Audubon Resource Center (ARC) located in Tampa and also adjacent to the Hillsborough River in Hillsborough County. The ARC program serves as an outdoor experiential excursion for SDHS 4th grade students. The education program is also funded by SWFMD, and the grounds-keeping and maintenance is funded by the Hillsborough County Parks System. The focus of the Lettuce Lake program, which services 1,300 to 1,400 4th graders annually, is to introduce students to their local lake, wetlands, and river watershed. Students participate in activities in the field, such as using dip-nets to take species diversity surveys along and in the marshy edges of the Hillsborough River. The 4th graders and teachers who have engaged in the prior-learning activities about wetlands in order to prepare for their park visit spend a half day at the park as a culminating activity.

Sample

The population sample included a total of nine interview subjects from the three EE sites, including three from Crystal Springs Preserve, four subjects from Nature's Classroom, and two subjects from the Lettuce Lake EE program. The nine interview subjects included five females and four males, ranging in age from middle thirties to three subjects over sixty years of age. Collectively, they have been involved in EE in some capacity ranging from 11 to 44 years to more than 60 years involvement in EE in some capacity. Cumulatively, the participating instructors have been at each of their particular EE sites from seven to 15 years with one person on site for more than 42 years. Of the 9 interview subjects, four of them hold baccalaureate degrees in a variety of majors, with the other five having achieved several advanced graduate degrees in science and Florida Master Naturalist certifications.

Research Focus

The research goal of this study was to ascertain to what degree three outdoor environmental education programs include A to A strategies and PBE models. An evaluation of the collected data was used to develop a narrative story of the environmental education being offered to students at the three education sites located along the Hillsborough River watershed.

Measures

The measurement standard for designating the inclusion of A to A continuum strategies and PBE models was if any wording of the strategies were mentioned or displayed in any degree in spoken words during the interviews, or were observed during the delivery of the program, or were included as any part of the benchmark standards in the written curriculum.

The two variables or critical lenses through which the collected data are filtered were the A to A continuum strategies and PBE models of instruction. The A to A continuum is comprised of five phases or developmental stages, ranging from the beginning level of awareness and appreciation, to knowledge and understanding, to a stage of developing a set of attitudes and values. The upper two levels include problem-solving skills, and ultimately, a level of personal responsibility and action. PBE strategies and models are the methods used by EE instructors that seek to connect students to conditions and issues in their local environment. There are five descriptive characteristics of PBE which include community/local emphasis, local connections made to water use and conservation, appreciation of the natural world at a local level, an active commitment to environmental quality and conservation, and making connections to the local environment outside of the EE site.

Research Design

The design of this qualitative research was to collect three forms of data from each of the three EE sites in the study. The three forms of data included a 25 question interview, administered one-on-one with each interview subject. The interviews were recorded and transcribed to preserve the accuracy of answers and elaborations by participants that were material to the development of any narrative of their own personal EE experiences. Each of the various site activities and program delivery were observed, and anecdotal records were kept and coded afterwards for the inclusion of A to A continuum strategies and PBE models of instruction. The two written science curricula from SDHC for Nature's Classroom and Lettuce Lake, 6th and 4th grades respectively, were analyzed and coded for the inclusion of A to A continuum strategies and PBE models of instruction as well.

In summary, the basic design of this qualitative study was to collect data from three sources. These included one-on-one interviews, the observations of program delivery, and the analyses of the curriculum of each site which were evaluated through a critical lens of both A to A continuum strategies and PBE models of instruction.

Data collection procedures. The data collection procedures began with interviews which took place at each of the respective sites, and were conducted with one instructor at a time to maintain anonymity of his or her individual responses. The interview survey was comprised of 25 questions across four topic areas including demographics, site-related, instructor-related, and program-specific information (Appendix A). Each recorded interview was conducted prior to, and on different days, from the program delivery observations in the field. The recorded interviews were transcribed to assure accuracy to aid in the triangulation with the other collected data--interviews, observations, and benchmark standards in the written curriculum. Anecdotal

records were derived from program delivery observations to determine the level of inclusion of A to A and PBE strategies employed by each observed instructor. To increase the validity and reliability of this study, the three forms of data collected from the programs were triangulated to help form the basis of a narrative comparison of the level to which each of the programs included any of the A to A continuum strategies and PBE models.

Internal and external validity threats. There may be a certain degree of validity threat due to a bias resulting from the inclination of instructors possibly saying things based on what they believed I was looking for during my observations, which is a normal reaction to being observed in an assessment-driven educational culture. I believe there is a threat to validity since I provided subjects with a copy of the interview questions before the interviews and observations were conducted, giving advanced notice of what I was looking for during the interviews and observations.

