THE EFFECTIVENESS OF AN ENVIRONMENTAL EDUCATION PROGRAM ON INCREASING ENVIRONMENTALLY CONSCIOUS BEHAVIOR IN COLLEGE STUDENTS

A Thesis in
Agricultural and Extension Education
by
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ABSTRACT

In the year 2050, the world population is projected to reach 9 billion (United States Census Bureau, 2011). As the human population increases, pro-environmental behaviors are important to practice. By practicing pro-environmental behaviors, the negative impact that humans have on the earth may decrease. The authors Robertson & Lee (2009) quote and cite the World Wide Fund for Nature (WWF) (2006) and state that, “We may “overshoot” the planet’s worth of natural resources by up to three planets’ worth” (WWF, 2006 (as cited in Robertson & Lee, 2009, p. 78)). Environmental education programs are a way to teach people about the world in which we live. These programs can be low-cost and can incorporate a lot of information into a short amount of time and may aid in behavior change.

A descriptive case study was used to determine the impact of a one-day environmental education program on participant’s environmental behaviors, attitudes, values, worldviews, and beliefs. Forty-five college students in an environmental education program completed a survey immediately prior to the program, immediately after the program, and again six weeks later. The surveys measured participants’ environmental attitudes, beliefs, worldviews, values, and behaviors. The pre-test determined the perceived environmental beliefs and behaviors that each participant had upon entering the program. The post-test sought to determine beliefs and attitudes directly after participation in the program and to determine the likeliness of each participant to engage in environmental behaviors presented in the pre-survey. The six-week delayed post-survey sought to determine the self-reported environmental behaviors
that each participant engaged in six weeks after participating in the educational program. In addition, a focus group was held to gain a greater understanding of the changes in behavior of the participants and attitudes about the environment and the environmental program. Pre program survey scores were compared with post program survey scores and analyzed for differences. Qualitative findings from the focus group were analyzed for common themes across responses.

The responses indicated that the New Ecological Paradigm (NEP) scores were higher on the post-program survey than on the pre-program survey. The likeliness of the participants to practice environmental behaviors was also higher on the post-program responses than were on the pre-program responses. The participants responses showed six weeks later, their behaviors were also higher than their pre-program surveys indicated. The six-week responses were lower than the post-program responses. The focus group responses indicated that the environmental education program did indeed have an effect on respondent environmental behavior and that education is an important tool to communicate the importance of sustainability.

Results from this study can be used to encourage others to take an environmental education course or workshop or to possibly make it a requirement for graduation or for inclusion in a freshman seminar. Every major can incorporate environmental education and sustainability in some way. As the population grows, sustainability is important. The results also indicate that a short program may be an effective way of influencing behavior. The knowledge that a short program can be effective may lead to more being developed and utilized to teach others about the world around them, how to coexist with it, and how to ensure that the resources that are present today exist for many generations.
Other short courses may also be developed and utilized in other areas or even as a precursor to longer courses.
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CHAPTER 1

Introduction

Pro-environmental behaviors are becoming more important to practice as the human population increases. The earth may eventually reach maximum carrying capacity and be unable to support the population. Practicing pro-environmental behaviors can benefit the earth by lessening the negative environmental impact that individuals have on the planet. Pro-environmental behaviors can be developed by a combination of influences that include value, identity, social influences, personal responsibility, and intention, among other factors (Ajzen, 1991; Evans et al., 2007; Hines, Hungerford & Tomera, 1986/1987; Hungerford & Volk, 1990; Kollmuss & Agyeman, 2002; Kyburz-Graber, Hofer, & Wolfensberger, 2006; Scott & Willits, 1994; Stern, 2000; Strife, 2010).

There are many factors that influence environmental behavior, as Osbaldiston and Schott (2012) stated, “One area that should not be overlooked is small-scale or low-cost attempts to influence individuals’ behavior” (p. 258). Environmental programs are one way to provide small-scale, low-cost educational programs to the public. This study focused on the effects of a one-day program, ‘Environmental Education through Sustainability: My Place in the Green Movement’, on participant environmental attitudes, beliefs, worldviews, and values (EABWV) as measured by the New Ecological Paradigm (NEP) scale and an environmental conservation and behavior (ECB) scale.

Since 1976, environmental educators at Shaver’s Creek Environmental Center (SCEC), a Pennsylvania State University-affiliated environmental center, have been active in teaching programs, festivals, and community events about our natural world.
Other programs that are offered at SCEC include seasonal festivals, raptor and animal shows, team-building, school field trips, summer camps, and family nature programs, among others. Each semester, environmental educators at Shaver’s Creek conduct day-long environmental education (EE) programs that teach students about various environmental topics. Students from the majors Agricultural and Extension Education, Secondary Education, Elementary Education, Wildlife and Fisheries Science, and Art Education, have participated in these programs in the past. Between 15 and 30 students participate in these day-long programs each time one is offered. Students are asked to actively participate in various lessons throughout the day to better understand the topic of the program. Each student leaves with a deeper knowledge of the topic as well as ideas on how to use the resources discussed in the program in real-life scenarios and settings.

Sustainability is a topic that has gained attention since the first Earth Day in 1970. Many authors, researchers, and scholars have written about the various aspects of the topic (Johnston, Everard, Santillo & Robert, 2007; McKenzie-Mohr, 2000; Osbaldiston & Schott, 2012; Robertson & Lee, 2009; Seatter, 2011; Yang, Lam & Wong, 2010). Sustainability is a broad topic with various definitions and can be applied to many circumstances. Johnston, Everard, Santillo, & Robert (2007) define sustainability as “a method of harvesting or using a resource so that the resource is not depleted or permanently damaged” (p. 61-62). Sustainability can refer to business, living, development, and decision-making, among others. The research focuses on sustainable living through the topics of solid waste management (landfills) and recycling, water conservation, fuel conservation, and electricity conservation. These values were
categorized together to represent forms of living more sustainably and constitute the environmental behavior scale created by Lee (2008) and were used in this research.

The use of short-term programs as an educational tool is invaluable to those who do not have a lot of time to take a formal class. Educators who teach programs are able to include a variety of information into a condensed time frame. The purpose of a program is to present the information of a topic in hopes of sparking the interest of its participants. The participants may ideally take it upon themselves to further explore the topic covered in the program. Understanding can occur when a person is able to connect the lesson learned with their life and act accordingly.

**Significance of the Need**

Researchers studied what causes pro-environmental behavior, behavior in general, and the correlation of environmental attitudes, beliefs, world views, and values with environmental behavior (Ajzen, 1991; Barr, 2007; Lee, 2008). Few literary examples were found through the context of whether or not one-day environmental education programs are effective ways to change environmental behavior. Therefore, this study sought to fill the gap and determine if there is an effect on the participant’s environmental behavior after completing a day-long program on environmental education through sustainability that highlights the various pro-environmental behaviors as outlined by Osbaldiston and Schott (2012) and Lee (2008).

There is a need to study the effects of a one-day environmental education program on environmental attitudes and behaviors because the population is growing and there will be a time when the earth has reached its carrying capacity of humans that it can
support (Osboldiston & Schott, 2012). Osboldiston and Schott (2012) state, “If human population continues to grow and if human aspirations continue to focus on increased material wealth, then humans are likely to cause our own ending” (p. 287). The humans of the future will have limited resources if they continue to live as society has in the past. People should learn how to work with the earth to live well in our place. A Native American saying refers to sustainability as considering those seven generations in the future when making decisions. People can learn from the wisdom of the Native Americans and apply it to our decisions that we make today. We are not the ones who will be impacted, but our children, grandchildren, and future generations. Smith-Sebasto and Obenchain (2009) argue that “It is imperative that researchers know what, if any, impact these types of experiences have on the participants” (p. 50).