Data analysis procedures. The observation data was analyzed to determine the degree which A to A strategies and PBE models were included in the program delivery. There was also an analysis of the written curricula of each site to determine if A to A strategies and PBE models were included in the written benchmark standards from SDHC for 4th and 6th grades. Data analysis procedures included a tabulation of the observed use or mention of A to A continuum strategies and PBE models at any point during data collection. The first data analysis was of the interview results with each of the nine subjects, which was comprised of 25 questions. Fifteen were coded for responses that indicate the inclusion of both A to A strategies and PBE models of instruction (Appendix A). The coded questions/answers included numbers 9 through 11, 13 through 22, and questions/answers 24 and 25. These 15 answers were coded positively for inclusion if the response had any reference to A to A continuum strategies and PBE models of

instruction. A total percentage was derived by dividing the positive responses given in the answers by the total possible responses that could reference A to A continuum strategies and PBE models. A second percentage was derived in the same manner for the inclusion of levels four and five in the A to A continuum. The inclusion of levels four and five indicated an effort to move students beyond awareness and knowledge into levels of personal responsibility and action. Inclusion of the strategies occurred more than once in many instances, but if a strategy was stated or addressed even once in a response, the response received a score for inclusion. The final tabulated percentages of the inclusion of the two strategies are depicted in Table 1 (see Chapter 4).

During the observation phase of the study, several activities were observed at each site. Anecdotal records were collected and analyzed to determine if A to A continuum strategies and PBE models were included at any point during the delivery of the program components. The activities were scored in the affirmative for strategy inclusion if there was any mention or display of the A to A continuum strategies and PBE models, with particular attention paid to the inclusion of activities that included problem-solving, personal responsibility, or action on behalf of the environment. The tables in Chapter 4 (Table 2, Table 3, and Table 4) display an overall view of the inclusion of the strategies during each observed activity. Each of the five strategies and phases on the A to A continuum were assigned a number in ascending order between one and five. The five parts of the PBE model were also assigned a one through five to label them but not to ascribe any ascendancy attributed to the A to A continuum. Whenever a strategy was not included during the activity, a space was assigned to indicate its absence or that it was not observed during that time. Table 5 displays the percentages for the inclusion of the A to A continuum strategies and PBE models during each of the observed activities.

For Nature Classroom and Lettuce Lake, each curriculum standard benchmark was analyzed to determine if any part of the vocabulary in the descriptors indicated the inclusion of A to A strategies and PBE models. The same one to five label designation that was used in the observation method was also used to analyze and tabulate the inclusion of A to A continuum strategies and PBE models for the curriculum analysis. When a strategy was not included, a space was entered to represent the missing strategy or model. These data are displayed in Tables 6 and 7.

Chapter IV

Results

The purpose of this qualitative study was to examine the environmental education culture of three outdoor environmental education programs located along the Hillsborough River in Hillsborough and Pasco counties in Florida. Another purpose of the study was to examine the extent to which students were receiving instruction beyond the basic levels of awareness and knowing to receiving instruction that developed personal responsibility and the skills for taking action. Data collected from interviews, observations, and curricula analyses were triangulated to determine the level to which each of the programs included Awareness to Action (A to A) continuum strategies and Placed-Based education (PBE) models. This chapter includes an overview of A to A strategies and PBE models and the rationale for their use in EE programs, followed by an analysis of the data from each of the three collection methods to assess the inclusion of A to A continuum strategies and PBE models.

The interviews, the observations of program delivery, and the analyses of the curriculum of each site were evaluated through a critical lens of both A to A strategies and PBE models, which have been determined or recommended as methods to develop the environmental literacy of students (Barnes, 2013; Sobel, 2005). As noted in the literature review, environmental literacy is more fully attained when a person is equipped with the tools and feelings of empowerment to participate in decision-making and activities that can positively affect the quality of the environment (Barnes, 2013). Developing the environmental literacy of students could be enhanced by EE educators providing opportunities and experiences that take students beyond just being aware or knowledgeable about environmental issues which could help students develop and practice personal responsibility and pro-environmental behaviors. Knowing about an issue is

a necessary foundation, but environmental literacy requires a dimension of personal responsibility and taking action. The rationale for using PBE models is that many students are more aware of environmental issues in places far away from where they are, such as the plight of polar bears due to melting ice in the Arctic, but have little grasp or cognizance of environmental issues and conditions in their own communities. Environmental literacy is more fully attained when a person is empowered with the skills to make decisions and take action on behalf of the environment in their own communities. The inclusion of these strategies in an EE program is not to minimize the severity of global environmental issues, but instead, equips students to be more aware of and equipped to take action on a local level.