In such a fast-paced world, it is possible that people are unable to take the time to learn about and understand the environment and what humans are able to do to preserve and conserve it. More importantly, students may not realize that they are able to make a difference in their world. Student’s perceived levels of self-efficacy may be low, which may cause them to not take the necessary action to change personal behavior (Meinhold & Malkus, 2005). One of the messages emphasized during the EE program highlighted in this study was that ‘you (the participant) can make a difference’. Additionally, Seatter (2011) calls for “the urgent need for thoughtful and articulate individuals involved in environmental and sustainable endeavors and the education that aspires to facilitate knowledge, skills, and attitudes for environmental issues” (p. 22).

The use of a one-day program allows educators to communicate a lot of information in a short amount of time so that the people in the program become interested
in a topic and may hopefully continue to learn about the details of the subject. Once the instructor of such a program introduces the subject, the student is then able to ignite the interest in the topic and seek for themselves other opportunities to learn. According to Dale’s Cone of Experience (Anderson, n.d.), people remember 70% of what they say and write and 90% of what they do. On Dale’s Cone of Experience (Anderson, n.d.), the example of ‘participate in hands-on workshop’ is given for the section including remembering 70% of what they [people] say and write. By taking this next step [writing, saying, doing], participants will be better able to relate the lessons to their personal lives, which increase their understanding of the subject. Programs are a way to spark the interest in participants, but little research has been done specifically on their effectiveness of environmental behavior change. Results may be able to show that EE programs have an effect on behavior change of participants after the program, and then the possibility of creating more programs to change behavior may be designed and implemented.

There is a need to research and document the effectiveness of these programs on participant’s environmental behavior because the resources that we have available to us as a society are becoming scarce as the world population reaches 9 billion (United States Census Bureau, 2011). Many students come to the programs at SCEC to gain knowledge about environmental topics and to obtain resources that they can use later in life in their professional careers. Careers can include education, biology, natural science, and research, to name a few. Some people are ignorant to and deny the fact that it is everyone’s responsibility to be sustainable as they live and use the resources that the planet has to give (Norgaard, 2006). The earth will not be able to provide forever if we continue to live unsustainably.
Since the research focused on living more environmentally conscious through the use of recycling, water conservation, solid waste management, fuel conservation, and electricity conservation, a need for more information about each topic was presented. No new water has been created on the earth. The amount of drinking water that is available for use is what we and future generations will have for life. Water is not created; rather, it travels in a continuous cycle (water cycle) and is constantly moving (Capelli & Perlman, 2012). Without water, we will not survive (Capelli & Perlman, 2012). Humans should learn to conserve the precious water that is available to ensure that it will be there for future generations.

Similarly, with an increase in the population, solid-waste is an issue. On average, people throw away 4.4 pounds of garbage every day (United States Environmental Protection Agency [EPA], 2013). If the United States Census Bureau (2011) projected 9 billion people by the year 2050, about 14,454,000,000,000 pounds of garbage would be generated. The garbage generated may go into a landfill. Landfills can take up space, many are dirty, and may damage the environment around them. It is therefore necessary for people to reduce, reuse, and recycle their products so that they do not end up in landfills. Modern landfills, however, are designed and constructed to “protect the environment from contaminants” and some even convert the harmful gas emissions into energy (United States Environmental Protection Agency [EPA], 2012). Recycling products also decreases the amount of fossil fuels, a non-renewable resource, that are used to transport and make new products. The shorter driving distance may require less fuel to be used during transportation, which may reduce the need for this fuel.
Additionally, new materials (petroleum) may not need to be mined for the use in making new plastics.

The idea exists in the minds of some that one person will not be enough to make a difference in the world. People may view sustainability as such a large problem that it is overwhelming to think of the possible ways that one person can make the difference. Through environmental education, educators are able to dispel the myth that one person cannot make a difference.

Knowledge about the environment is useful to understand because participants of various programs may leave and ideally participate in carrying out the positive environmental behaviors learned during the program. The environmental behaviors can possibly result in greater personal water, energy and fuel conservation as well as a decrease in personal solid waste disposal. Determining whether or not the program impacts participants’ actual practice of these behaviors will be useful in teaching future programs with the same theme to more effectively relay the message of sustainability for a changing world.

The United States Census Bureau (2011) predicts that the world population will reach 9 billion by the year 2050. Robertson and Lee (2009) cite the World Wide Fund for Nature (2006) when the authors argue that if the people do not change their behavior from the trends that were present in the past, “we may “overshoot” the planet’s worth of natural resources by up to three planets’ worth” (World Wide Fund for Nature, 2006 (cited in Robertson & Lee, 2009, p. 78)).
Purpose

The purpose of the research study was to determine the effect of a one-day environmental education program focused on sustainability on participant’s environmental attitudes, beliefs, world views, and values (EABWV) as well as their environmental behavioral practices.

Research Questions

1. Is there a difference between the pre-program survey EABWV pro-NEP scores and the post-program survey EABWV pro-NEP scores?
2. Is there a difference between the pre-program behavioral scores and the post-program behavioral pro-ECB scores?
3. Is there a difference between the pre-program survey environmental behaviors and the delayed post-program survey environmental behaviors?
4. Is there a difference between the post-program survey environmental behaviors and the delayed post-program survey environmental behaviors?
5. Are there differences in EABWV based on demographic factors?

In addition to the research questions, a focus group was conducted to determine why and how the participants of the program made the changes in their environmental behaviors. The focus group also aided in explaining what the motivating factors for initiating participant behavior change were. The results of the focus group were used to aid in the explanation of the research questions and to draw parallels between the quantitative and qualitative data.
Assumptions

The researcher can assume that the participants in the program had some form of interest in the topic of environmental education through sustainability, so the pre-survey results may show a higher participation in pro-environmental behaviors and a stronger set of EABWV if compared to the general population. The researcher can also assume that the participants in the program may answer the survey questions differently on the day of the program than on the day of the six-week delayed post-program survey due to the difference in setting and the presence of others.

Limitations of the Study

The population for this study consisted of those who participated in a day-long environmental education program at Shaver’s Creek Environmental Center in February of 2013. The population consisted of the entire class, which does not allow for random selection or random assignment. Therefore, the findings of this study are not able to be generalized to any other populations. The students who participated in the program expressed interest in the class prior to the survey being given, so the students had some personal reason for participating, whether it be an interest in the environment, sustainability, or some other factor. Additionally, the focus group consisted of a self-selected group of program participants.

Operational Definitions

Environmental Education – A process aimed at developing “a world population that is aware of, and concerned about, the environment and its associated problems, and which
has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions to current problems, and the prevention of new ones.” – The Belgrade Charter (1975, p. 58)

**Sustainability** – “Of, relating to, or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged” (Johnston et al., 2007, p. 61-62).

**Pro-Environmental Behavior** - Behaviors that are “comparatively better for the environment” with regards to consuming “materials and energy” (Osboldiston & Schott, 2012, p. 258).

**Self-Efficacy** – “Self-percepts of efficacy influence thought patterns, actions, and emotional arousal” (Bandura, 1982, p. 122).