Interviews and Observation Data Analysis

In the Crystal Springs Preserve interviews, there was a possible score of 225 for referencing A to A continuum strategies and PBE models. Out of the 225, the responses were coded positively for AA and PBE 140 times, resulting in a score of 62%. When the upper two levels of the A to A continuum were coded, there was a percentage of 42% or 38 out of 90 responses that included the strategies. In reference to PBE models that connect students to their local environment, the interview score was 88% for inclusion of PBE strategies and mindset.

The two questions that were not coded included number 12 and number 23. Question 12 asked: What are the main influences that have shaped your attitudes toward educating children about the environment and natural world? The responses to this question included: (a) influenced by a guiding family member, (b) always being out and involved in nature, (c) scouting membership and experiences, (d) concern for the lack EE programs available to more people. Question 23 asked: What needs to be added to or changed, either in this EE program or to school or home-based EE, to motivate students toward pro-environmental behaviors and action? The

responses included: (a) the development of programs more fully aligned to the science standards from the school districts, (b) outreach programs to take their message to audiences who are unable to come on site, and (c) a wider development of service projects that give students more experience tackling local environmental issues.

In the Nature's Classroom interviews, there was a possible score of 300 for referencing A to A continuum strategies and PBE models. The respondents scored 161 out of 300 or a 54% for responses that included A to A continuum strategies and PBE references. When the responses were coded for the inclusion of levels 4 and 5 in the A to A continuum, there was a score of 31 out of 120 or a 26%. In reference to PBE models that connect students to their local environment, the interviews were scored at 66% for inclusion of PBE models. Question 12 asked: What are the main influences that have shaped your attitudes toward educating children about the environment and natural world? Responses included: (a) being taken out into nature by a family member, and in particular with their fathers and other mentors who helped them form connections to nature, (b) scouting membership experiences, and (c) familiarity with wilderness awareness schools. Question 23 asked: What needs to be added to or changed, either in this EE program or to school or home-based EE, to motivate students toward pro-environmental behaviors and action? The responses included (a) the need for more funding, (b) the need for more teachers on site in order to lower the teacher to student ratios to affect a deeper connection during the program, and (c) more EE training for the classroom teachers who bring their students through the program. When asked how well or in what way their program prepares students to make pro-environmental decisions back in their own communities, one of the themes expressed was that they hoped students would develop a sense of caring about the environment or that students would somehow figure out how to "give back" to help the environment.

The Lettuce Lake interviews had a total of 150 possible responses of which the respondents scored 78 out of 150 questions or a 52% of responses that included A to A continuum strategies and PBE references. When the responses were coded for the inclusion of levels 4 and 5 in the A to A continuum, there was a score of 12 out of 60 or a 20%. In reference to PBE models that connect students to their local environment, the interviews scored a 68% for inclusion of PBE strategies and mindset. Question 12 asked: What are the main influences that have shaped your attitudes toward educating children about the environment and natural world? The responses included: (a) being introduced to nature by family members and, in particular parents, and (b) always wanting to be a teacher and share nature with children. Question 23 asked: What needs to be added to or changed, either in this EE program or to school or home-based EE, to motivate students toward pro-environmental behaviors and action? The responses included (a) the need for more exposure to nature for more students, and (b) the need for service projects written into the curriculum.

Tables 1 through 5 display the interviews and observation data discussed above.

Table 1. Percentage of Inclusion of A to A Continuum Strategies and PBE Models in Interviews.

Environmental education study site	Awareness to action continuum strategies (levels 1-5)	Awareness to action continuum strategies (levels 4 and 5)	Place-based education models (1-5 points)	Aggregate score
Crystal Springs Preserve	62%	42%	88%	192
Nature's Classroom	54%	26%	66%	146
Lettuce Lake	52%	20%	68%	140

Table 2. Crystal Springs Preserve Observations.

Program Activity	A to A continuum strategies 1. Awareness & appreciation 2. Knowledge & appreciation 3. Attitudes & values 4. Problem-solving skills 5. Personal responsibility & action.	PBE model strategies 1. Community/local emphasis 2. Local connections made to water use & conservation. 3. Appreciation of the natural world at local level. 4. Active commitment to environmental quality & conservation. 5. Connections made to local environment outside the site.
River rats – Dip netting with biodiversity survey.	1, 2, 3, 4, 5	1, 2, 3, 4, 5
Watershed simulation tables	1, 2, 3, 4, 5	1, 2, 3, 4, 5
Nature hike; spring pond exploration	1, 2, 3, 4, 5	1, 2, 3, 4, 5
Interpretive classroom & survival lesson	1, 2, __, 4, 5	1, __, 3, __, 5
Discovery room (4-5 year olds students)	1, 2, __, __, __	1, __, 3, __, 5
Shelter Building	1, 2, 3, 4, 5	1, 2, 3, 4, 5
Discovery room & survival (middle grade students)	1, 2, __, 4, __	__, __, 3, __, 5