**New Ecological Paradigm** - Scale that measures individual views on “the reality of limits to growth, antianthropocentrism, the fragility of nature’s balance, rejection of exemptionalism, and the possibility of an ecocrisis” (Dunlap, Van Liere, Mertig, & Jones, 2000, p. 432).

**Environmental and Conservation Behaviors** - A list of “self-reported” conservation and recycling behaviors (Lee, 2008, p. 33).

**Summary**

Short-term programs are a way for educators to inform the participants of information related to a specific topic in a short amount of time. Programs are used to pique the interests of the participants in a condensed amount of time and then to
encourage them to continue to find more information about the topic. Environmental education is a broad theme that can be applied to many topics. This research focused on behavioral change through examining EABWV and various environmental practices. In today’s fast-paced world, it can be difficult to find time to take a full-length class on a topic. Programs can be used to impact knowledge about many topics in a condensed amount of time. We as a society need to be aware of the environmental implications that we will face if we do not change anti-environmental behaviors. By promoting pro-environmental behaviors and self-efficacy for these behaviors during environmental education programs, people may understand that they can make a difference in their natural world and may make pro-environmental decisions.
CHAPTER 2
Review of Literature

The purpose of this review of literature is to provide a foundation of knowledge and previous research about the various aspects of this study. This review of literature is guided by five sections:

- The importance of environmental education and being environmentally conscious
- Current environmental attitudes and behaviors
- Behavior change
- Teaching environmental education
- The effect of workshops on changing attitudes/behavior

The Importance of Environmental Education and Being Environmentally Conscious

Learning about the environment is important because we must coexist with it in order to continue living the way we do (Orr, 1992). Orr (1992) believes society must learn to live “well in a place” (p. 126), which means that in order to coexist with other species, we must take into account what we are doing that affects the natural world. In 1983, education for the environment was one of the only disciplines that offered the background knowledge and practical skills to make an environmental contribution (Huckle, 1983). According to the United States Census Bureau (2011), the population of the world is projected to reach 9 billion by the year 2050. It is important to teach future generations how to take care of our planet because we have no other alternative. Various authors believe the more that is known about the world in which we live and its
environmental issues, the more informed decisions are made regarding actions (Hines et al., 1986/1987; Scott & Willits, 1994; Stern, 2000).

In 1962, Rachel Carson’s book, *Silent Spring*, sparked a movement of environmental consciousness in the United States (Krause, 1993). Because of Carson’s book, people began to realize that humans have an impact on the environment and took action to become more environmentally aware and conscious. One of the most influential actions was the first Earth Day in 1970. The Earth Day celebration has resulted in continuous environmental action. Multiple demands were raised to develop environmental education (Hungerford, 2010). This demand and need for environmental education was recognized by the government, and the Environmental Education Act of 1990 was passed (National Environmental Education Act, 1990).

“The ultimate aim of education is shaping human behavior” (Hungerford & Volk, 1990, p. 257). Breiting and Morgensen (1999) agree that the goal of environmental education is to develop “action competence” (p. 349). The authors explain the five purposes of environmental education, which include: awareness, sensitivity, attitudes, skills, and participation. In this paper, Hungerford and Volk (1990) also delve into the linear model of behavior change created by Ramsey and Rickson (1976). Hungerford & Volk, (1990) quote and cite Ramsey and Rickson (1976) in their article by stating, “Increased knowledge leads to favorable attitudes...which in turn lead to action promoting better environmental quality” (p. 258). Environmental education, therefore, is an important factor in creating action among its students. If we are able to understand the implications of our actions and become aware of the impact that we have on our world, we too can help to make changes to a sustainable, lasting future.
The answer to changing environmental behavior is not an easy task. Hungerford and Volk (1990) quote and cite Hines, Hungerford and Tomera (1986/1987) when discussing the Hines Model of Responsible Environmental Behavior, stating,

“An individual who expresses an intention to take action will be more likely to engage in the action than will an individual who expresses no such intention...However,...it appears that intention to act is merely an artifact of a number of other variables acting in combination, e.g., cognitive knowledge, cognitive skills, and personality factors” (p.259).

“Before an individual can intentionally act on a particular environmental problem, that individual must be cognizant of the existence of the [issue]. Thus, knowledge of the [issue] appears to be a prerequisite to action” (p. 259).

“[An] individual must also possess knowledge of those courses of action which are available and which will be most effective in a given situation” (p. 260).

“Situational factors, such as economic constraints, social pressures and opportunities to choose different actions may...serve to either counteract or to strengthen the variables in the model” (p. 260).

Essentially, Hines et al. (1986/1987) believed that responsible behavior is influenced by situational factors and intention to act. Intention to act is influenced by action skills, knowledge of action strategies, knowledge of issues, and personality factors, which are influenced by attitudes and personal responsibility. Environmental Education in this respect is an important aspect of shaping behavior as it provides the knowledge base for informed decision making and behavior change. Each model provided multiple
influences on environmental behavior, but many show that knowledge is a factor, which strengthens its importance.

Environmental issues today include global warming, finding a way to switch to clean energy, reviving oceans, defending endangered wildlife, pollution prevention, maintaining safe drinking water, and creating sustainable communities, among other issues (Natural Resources Defense Council, 2012). With a world population trending toward 9 billion (United States Census Bureau, 2011), understanding “living well in a place” is more important than ever (Orr, 1992, p. 126). In fact, if the behavioral trends that have been present in the past continue, “we may “overshoot” the planet’s worth of natural resources by up to three planets’ worth” (World Wide Fund for Nature, 2006, (as cited by Robertson & Lee, 2009, p. 78)).

One of the ultimate goals of EE curriculum is “promoting respect for the environment, teaching values related to the environment, and encouraging environmentally responsible behavior” to encourage the development of environmental behaviors through the promotion of respect for the environment, taking an active role in the environment, and solving local environmental problems (Hewitt, 1997, p. 35). The Belgrade Charter (1975) states,

“The goal of environmental education is: To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions to current problems, and the prevention of new ones.” (p. 58).
This charter was proposed at the 1975 UNESCO workshop. Thirty years later, McKeown and Hopkins (2005) reported the goal of educating for sustainable development (ESD) stating it is,

“…a vision for a better world. They envision a world in which business, industry, government, and citizens practice environmental stewardship, leave smaller ecological footprints, and participate in community-based decision making” (p. 221).

Some commonalities of all of these goals are that the future is important and it is important for citizens to be engaged and knowledgeable about their world.

Producing environmentally-minded citizens to solve the future problems of a changing earth that is in need of sustainability and environmental awareness is crucial (Waters, 2011). Strife (2010) argues that sustainability is in need of EE. To bridge the EE and sustainability gap, sustainability needs to have a positive “human benefits” approach (Strife, 2010, p. 180). Additionally, sustainability enthusiasm needs to be emphasized in EE (UNESCO, 1977 (as cited in Strife, 2010)). Framing sustainability in a positive manner “helps garner public interest, encouraging motivation for change” (Strife, 2010, p. 181). Additionally, Strife (2010) believes that EE should be humanized, meaning that humans need to know the benefits of this discourse. The benefits of sustainability include long-term economic cost saving and human health benefits that produce a “triple bottom line: profit, planet, and people” (Strife, 2010 p. 181). Another benefit of sustainability is localization. Local resources are able to be used, which has economic benefit as well as “reduces consumption of fossil fuels” to transport goods (Strife, 2010, p. 181).
Pruneau et al. (2006) focus on the importance of changing ones environmental behaviors as their environmental knowledge increases. Ajzen (1991); Evans et al. (2007); Hines et al. (1986/1987); Hungerford and Volk (1990); Kollmuss and Agyeman (2002); Kyburz-Graber et al. (2006); Scott and Willits (1994); Stern (2000); and Strife (2010) provide models and factors that predict behaviors. The authors have common themes in each of their models. The themes include knowledge, self-efficacy, and values/attitudes. It is important to understand that there are many factors which influence behavior. One way to influence behavior is to be environmentally conscious.

Authors agree that in order to make a positive change in the environment, we must first understand what is going on in that environment. The amount of knowledge that people have about the world we live in has an impact on behavior (Hines et al., 1986/1987; Kollmuss & Agyeman, 2002; Stern, 2000). Awareness thus influences behavior.

Current Environmental Attitudes and Behaviors

Osbaldiston & Schott (2012) performed a meta-analysis on various environmental behavior-related experiments in a recent study. Osbaldiston & Schott (2012) concluded that the different environmental behaviors that exist include “public recycling, public energy conservation, water conservation, curbside recycling, central recycling, home energy conservation, and gasoline conservation” (p. 280).

Advertisements for products highlighting environmentally sound standards can be seen. The automobile industry, for example, has been advertising high fuel efficiency and gas mileage in various vehicles. The United States Environment Protection Agency
(EPA) released the 2012 fuel economy trends report stating that carbon dioxide decreases as fuel economy increases. Car manufacturers supply what the consumer demands.

A report by the EPA published in 2013 states that Americans are recycling more. Since 1980, Americans have been increasing the amount of recyclables they produce by about 15 million tons (United States Environmental Protection Agency (EPA), 2012). However, only 34.7% of waste was recycled by United States citizens in 2011 (EPA, 2012). Some places such as Shaver’s Creek Environmental Center (SCEC) are converting to a ‘zero waste’ policy. Here, most waste is able to be recycled or used for other purposes. When places like SCEC advertise their zero-waste efforts and educate others during workshops, festivals, and other community activities, people become aware of what they are throwing away and think twice about doing so (Focus Group, 2013). In this way, the practices being modeled at SCEC are helping to change the behavior of those attending these activities.

Home energy use has also decreased. In a report published in August, 2013 from the United States Energy Information Administration, residential energy consumption shows a decrease per household in 2012. More homes are being built that take into account energy-saving factors, such as insulation. Choosing the right insulation alone can decrease the cost of utility bills (United States Department of Energy, 2012).

Water conservation is another environmental behavior. Water use is an inevitability of human life. In the year 2005, water withdraws were less than they were in 2000 and 1980 (Kenny et al., 2009). This decrease in water consumption could be related to the increased awareness of the need for water conservation.
Recycling, home energy use, gas conservation, water conservation, and the adoption of new technology are all examples of environmental behaviors outlined in the Osbaldiston & Schott (2012) meta-analysis. If the population was not concerned with the health of the environment, the numbers of these environmental behaviors would show a different trend. Hungerford (2010) agrees that there is a “growing public interest” in environmental behaviors, and includes “land-use management, threatened and endangered species, [and] human population growth” to the list (p.2). The trends in each behavior show that people are concerned and, as a whole, take the steps toward pro-environmental action. Even though there are increasing trends in the concern for the environment, continuing to educate the people about the environment is necessary to ensure that the earth will always be cared for.

**Behavior Change**

There are multiple models that help predict behavior. Hungerford & Volk (1990) believe that environmental behavior can be changed by providing knowledge about the issue. However, behavior change is not a result of more knowledge alone. Attitudes, awareness and self-efficacy are also influential for environmental decision making and behavior changes (Hungerford & Volk, 1990). Evans et al. (2007) agree that “environmental attitudes predict behavioral intentions”, but may not predict actual behaviors (p. 636). Scott and Willits (1994) agree that supportive attitudes have an effect in positive environmental behavior. Kyburz-Graber et al. (2006) and Strife (2010) advocate for “education to empower individuals and society to participate” (p.186), which relates to self-efficacy and perceived ability to complete tasks.
The conceptual framework for this study and the relationships between the variables leading to environmental behavior are shown in Figure 2.1. The model was constructed using a combination of nine (Ajzen, 1991; Evans et al., 2007; Hines, Hungerford & Tomera, 1986/1987; Hungerford & Volk, 1990; Kollmuss & Agyeman, 2002; Kyburz-Graber, Hofer, & Wolfensberger, 2006; Scott & Willits, 1994; Stern, 2000; Strife, 2010) pre-existing models and factors that predict behavior. All nine models/factors showed circumstances that influence behavior. Behavior can refer to both pro and anti-environmental behavior and the model below can be used to determine either form. The focus of this study, however, is on promoting pro-environmental behavior and how participation in an environmental education program can influence it.
Figure 2.1. The models considered for this figure came from the researchers Ajzen, 1991; Evans et al., 2007; Hines, Hungerford & Tomera, 1986/1987; Hungerford & Volk, 1990; Kollmuss & Agyeman, 2002; Kyburz-Graber, Hofer, & Wolfensberger, 2006; Scott & Willits, 1994; Stern, 2000; Strife, 2010.
Each of the influencers of behavior can be found in this research study.

Environmental values and beliefs are two parts of what the New Ecological Paradigm (NEP) scale measures. The NEP scale was administered at the beginning and end of the EE through sustainability program. As the Native American saying states, we must consider the seventh generation when making decisions. The responsibility of today’s society to practice pro-environmental behaviors is necessary to ensure that the resources that we have today are available for future generations. Self-efficacy was instilled in the students in the Environmental Education through Sustainability workshop when they were told that they could make a difference in their world and that one person is enough to make an impact. Knowledge was a part of the workshop in respect to the lessons that were taught throughout the day. The lessons focused on recycling/solid waste management, water conservation, energy conservation, fuel conservation, and sustainable practices, such as the inputs and outputs of a community. Intention was then measured when the post-program behavior survey was given that asked students the likeliness of their participation in environmental behaviors. These factors, along with societal influence, affect behavior. Societal influence can be present through community regulations, availability to practice pro-environmental behaviors, and what others think about these practices. An example of a societal influence may include a neighbor seeing another neighbor put out their recycling bin and feeling guilty that they have not done so.

Teaching Environmental Education

With the increase in environmental awareness as a whole, secondary school EE classes are becoming more highly enrolled than before (Edelson, 2007). Making “EE socially relevant”, though, is crucial (Hungerford, 2010, p. 3). As a result, students are
becoming more environmentally knowledgeable. Since some of the goals of EE curriculum include “encouraging environmentally responsible behavior” (Hewitt, 1997, p. 35), and develop a world that is more environmentally aware (Adkins & Simmons, 2002), it is the goal of teachers to instill in their students a positive knowledge base and understanding of the subject matter. Even with an understanding of the importance of EE to provide for a better, more sustainable future, teachers may be underprepared to teach these types of lessons in educational settings.

Hwang (2011) and Yang, Lam, and Wong, (2010) propose that there is a place for EE in the secondary school classroom, and that it is the responsibility of the teacher to possess the knowledge and skill to effectively teach about the environment. Ko and Lee (2003) believe that teachers who have a more favorable attitude toward the environment taught it more than teachers who did not. Likewise, limited EE exposure could be a reason why teachers do not teach EE in the classroom (Peffer & Bodzin, 2010).