Table 3. Nature’s Classroom Observations

Program Activity	A to A continuum strategies 1. Awareness & appreciation 2. Knowledge & appreciation 3. Attitudes & values 4. Problem-solving skills 5. Personal responsibility & action.	PBE model strategies 1. Community/local emphasis 2. Local connections made to water use & conservation. 3. Appreciation of the natural world at local level. 4. Active commitment to environmental quality & conservation. 5. Connections made to local environment outside the site.
Orienteering and hike.	1, 2, 3, 4, 5	1, 2, 3, 4, 5
Upland and wetland hike.	1, 2, 3, 4, __	1, 2, 3, 4, 5

Animal compound and aviary.	1, 2, 3, 4, 5	1, 2, 3, 4, 5
Interpretive classroom, mammals, amphibians and reptiles.	1, 2, 3, __, 5	1, 2, 3, 4, 5
Shoreline sampling and diversity surveys.	1, 2, 3, 4, 5	1, 2, 3, 4, 5

Table 4. Lettuce Lake Observations

Program Activity	A to A continuum strategies	PBE model strategies
	1. Awareness & appreciation 2. Knowledge & appreciation 3. Attitudes & values 4. Problem-solving skills 5. Personal responsibility & action.	1. Community/local emphasis 2. Local connections made to water use & conservation. 3. Appreciation of the natural world at local level. 4. Active commitment to environmental quality & conservation. 5. Connections made to local.
Biodiversity river survey.	1, 2, __, 4, __	1, 2, 3, __, 5
Wetland hike; bird & reptile identification.	1, 2, __, 4, __	1, 2, 3, __, 5

Table 5. Percentage of A to A and PBE strategies inclusion during observed activities

Environmental education study site	Awareness to action continuum strategies (All 1-5 levels)	Awareness to action continuum strategies (Levels 4 and 5)	Place-based education models (1-5 points)	Aggregate Score
Crystal Springs Preserves	83%	79%	80%	242
Nature's Classroom	92%	80%	100%	272
Lettuce Lake	60%	50%	80%	190

Curriculum Analysis

The two EE centers that have a program directed to a specific grade level in Hillsborough School District, Nature's Classroom for 6th grade, and Lettuce Lake for 4th grade provided the curriculum benchmarks that guide their EE programs.

The data collected from an analysis of the 6th grade curriculum for Nature's Classroom for the inclusion of PBE strategies are reflected in Table 6 with an overall PBE inclusion rating of 67%. These data can be compared to the percentages from the other EE sites in Tables 7 and 8. The percentage rating of PBE model inclusion for the Nature's Classroom 6th grade curriculum was determined by rating 19 standard benchmarks, as shown in Table 6. There was a score of 19 ones, 18 twos, 18 threes, and 18 fives, but only 1 four, which has to do with strategies that foster an active commitment to environmental quality and conservation. In the analysis of the 22 standard benchmarks for A to A continuum strategies in the Nature's Classroom curriculum, which can be seen in Table 6, there were 22 ones and twos, at the awareness and appreciation level and knowledge and understanding level. Overall, when calculated for inclusion of A to A continuum strategies 1 through 5, the curriculum was scored at 45%. There was one reference in the curriculum to level three which addressed student attitudes and values, and two benchmarks at levels 3 and 4, which addressed the development of problem-solving skills, and personal responsibility and action. Only 4% of the curriculum addressed the upper levels of the A to A continuum and with only one standard benchmark out of 22 that addressed the development of student attitudes and values toward the environment. The three benchmarks at levels 3, 4, and 5 were 7th grade curriculum added on to the 6th grade program (Table 6).

The data collected from an analysis of the 4th grade curriculum for the Lettuce Lake program for the inclusion of PBE strategies are shown in Table 7 with an overall PBE inclusion rating of 75%. There were 15 standard benchmarks analyzed for the inclusion of PBE models in the Lettuce Lake fourth grade program. There were 13 ones, 13 twos, and 13 fives, and 14 threes which focused on community and local emphasis, local connections made to water use and conservation, and an appreciation of the natural world at the local level. There were three instances that included PBE strategy number 4 which had to do with helping students develop an active commitment to environmental quality and conservation. In an analysis of the 4th grade curriculum at Lettuces Lake for the inclusion of A to A continuum strategies, the data collected showed 15 out of 15 standard benchmarks included at the lower two levels of the continuum for awareness and appreciation and knowledge and understanding. There were three benchmarks that addressed level 3 which helps students to develop attitudes and values toward the environment. The analysis of the Lettuce Lake 4th grade curriculum determined that only 7% of the program includes the higher levels of the continuum with five benchmarks at level 4 and one benchmark that addressed level 5, which are intended to help students develop problem-solving skills, personal responsibility, and action toward the environment.

It should be noted that Crystal Springs Preserve is a privately-owned environmental center, with programs not bound by any definitive sets of standards or benchmarks that could be analyzed for this study. The center customizes their programs to meet the needs of individual group's curricular needs. Crystal Springs Preserve EE program annually sees more than 50,000 students of all ages and grade levels from pre-kindergarten through university and college groups. There was some discussion during the interviews of a possible plan to align their EE activities more directly to various school district and state science standards in the advent of

common core state standards initiatives. The programs are developed with themes and units derived from Project Wet and Project Wild curricula described in the review of the literature in chapter two.

Table 6. Nature’s Classroom – Sixth grade curriculum analysis for inclusion of A to A and PBE strategies.

Standards/benchmarks	A to A continuum strategies 1. Awareness & appreciation 2. Knowledge & understanding 3. Attitudes & values 4. Problem-solving skills 5. Personal responsibility & action.	PBE model strategies 1. Community/local emphasis 2. Local connections made to water use & conservation. 3. Appreciation of the natural world at local level. 4. Active commitment to environmental quality & conservation. 5. Connections made to local environment outside the site.
SC. 6. E. 6. 1	1, 2, __, __, __	1, 2, 3, __, 5
SC. 6. E. 6. 2	1, 2, __, __, __	1, 2, 3, __, 5
SC. 6. E. 7. 8 (7 th grade curriculum)	1, 2, __, __, __	1, 2, 3, __, 5
SC. 6. E. 7. 9 (7 th grade curriculum)	1, 2, __, 4, 5	1, 2, 3, __, 5
SC. 6. L. 14. 1	1, 2, __, __, __	No rating
SC. 6. L. 14. 2	1, 2, __, __, __	No rating
SC. 6. L. 15. 3	1, 2, __, __, __	1, 2, 3, __, 5
SC. 6. L. 15. 4	1, 2, __, __, __	1, 2, 3, __, 5
SC. 6. E. 7. 1	1, 2, __, __, __	1, __, 3, __, 5
SC. 6. E. 7. 2	1, 2, __, __, __	1, 2, 3, __, 5
SC. 6. E. 7. 3	1, 2, __, __, __	1, 2, __, __, __
SC. 6. E. 7. 4	1, 2, __, __, __	1, 2, 3, __, 5
SC. 6. E. 7. 5	1, 2, __, __, __	1, 2, 3, __, 5

SC. 6. E. 7. 6	1, 2, __, __, __	1, 2, 3, ____, 5
SC. 6. E. 7. 7	1, 2, __, __, __	1, 2, 3, ____, 5
SC. 7. L. 17. 1 (7 th grade curriculum)	1, 2, __, __, __	1, 2, 3, ____, 5
SC. 7. L. 17. 2 (7 th grade curriculum)	1, 2, __, __, __	1, 2, 3, ____, 5
SC. 7. L. 17. 3 (7 th grade curriculum)	1, 2, 3, 4, 5	1, 2, 3, 4, 5

Table 7. Lettuce Lake – Fourth grade curriculum analysis for inclusion of A to A and PBE strategies.

Standards/benchmarks	A to A continuum strategies 1. Awareness & appreciation 2. Knowledge & understanding 3. Attitudes & values 4. Problem-solving skills 5. Personal responsibility & action.	PBE model strategies 1. Community/local emphasis 2. Local connections made to water use & conservation. 3. Appreciation of the natural world at local level. 4. Active commitment to environmental quality & conservation. 5. Connections made to local environment outside the site.
SC. 4. N. 1. 1	1, 2, __, 4, __	1, 2, 3, 4, __
SC. 4. N. 1. 2	1, 2, __, 4, __	1, 2, 3, __, 5
SC. 4. N. 1. 5	1, 2, __, 4, __	__, __, __, __, 5
SC. 4. N. 1. 6	1, 2, __, 4, __	__, __, 3, __, 5
SC. 4. E. 6. 3	1, 2, 3, __, __	1, 2, 3, __, 5
SC. 4. E. 6. 4	1, 2, 3, __, __	1, 2, 3, __, 5
SC. 4. E. 6. 6	1, 2, __, __, __	1, 2, 3, __, 5
SC. 4. P. 8. 2	1, 2, __, __, __	1, 2, 3, 4, 5
SC. 4. P. 9. 1	1, 2, __, __, __	1, 2, 3, __, 5
SC. 4. L. 16. 2	1, 2, __, __, __	1, 2, 3, __, 5

SC. 4. L. 16. 3	1, 2, __, __, __	1, 2, 3, __, __
SC. 4. L. 16. 4	1, 2, __, __, __	1, 2, 3, __, 5
SC. 4. L. 17. 2	1, 2, __, __, __	1, 2, 3, __, 5
SC. 4. L. 17. 3	1, 2, __, __, __	1, 2, 3, __, 5
SC. 4. L. 17. 4	1, 2, 3, 4, 5	1, 2, 3, 4, 5

Table 8. Percentage of A to A and PBE strategies inclusion in standards benchmarks.