Hungerford (2010) believes that EE is an important topic to teach. Although EE is important and it is being taught in the classroom, it is important for the teacher to possess background knowledge about the environment. Workshops are a way to communicate environmental educational knowledge to educators. Environmental educators who teach these workshops and other programs need to educate the public about much more than the various environmental topics. They must also “strive toward enabling and empowering” residents to become more knowledgeable of environmental issues and to eventually “act on behalf of the environment” (Sutton, 1989 (as cited in (Bush-Gibson & Rinfret, 2010, p. 85)). A small percentage of higher education institutions currently include an EE methods course in their teacher preparation programs (Heimlich, Braus,
Environmental education can also be useful in teacher preparation programs. Peffer and Bodzin (2010) argue that to encourage EE in the teacher preparation courses, teachers should “collaborate with non-formal environmental educators” (p. 268). Even outside of teacher preparation, having EE experience shows a positive impact on student achievement (GPA, grades) and engagement (motivation) (Strife, 2010). Encouraging pre-service teachers to gain experience in EE allows them to help promote environmental literacy and an appreciation of the natural world for their students (Hammerman & Hammerman, 1985). Peffer and Bodzin (2010) also argue that non-formal EE provides “interdisciplinary content and novel instructional strategies” for beginning teachers, which provides more “skills, abilities, and resources” to better incorporate EE in their classroom (p.268). Some professional organizations recommend the inclusion of non-formal EE in teacher preparation programs, although “it is not a standard practice” (Peffer & Bodzin, 2010, p. 270).

**The Effect of Workshops on Changing Attitudes/Behavior**

Dr. G. Vahoviak expressed the importance of environmental education when he stated, “In short, we often have one chance to ‘touch’ students who do, or may have, an impact on youth and EE. These classes reach many more students from various colleges and departments than do our other, semester-long credit classes. Any evidence of their value, impact, and strengths will greatly enhance their future offerings” (J. Shilladay (personal communication, November 14, 2012)).
The students who sign up for these workshops at SCEC do so out of their own interests. Places that practice non-formal EE like SCEC have many benefits. These include “flexibility, inexpensive price”, and short, specific programs (Environmental Education and Training Partnership (EETAP), 2004 (as cited in Bush-Gibson & Rinfret, 2010, p. 79)). Nature centers and other organizations may provide “professional development and environmental education curricular material for teachers, and experiential programs for school students and the general public” (Peffer & Bodzin, 2010, p. 268). In fact, “public programs”, which can include workshops, “are an important component of environmental adult education” (p. 83) and “are an excellent way of raising public awareness and understanding of natural processes” (Bush-Gibson & Rinfret, 2010, p. 83-84).

Like the Ajzen, 1991; Evans et al., 2007; Hines, Hungerford & Tomera, 1986/1987; Hungerford & Volk, 1990; Kollmuss & Agyeman, 2002; Kyburz-Graber, Hofer, & Wolfensberger, 2006; Scott & Willits, 1994; Stern, 2000; Strife, 2010 models state, behavior comes from many factors, not just knowledge. Providing students with a positive environmental view, as well as the perceived self-efficacy that they are able to make a positive difference in the environment can be just as influential on environmental behavior as knowledge.

Hungerford and Volk (1990) reference various authors when arguing that educators cannot make assumptions that one course will completely change the behavior of their students. Ramsey, Hungerford & Tomera (1981) believe in the usefulness of reinforcement of environmental topics to influence behavior. Workshops are an effective opportunity to reinforce environmental knowledge that, in conjunction with other factors,
leads to environmental behavior change. According to DiEnno and Hilton (2005) who studied the effects of knowledge retention on EE high school students, students found EE enjoyable and felt that the information learned was beneficial and will increase the chance that they further their interests in this area.

Workshops can incorporate a lot of material into a shorter amount of time. Participants in workshops often regard the information as “helpful in improving instructional skills”, such as teaching performance (Pandachuck, Harley, & Cook, 2004, p. 798). Pandachuck, Harley, and Cook (2004) studied the effectiveness of a two-day workshop on teaching enhancement. Some workshops are not designed to encompass a large group of people. The possible reason for this is that in a smaller group, individuals may get more attention than in a larger group setting. Groups as small as eight participants have been evaluated for knowledge and skill gained at a workshop and the results concluded that information was indeed learned and scores on the post-test for knowledge and skill gain increased from the pre-test (D’Eon, 2004; D’Eon, Sadownik, Harrison, & Nation, 2008). The length of each workshop was two days and two half-days, respectively. Whether the lesson taught in these workshops reaches ten people or 100 people, the effectiveness can still be measured, but not always generalized. Many articles depict the effectiveness of workshops. Miller and Mount (2001) surveyed a small number of people in their workshop on motivational interviewing and its effect on behavior change. They concluded that the results were positive with respect to knowledge gain.

Workshops are indeed an effective way of getting information across to people. Participants from different backgrounds and interest levels are able to attend and learn
useful information about the subject matter. The literature supports the fact that participants benefitted from the knowledge learned through the workshops as written by Miller & Mount (2001). There is a need for further study to determine the extent to which information being taught in workshops can enhance the prior knowledge of the participants.
CHAPTER 3

Methods

The methods section of this thesis describes the population, research design, procedures, and limitations of this research study.

Purpose and Research Questions

The purpose of the research study was to determine the effect of a one-day environmental education program focused on sustainability on participant’s environmental attitudes, beliefs, world views, and values (EABWV) as well as their environmental behavioral practices.

The following research questions guided this study:

1. Is there a difference between the pre-program survey EABWV pro-NEP scores and the post-program survey EABWV pro-NEP scores?
2. Is there a difference between the pre-program behavioral scores and the post-program behavioral pro-ECB scores?
3. Is there a difference between the pre-program survey environmental behaviors and the delayed post-program survey environmental behaviors?
4. Is there a difference between the post-program survey environmental behaviors and the delayed post-program survey environmental behaviors?
5. Are there differences in EABWV based on demographic factors?
Population

The population for this study was college students who enrolled in a one-day environmental education program entitled: “Environmental Education through Sustainability: My Place in the Green Movement” which was facilitated by environmental educators at The Pennsylvania State University’s Shaver’s Creek Environmental Center (SCEC). Based on the majors of students who attended previous Shaver’s Creek programs, an e-mail was sent to advisors and faculty who were affiliated with these majors, as well as some student groups that are in the affiliated majors. Various staff and faculty members who represent education majors were also sent e-mails. The e-mail that was sent included the program flyer and coordinator contact information. The advisors and faculty were asked to forward the flyer to students in their respective groups and/or discipline. Directions on the flyer instructed students to e-mail their willingness and commitment to participate in the environmental education (EE) program to the program coordinator. Students registered for the program via email request sent to the program coordinator. Upon registration, each student received a confirmation letter stating the details of the program. Students were registered for the program based on order of application receipt. Registration was limited to 60 people. Two people cancelled at the last minute, and of the remaining 58 registered students, 45 participated in the program. Forty-five of the 45 responded to the pre and post New Ecological Paradigm (NEP) and environmental conservation and behavior (ECB) surveys on the day of the program. Nine of the 45 participated in the focus group. Out of the 45 original participants, 41 responded to the six-week post program ECB survey, which yielded a 91.1% response rate.
While students of all majors were welcome to attend the program, it was expected that students who registered for the program would primarily represent disciplines including Secondary Education, Elementary Education, Science Education, and Agricultural and Extension Education. Some majors that have been represented in past programs other than EE through Sustainability that have been offered at Shaver’s Creek include, but are not limited to the following examples: Wildlife and Fisheries Science, Environmental Resource Management, and Biology.