Environmental education study site	Awareness to action continuum strategies (All 1-5 levels)	A to A strategies Levels 4 and 5 Awareness to action continuum strategies (Levels 4 and 5)	Place-based education models (1-5 points)	Aggregate score
Crystal Springs Preserve	N/A	N/A	N/A	N/A
Nature’s Classroom	45%	4%	67%	116
Lettuce Lake	52%	7%	75%	134

Table 9 is an aggregate of the data from the interviews, observations, and analysis of the curricula of all three EE sites in the study. An aggregate of observation scores from Crystal Springs Preserve, Nature’s Classroom, and Lettuce Lake indicated a greater inclusion of the A to A continuum strategies and PBE models during the observed delivery of each of the programs, with a score of 704. When the combined EE instructor interview scores from each of the three EE sites were aggregated, it indicated the second greatest level of inclusion of the A to A continuum strategies and PBE models, with a score of 478. The lowest aggregated score for

inclusion of the A to A continuum strategies and PBE models was in the written curriculum with a combined score of 250.

Table 9. Aggregate score for inclusion of Awareness to Action and Place-based strategies.

Environmental education study site	Interviews	Observations	Curriculum analysis
Crystal Springs Preserve	192	242	N/A
Nature's Classroom	146	272	116
Lettuce Lake	140	190	134
Total	478	704	250

Chapter V

Discussion

In this chapter, I provide an analysis and discussion of the findings from the triangulation of data from the interviews, the program delivery observations, and analyses of site curricula for the inclusion of Awareness to Action (A to A) continuum strategies and Place-based education (PBE) models of instruction at the three local Environmental Education (EE) programs in the study. The purpose of this study was to reveal the extent to which three EE programs include A to A continuum strategies and PBE models. A mindful inclusion of A to A continuum strategies and PBE models in EE programs can help develop the environmental literacy of students, as well as develop the skill sets necessary to make pro-environmental decisions and take action on behalf of the environment.

An analysis of interview data indicated inclusion of PBE models of instruction which helps to connect students to a sense of place. In reference to the A to A continuum strategies, the scored responses indicated a greater emphasis on the lower levels of awareness and knowledge, but less inclusion of the upper levels of the continuum with problem-solving, personal responsibility, and action. Table 9 displays the aggregate score of the A to A continuum strategies. The aggregate score was derived by adding the percentages as raw numbers which showed the inclusion of A to A continuum strategies and PBE models of instruction. Adding the five A to A continuum strategies resulted in a sum of 168, whereas the inclusion of the upper levels of the A to A continuum had a lower sum of 88 (Table 1). The observed Crystal Springs Preserve program scored in the higher range of both the A to A strategies and PBE models of instruction. This can possibly be attributed to designing programs focused on strategies that include the higher levels of the A to A continuum. The sentiment expressed by educators at

Nature's Classroom was one of hope; a hope that by sharing their love and passion for nature, students will develop similar attitudes and values necessary to care for the environment. Each of the educators from all three sites in the study spoke fondly of their memories of the caring adults, either family or mentors, who took them by the hand and led them out into nature. They expressed that through loving guidance, exposure, and time to explore, they were enabled as children to develop the attitudes and values toward the environment that influenced them throughout their lives. According to the instructors at each site, they explained that there is a distinct minority of the students, approximately 10-20%, who arrive with higher levels of awareness, prior knowledge, and established attitudes and values toward the environment. Possibly some students have developed these higher level A to A traits through immersion in nature by participating with family in outdoor activities, scouting experiences, camps, and camping. These students are on the cusp of a greater, more complete level of environmental literacy, and would benefit from an accelerated EE program that could potentially take them to the higher levels of the A to A continuum.

In an analysis of the observation data, Nature's Classroom consistently incorporated A to A strategies and PBE models, at 80% to 100%, throughout each of the observed activities even though those same A to A and PBE strategies are not written into the curriculum. The Crystal Springs Preserve program included strategies from the A to A continuum and PBE models approximately 79% to 83% throughout each of the observed activities. The two observed activities at Lettuce Lake collectively included strategies from the A to A curriculum at approximately 50% to 60%, but included PBE models at approximately 80% throughout the observed activities.