Students who participated in this day-long environmental education program should have an interest in the environment, environmental education, or sustainability. The researcher implied that since the students registered for this program on their own accord, each student had some personal interest in one of the aforementioned topics.

**Research Design**

The research used a descriptive case study design. The demographic questions were used to describe the members of the population. Since the participants in the survey are not randomly selected, results from the research cannot be generalized to other populations. Finally, qualitative research took place through the use of a focus group of students in the EE program. A focus group was chosen to aid in explaining the research questions in this research because it “can be defined as a carefully planned discussion designed to obtain perceptions on a defined area of interest in a permissive, nonthreatening environment.” (Krueger, 1988, p. 18).

The program that the students participated in for this research study focused on sustainable living through a set of pro-environmental behaviors as well as a set of

A pre-test, post-test, and six-week delayed post-test were used in this study. The pre-survey determined the current perceived environmental behaviors and EABWV that each participant had upon entering the program. The post-survey sought to determine the EABWV of the participants directly after the program and to determine the likeliness of each participant to engage in the environmental behaviors presented in the pre-survey. The six-week delayed post-survey sought to determine the self-reported environmental behaviors that each participant engaged in six weeks after the end of the program.

The research data indicated if the program itself had an effect on the attitudes or perceived behavior of the participants. Assessing the reported environmental behaviors six weeks later indicated whether or not the participants actually changed their behaviors from the time that they completed the program.

In addition to these survey topics, demographics were assessed as well. Demographic questions developed by Lee (2008) included “age, gender, [and] major” (p. 32). Lee (2008) utilized the environmental behavior and NEP scales to determine the relatedness of EABWV and perceived environmental behavior among African American college students. Lee (2008) cited authors Barr (2007) and Zelezny, Chua and Aldrich (2000) when Lee (2008) stated that “young, single-family dwelling, and well educated women demonstrate more proenvironmental attitudes and behaviors” (p. 32). Van Liere & Dunlap (1980) suggest that various demographics respond differently to environmental attitudes and behaviors and some are predictors of these same attitudes and behaviors.
Reporting the academic major of the participants is useful to consider because some majors are thought of to be more environmentally conscious than others. For example, a student in an environmental major may be more likely to recycle than an education major because the topic of being eco-friendly is stressed in the former, although this is not always the case. Type of living arrangement indicates the ease of which participants can participate in these environmental behaviors. Oftentimes, recycling and conserving water and electricity can be easier in the dorms on campus because the facilities are designed to do so. Reminders in the hallways and in the rooms of dorms on the Pennsylvania State University Campus may exist to remind students to conserve resources. People who live off of campus may not experience the environmental resources (recycling bins, reminders to conserve) as those on campus. Last, career goal is a useful demographic to consider because there may be a trend in pro-environmental behaviors of those who are pursuing an environmental career.

In an effort to explore participant attitudes, beliefs, or behaviors related to environmental concerns, a focus group was held. The focus group questions were based upon the NEP survey: limits to growth, respect for the balance of nature, anti-anthropocentrism, perception of an eco-crisis, and rejection of exemptionalism. Anthropocentrism refers to “the belief that nature exists primarily for human use and has no inherent value of its own” (Dunlap et al., 2000, p. 431). Exemptionalism refers to the idea that humans alone “are exempt from the constraints of nature” (Dunlap & Catton Jr., 1994 (as cited by Dunlap et al., 2000). Questions that represent these main ideas were asked during the focus group session. Other questions that were asked during the focus
group include participant thoughts on their perceived environmental behavior as well as their thoughts on why their behavior changed, if it did.

Krueger (1988) stated that “Focus groups are typically composed of seven to ten people” for the purpose that they “must be small enough for everyone to have opportunity to share insights and yet large enough to provide diversity of perceptions.” (p. 27). The focus group used in this research consisted of nine participants. The author goes on to write about the usefulness of focus groups to assess programs after they have happened. The focus group used in this research cannot be generalized to a larger population. Not being able to generalize to a population can be a quality of focus groups (Krueger, 1988). Krueger (1988) outlines the steps to conducting a focus group. The steps include:

1. Determining the purpose of the group
2. Determining which group to study
3. Developing a plan and obtaining resources

Asking open-ended questions is an important part of the focus group. Using questions that can be answered with a ‘yes’ or ‘no’ answer should be avoided in the best interest of adding to the discussion (Krueger, 1988). The questions should be focused (Krueger, 1988). The questions in this research were focused on participant environmental behaviors, environmental attitudes, worldviews, beliefs, and attitudes. Any question that could be answered with a ‘yes’ or ‘no’ included a follow-up question.

Audio-recording and taking written notes during the focus group session are appropriate (Krueger, 1988). The researcher both audio-recorded the focus group and
took written notes. Moderator-encouraged discussion is also appropriate “with “value neutral” gestures and comments.” (p. 84).

Analyzing the focus group is an important step. The audio-recording of the focus group was transcribed by the researcher and read to understand the main ideas and common themes of each question. In order to provide direct quotes to this thesis, the researcher had to edit some grammar of the focus group, which is “appropriate as long as the meaning is not changed.” (Krueger, 1988, p. 118).

IRB approval for this research was obtained prior to the workshop and administration of surveys to participants. The IRB was submitted on January 15, 2013 and was approved on Friday, January 18, 2013.

Validity and Reliability

Pro-environmental behaviors can be categorized into groups which include “public recycling, public energy conservation, water conservation, curbside recycling, central recycling, home energy conservation, and gasoline conservation” (Os baldiston & Schott, 2012, p. 280). These behaviors were present in a survey created by Lee (2008). By cross-referencing the behaviors that Lee (2008) researched with the Os baldiston & Schott (2012) meta-analysis of these same behaviors, the survey that was given to the students in this research project covered the various environmental behaviors in which a person is able to participate. The set of environmental attitudes used in this research study were adapted from the NEP scale (Dunlap et al., 2000). This scale has been used in the past to measure environmental attitudes, beliefs, worldviews, and values (Dunlap et al., 2000).
The EABWV scale was adapted from the New Ecological Paradigm (NEP) (Dunlap et al., 2000). The NEP addresses the topics of respect limits to growth, respect for the balance of nature, anti-anthropocentrism, perception of an eco-crisis, and rejection of exemptionalism (Dunlap et al., 2000; Lee, 2008). This scale is a proven, popular, and credible instrument that measures the attitudes of the participant about the state of the environment. This tool has been used in numerous studies and has been tested on numerous populations, including college students (Lee, 2008). The Environmental Conservation and Behavior scale was adapted from an environmental conservation and behavior scale by Lee (2008). The scale that Lee (2008) used was tested on college students and has been used in conjunction with the NEP to determine the relationship between environmental attitudes and perceived environmental behavior (Lee, 2008). Both the ECB and NEP surveys were Likert-style items. The ECB survey consisted of eleven questions, while the NEP survey consisted of fifteen questions. The surveys given before and after the program were used to evaluate the change in EABWV and perceived behavior that the participant exhibited before the program and planned to participate in after the program.