In an analysis of the School District of Hillsborough County written curriculum for each site, 6th grade for Nature's Classroom and 4th grade for Lettuce Lake, both sets of data revealed a greater concentration of benchmark focus on the lower level strategies of the A to A continuum. In this study, my analysis of the written curriculum of Nature's Classroom shows that the upper levels 4 and 5 of the A to A strategies are provided for only 4% of the standard benchmark vocabulary. There is a greater focus of PBE models in the 6th grade written curriculum, which is approximately 67% of the standard benchmark vocabulary. The 4th grade written curriculum for Lettuce Lake scored a slightly higher percentage than the 6th grade curriculum, revealing an overall inclusion of A to A continuum strategies in the vocabulary at 52%; however, the upper 4 and 5 levels were included in only 7% of the benchmarks. A similar analysis of the written curriculum for the Crystal Springs Preserve programs was not performed, since they are a privately-owned entity not bound to any specific school or state mandated curriculum. They have upwards of 50,000 students per year, ranging from pre-kindergarten to university students, and they are able to customize all of their programs to the specific needs and requirements of each visiting group. At Crystal Springs Preserve, there was an expressed desire to more fully align activities to the science standards of the various school districts, and eventually to the proposed common core standards, in order to create a more cohesive connection between their program and the curricular requirements of various grade levels.

An analysis of the aggregate score of the three data sets (Table 9) indicates an interesting finding in when the total aggregated scores are compared for the inclusion of A to A continuum strategies and PBE models of instruction. The lowest of the three scores for inclusion of A to A continuum strategies and PBE models of instruction was in the written curricula, with a total score of 250, in comparison to an aggregate score of 478 for the interview data set. This finding

suggests there are discrepancies between the expectations of the written curricula versus what the instructors indicate they include in their instruction during their individual interviews. The observation data revealed the highest levels of inclusion of A to A continuum strategies and PBE models of instruction with an aggregate score of 704. An analysis of the interviews with instructors and the observations of program delivery provides evidence that programs include upper level action strategies of connecting students to their local environments at higher levels than the written curricula require. They show through their own intuitive actions during the delivery of each of their respective environmental education programs, the importance of exposing their students to the upper levels of the A to A continuum strategies and all of the PBE models of instruction.

The talent and passion EE instructors have for sharing their wealth of knowledge of and love for the environment, and although it is a positive trait to keep a sense of hope for the future, programs must move beyond relying on hope and the mindset that if students are aware or know about the environment, this attitude will automatically translate into students having the confidence and skill sets to take action on behalf of the environment. If students are to be empowered to make pro-environmental decisions or be able to take action, then EE and other programs need to actively teach them the necessary skills.

The development of environmental literacy in students would be enhanced by EE programs mindfully-designed in a way that moves students beyond the awareness and knowledge levels of the A to A continuum.

Recommendations

Accelerated EE programs could be created for students who have already reached the first three levels of the A to A continuum. Students with advanced awareness and higher levels

of environmental literacy would benefit from advanced EE programs designed to take them beyond the lower levels of the A to A continuum. These programs could be achieved with the institution and promotion of the renewed importance of service learning, and in particular, environmental service learning for the students at all environmental literacy levels, as well as all socioeconomic levels. A value should be placed on civic involvement, and further allow students to be actively interested and engaged in their local environment. Additionally, it is important that all students are afforded opportunities and access to consistent, contiguous EE exposure and experiences in natural settings throughout their school career. When off-campus access is an issue, high-quality EE curricula could be enhanced through engaging with elements of nature such as creating and cultivating butterfly and vegetable gardens, having wetland and retention pond restoration activities, as well as through having other service projects. Service projects might include enacting school-wide recycling efforts through which students could more fully develop their sense of personal responsibility and ability to take action.

The greatest potential benefit to the future quality of the environment is when students of all ages are given access to high quality EE programs that more fully develop their environmental literacy, but it is also the students who will ultimately benefit the most from their contact with nature. In addition to environmental conservation, there are other benefits of EE programs. There are emotional and mental health components that have been quantified in studies conducted to determine the effect that being in natural settings has on the brain (Jordan, 2015). Jordan reported that when test subjects walked for 90 minutes in a natural area, compared to test subjects who walked in a high-traffic urban setting, there was a calming effect on parts of the brain associated with depression. Jordan's study also provided statistics on the dramatic growth of urbanization, and that people who live in urban settings have a 20% higher risk of

anxiety disorders, and a 40% higher risk of mood disorders compared to people who live in more rural settings. Many students now live in highly urban centers, with little to no access to natural areas. When provided opportunities to participate in activities in natural settings, students, and especially adolescent students, who are at greater the risk for depression and other behavioral concerns, may actually find relief from the conditions and issues that are having a negative impact on their academic and personal lives. There is a need for developing environmental literacy and future environmental stewards, but there are also many students experiencing great conflict which could be mitigated by being afforded more consistent access to nature throughout their school careers. Furthermore, the increasing diversity of the population should require an outreach to make the face of environmentalists and environmentalism mirror the diversity of the populations who live within each respective environment.