A panel of experts including environmental and teacher educators were asked to evaluate the content validity of the survey instrument. Since both of the surveys have been used and tested on the college student demographic, their content and construct validity was deemed reliable. The NEP scale shows a Cronbach’s Alpha value of .83. The tool was pilot tested by interns at Shaver’s Creek Environmental Center to ensure that the survey measured what it was intended to measure as well as clarifying any wording or
instructional issues. At this time, the researcher determined how long the survey would take to complete. Adjustments were made to the instrument based on the pilot test.

**Procedure**

Once the students had registered for the program and arrived at Shaver’s Creek Environmental Center (SCEC) on the day of the program, each student was given the option to complete a survey regarding environmental attitudes, beliefs, worldviews, values (EABWV), and behaviors. The survey was adapted from The New Ecological Paradigm (NEP) scale (Dunlap et al., 2000) to assess EABWV, and the Environmental Conservation and Behavior (ECB) scale (Lee, 2008) to assess environmental behaviors of the student participants. The NEP scale and a set of behaviors were paired together because, “Support for the NEP was positively related to a scale composed of eight pro-environmental behaviors” (Scott & Willits, 1994, p. 241). Clayton (2012) also states that “The NEP has been shown to predict self-reported environmental behavior (p. 172).

Each student who agreed to complete the survey was asked to sign a consent form outlining the confidentiality of the resulting survey data as well as its intended research purpose. There was a box on the consent form that asked if the student would like to participate in a focus group held at a later date. Nineteen expressed interest in the focus group, and were added to a list of possible participants. Nine of the participants who expressed interest in the focus group were able to participate in this event. The survey was administered upon collection of consent forms from the students and prior to the beginning of the program.
A follow-up survey was administered at the end of the program to assess the EABWV and anticipated behaviors of the students. The same scales administered in the pre-test instrument (NEP and ECB) were used as the post-test instrument; however, the wording of the ECB scale reflected the likeliness of participating in the environmental behaviors listed in the ECB scale. The NEP scale of EABWV consisted of the exact questions asked in the pre-test.

Five weeks after the program was completed, students were sent an email to notify them of the upcoming final survey. The e-mail also included a document that lists various resource references that would aid in learning more about sustainability. The resource references included statistical data, useful websites, as well as information on environmental education curricula (Project WILD, Project WILD Aquatic, PA Songbirds, Project Learning Tree, Project Food, Land and People, etc.). One week later, students who had expressed consent on the day of the program were contacted via email and asked to participate in an environmental behavior survey that was identical to the ECB survey found in the pre-test. The email sent contained the link to the internet survey. E-mailing the resources not only cuts costs while completing the research, but allowed the participants to remain completely anonymous during data collection. It also reflects the green principle of conserving paper as the attachment is electronic, rather than printed. A total of 41 out of the original 45 students completed this survey. The collection of responses from the participants was obtained during the six-week follow-up survey, not individual responses. To keep the surveys completely anonymous, students did not have an identification number associated with their identity. A general email was sent to all participants who completed the pre and post-test survey asking them to complete the six-
week follow-up survey. Data were reported as a group response rather than individualized responses.

One week following the email message containing the survey that was sent, a reminder email including a link to the survey was sent to the students who had not yet completed the internet survey in order to encourage non-respondents to participate. Following this reminder, three subsequent weekly reminder email messages were sent in an attempt to collect as much data as possible. After four attempts to get a response from the participants, the researcher assumed that the non-responding participants would not complete the survey.

The population of this study can be considered a case study since the students participating in each survey were not randomly selected from a larger population and the information collected from them will not be generalized to any other population. Case studies are useful tools to collecting research about “small group behavior” (Yin, 2009, p. 4). Each student that participated in the program was given the opportunity to complete the surveys. The data collected determined the behaviors and attitudes of the case study participants only.

After the internet survey was administered, a focus group was conducted to determine the qualitative responses of the participants as expressed through their EABWV and perceived behavior change. “The purpose of conducting a focus group is to listen and gather information. It is a way to better understand how people feel or think about an issue, product, or service. Focus groups are used to gather opinions” (Krueger & Casey, 2009, p. 2).
Students were recruited the day of the EE program to participate in the focus group study. Participation was on a volunteer basis by each participant as indicated on their consent form that was signed the day of the program. Upon arrival to the focus group session, students received another consent form to sign informing them of the confidentiality of their participation. The participants were asked to give their thoughts on a series of questions that delve deeper into their personal environmental attitudes and behavior changes. The focus group was audio recorded for later transcription by the researcher. Nine participants from the original program participated in the focus group. The participants were selected based on their desire to participate in the focus group. Initially, 19 people expressed interest in participating in the focus group, but only nine could attend on the scheduled date and time. The focus group took place in a classroom that is centrally located on campus and is ideal for group discussion. The questions that were asked during the focus group represent some area that the NEP measures as well as behavioral change motivators and inhibitors. The questions were:

1. How would you describe someone with good environmental behaviors?

2. Have your environmental behaviors changed as a result of participating in the workshop in February?
   a. What influenced this change?
   b. What impeded other changes in behavior you considered after the workshop?

3. Do you feel that humans have an impact on the environment globally?
   a. Are these impacts felt locally (in Central PA)?

4. Do you feel that there is a human population limit to what the earth can sustain?
5. If you believe the balance of nature is delicate, please indicate the biggest threat to this balance globally?

6. What does the term “living well” in the concept of ‘living well within one’s place’ mean to you?

**Data Analysis**

The quantitative data collected during this research were analyzed using IBM SPSS Statistics 20 and Microsoft Excel 2000. Descriptive statistics were used to analyze the data. The qualitative data were analyzed using content analysis. Since the population was not randomly selected, the data cannot be generalized to other populations.

Percentages were used to measure the difference between the EABWV and ECB scores. Focus group responses were analyzed by transcribing the data and using content analysis to determine themes related to environmental behaviors, values, attitudes, beliefs, and world views.

**Limitations**

Each participant came to the environmental education program with different levels of environmental attitude and behaviors. The past-experiences of the participants cannot be controlled. The free will of a person is also impossible to control. Even with a sound education and reasoning that sustainability is needed for the future, a person may or may not decide to participate in these pro-environmental behaviors.

Assuming that each participant is able to engage in the same environmental behaviors that others do is not possible since the living conditions and attitudes toward
conservation held by their roommates may differ. Additionally, some participants may live somewhere that does not offer recycling programs. Limitations that exist in the qualitative portion of the study (focus group) include people not discussing their real behaviors or feelings because they may not be comfortable because they do not want to be judged. Self-selection can also be a limitation related to the focus group. The focus group participants were not randomly selected.