A suggestion for future research would be to look at the behavioral and emotional benefits afforded to students given access and time out in the natural environment, and the degree to which time and access to nature positively impacts the academic performance and behaviors of students while they are at school.

Summary

In two studies that examined the multivariate relationship between environmental attitudes and pro-environmental behavior, it was determined that the strongest effect stems from personal-philosophical values and emotions (Grob, 1995). The study further found that no effects on environmental behavior stem solely from factual knowledge (Grob, 1995). It is important that students learn about the environment, but in order to develop their environmental literacy, students need learning experiences that afford them the opportunities to move beyond factual knowledge and into programs that develop their skills in problem-solving, recognition of

personal responsibility, and the confidence to take action on behalf of the environment. The instructors in each of three exemplary outdoor environmental education programs in this study are fully committed to conveying their pro-environmental message to their students, however, the environmental literacy of students could be further enhanced by curricula mindfully designed to incorporate strategies from all levels of the Awareness to Action continuum and Place-Based Education models.

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Appendix A

Educator Interview Questions

Demographic information

Questions	Responses
1. Male or female	
2. Age range: 20-29 30-39 40-49 50-59 60+	
3. Length of time involved in EE	
4. Length of time at this site	
5. Educational background	

Site-related information

Questions	Responses
6. Title or position and related duties.	
7. Who the program serves – populations, numbers, ages and grade levels.	
8. Who developed this site's EE program?	
9. How would you describe the primary purpose and mission of your program?	

Instructor information

Questions	Responses
10. What does EE and/or ecological literacy mean to you and why do you believe it is important?	
11. What are the main influences that have shaped your attitude toward the environment?	
12. What are the main influences that have shaped your attitudes toward educating children about the environment and natural world?	
13. What should an EE program try to teach students about the environment?	
14. In what ways do you feel your EE efforts are having a positive impact on student behaviors toward the environment?	
15. What are the three most important values that need to be promoted to motivate students to become engaged and adopt pro-environmental behaviors?	
16. What needs to be done in EE programs to move students from a place of knowing about the environment to a place of active doing on behalf of the environment?	

Program-related information

Questions	Responses
17. In what ways does your EE program inform students and help them understand how this place, out in nature is connected to their own local environment.	
18. Are there specific examples of how the program prepares students to make pro-environmental decisions when they are back in their respective communities?	
19. In the A to A continuum there are five phases, from awareness and appreciation, knowledge and understanding, attitudes and values, problem-solving skills to personal responsibility and action. Where do you feel most students are on the A to A continuum when they first arrive at the program? How about when they are getting ready to depart at the end of the program?	
20. How would you describe current student connections with and understanding of environmental issues and concerns?	
21. Over the years of your experience, are there changes in the numbers of students who show prior knowledge about the natural environment? If yes, in what ways?	
22. At the end of the day or the end of the program, how do you measure success with your students?	
23. What needs to be added to or changed, either in this EE program or to school or home-based EE, to	

motivate students toward pro-environmental behaviors and action?	
24. In what ways or to what extent do you feel your EE program is having a positive impact on the ecological literacy of your students?	
25. In a perfect world, what are three wishes you have for your students, the environment, and/or for your program?	

Appendix B

Site Observation Instrument

Site: _____ Day/Date: _____ Instructor: _____

Activity observed and anecdotal description of activity	Awareness & appreciation of and to the diversity of life that shares the earth with humans.	Knowledge & understanding – a basic understanding of how natural systems function, and how human systems are interconnected with and dependent upon them.	Attitude & values – a respect and concern for the earth’s health, and the ethical motivation to participate in environmental stewardship.	Problem-solving skills – the skills needed to identify and critically analyze environmental issues, and to contribute to resolving the root of the problems.	Personal responsibility & action – a deeper sense of moral responsibility to the earth, and the ability to make ecologically sensitive lifestyle and behavior choices.	Place-based education strategies: <ul style="list-style-type: none"> ○ Community/Local emphasis ○ Local connections made to water use/conservation ○ Appreciation of natural world at local level ○ Active commitment to environmental quality/conservation ○ Connections made to local environment outside of site.

Appendix C

Curriculum Evaluation Instrument

Site: _____ Date: _____

<p>Standards and benchmarks</p>	<p>A to A continuum strategies 1. Awareness & appreciation 2. Knowledge & understanding 3. Attitudes & values 4. Problem-solving skills 5. Personal responsibility & action.</p>	<p>PBE model strategies: 1. Community/local emphasis 2. Local connections made to water use & conservation. 3. Appreciation of the natural world at local level. 4. Active commitment to environmental quality & conservation. 5. Connections made to local environment outside the site.</p>

Appendix D

Data table to examine the inclusion of A to A continuum strategies and PBE models in interview responses.

Awareness to action			Place-based		
Interviews			Interviews		
CS	NC	LL	CS	NC	LL
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					