Summary

The population of 45 participants in a one-day program on sustainability completed a survey that measured personal environmental attitudes, beliefs, worldviews, and values as well as environmental conservation and behaviors. All 45 participants completed the same surveys before and after the program. The first survey determined environmental attitudes, beliefs, values, and worldviews and the extent to which the participants currently engaged in the behaviors. The second survey measured environmental attitudes, beliefs, values, and worldviews and the participants’ intent to engage in these behaviors. Forty-one of the original 45 program participants completed a six-week delayed post-test survey. This survey questioned whether or not the participants engaged in the behaviors six-weeks after the conclusion of the program. A focus group was conducted to provide an opportunity for participants to discuss their attitudes, beliefs, or behaviors related to environmental concerns. A total of nine people participated in the focus group. The scales that were used for the quantitative surveys were the New Ecological Paradigm scale (Dunlap et al., 2000) and a combination of an environmental and conservation behavior scale (Lee, 2008). Both of the scales have been tested on the
represented demographic. Data was analyzed using both qualitative and quantitative methods.
CHAPTER 4

Results

The results of this research study are outlined in chapter four. The data were analyzed using qualitative and quantitative methods. Percentages, means, and standard deviations were used to analyze quantitative data. Content analysis was used to determine common themes of qualitative data. The sample population consisted of 45 participants in the program ‘Environmental Education through Sustainability: My Place in the Green Movement’ (Environmental Education through Sustainability). The participants participation was voluntary. Random sampling was not used during this research study. The purpose of the research study was to determine the effect of a one-day environmental education program focused on sustainability on participant’s environmental attitudes, beliefs, world views, and values (EABWV) as well as their environmental behavioral practices. The results were guided by the following research questions:

1. Is there a difference between the pre-program survey EABWV pro-NEP scores and the post-program survey EABWV pro-NEP scores?
2. Is there a difference between the pre-program behavioral scores and the post-program behavioral pro-ECB scores?
3. Is there a difference between the pre-program survey environmental behaviors and the delayed post-program survey environmental behaviors?
4. Is there a difference between the post-program survey environmental behaviors and the delayed post-program survey environmental behaviors?
5. Are there differences in EABWV based on demographic factors?
Demographic Information

Each program participant was asked to complete demographic information about themselves. The information collected is presented in Table 4.1.

Table 4.1

Demographic Information of ‘Environmental Education through Sustainability’ Program Participants

<table>
<thead>
<tr>
<th>Gender</th>
<th>Science*</th>
<th>Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>17</td>
<td>Dorm</td>
</tr>
<tr>
<td>Female</td>
<td>28</td>
<td>Apartment</td>
</tr>
<tr>
<td>Hard</td>
<td>26</td>
<td>20</td>
</tr>
<tr>
<td>Social</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>Dorn</td>
<td>15</td>
<td>5</td>
</tr>
</tbody>
</table>

Note. Hard Sciences = College of Agricultural Sciences; Eberly College of Science; College of Engineering; College of Earth and Mineral Sciences

Social Sciences = College of Education; Smeal College of Business; College of Arts and Architecture; College of Liberal Arts; College of Health and Human Development

Research Question #1

Is There a Difference between the Pre-Program Survey EABWV Pro-NEP Scores and the Post-Program Survey EABWV Pro-NEP Scores?

Forty five participants who attended the program ‘Environmental Education through Sustainability: My Place in the Green Movement’ completed the pre-program surveys. The New Ecological Paradigm (NEP) scale items measure environmental attitudes, beliefs, worldviews, and values (Dunlap et al., 2000). This 15-item scale includes three questions each for items that pertain to ‘limits to growth, respect for the balance of nature, anti-anthropocentrism, perception of an eco-crisis, and rejection of exemptionalism (Dunlap et al., 2000). Participants could select one response for each item. This survey was given before the program began and immediately after it ended.
The responses were ranked using a Likert scale (1 = strongly agree, 2 = mildly agree, 3 = unsure, 4 = mildly disagree, 5 = strongly disagree). Items 1, 6, and 11 relate to ‘limits to
growth’. Items 3, 8, and 13 relate to respect for the balance of nature. Items 2, 7, and 12 relate to anti-anthropocentrism. Items 5, 10, and 15 relate to perception of an eco-crisis.
Items 4, 9, and 14 relate to rejection of anti-exemptionalism. Participants pre-program EABWV showed that on average, 58.2% were pro-NEP. Participant post-program EABWV showed that on average, 66.9% were pro-NEP. This value was created by adding the percentages of participants who responded with ‘strongly agree’ and ‘mildly agree’ for all odd-numbered items. Likewise, the percentages were reverse scored and added for participants who ‘mildly disagree; and ‘strongly disagree’ for even-numbered items. Adding the values of these scores indicates pro-NEP responses (Lee, 2008). Table (4.2) shows the current (pre-program) and post-program NEP values of the program participants. The item number, item, mean score for each item, standard deviation, mean pro NEP percentage, and number of respondents are included for each question. The average pro-NEP percentage is also included for each set of values.
Table 4.2
Comparison of Pre-Program and Post-Program NEP Scores*

<table>
<thead>
<tr>
<th>#</th>
<th>Item</th>
<th>Pre-Program</th>
<th></th>
<th></th>
<th>Post-Program</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>We are approaching the limit of the number of people the earth can support</td>
<td>45 2.09 0.900 73.3</td>
<td></td>
<td></td>
<td>45 2.00 0.953 77.8</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Humans have the right to modify the natural environment to suit their needs</td>
<td>45 3.31 1.240 57.8</td>
<td></td>
<td></td>
<td>45 3.67 1.297 62.2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>When humans interfere with nature it often produces disastrous consequences</td>
<td>44 2.23 0.859 72.7</td>
<td></td>
<td></td>
<td>45 2.07 1.195 75.6</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Human resourcefulness will insure that we do NOT make the earth unlivable</td>
<td>45 2.51 0.968 13.3</td>
<td></td>
<td></td>
<td>45 2.33 1.225 22.2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Humans are severely abusing the environment</td>
<td>45 2.09 0.973 75.6</td>
<td></td>
<td></td>
<td>45 1.84 1.086 77.8</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>The earth has plenty of natural resources if we just learn how to develop them</td>
<td>45 2.33 1.225 17.8</td>
<td></td>
<td></td>
<td>45 2.31 1.184 22.2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Plants and animals have as much right as humans to exist</td>
<td>45 1.51 0.895 86.7</td>
<td></td>
<td></td>
<td>45 1.31 0.821 91.1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>The balance of nature is strong enough to survive the impacts of a modern industrial nation</td>
<td>43 3.37 1.001 44.2</td>
<td></td>
<td></td>
<td>45 3.78 1.223 66.7</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Despite our abilities humans are still subject to the laws of nature</td>
<td>44 1.80 0.734 86.4</td>
<td></td>
<td></td>
<td>45 1.84 1.043 82.2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>The so-called “ecological crisis” facing humankind has been greatly exaggerated</td>
<td>45 3.27 1.009 46.7</td>
<td></td>
<td></td>
<td>45 3.84 1.205 66.7</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>The earth is like a spaceship with very limited room and resources</td>
<td>44 2.43 1.043 59.1</td>
<td></td>
<td></td>
<td>44 1.64 1.036 84.1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Humans were meant to rule over the rest of nature</td>
<td>45 3.64 1.282 64.4</td>
<td></td>
<td></td>
<td>44 3.84 1.413 75.0</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>The balance of nature is very delicate and easily upset</td>
<td>45 2.33 1.087 66.7</td>
<td></td>
<td></td>
<td>44 1.66 0.914 86.4</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Humans will eventually learn enough about how nature works to be able to control it</td>
<td>44 3.14 1.069 40.9</td>
<td></td>
<td></td>
<td>44 3.05 1.275 34.1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>If things continue on their present course, we will soon experience a major ecological catastrophe</td>
<td>43 2.19 1.075 67.4</td>
<td></td>
<td></td>
<td>44 1.86 1.091 79.5</td>
<td></td>
</tr>
</tbody>
</table>

Mean Pro NEP %

58.2 66.9
The data shows an increase of 8.7% between pro-NEP values. The post-program pro-NEP score was 66.9% and the pre-program pro-NEP score was 58.2%. Therefore, the participants EABWV were higher at the immediate end of the program than they were at the beginning of the program.

**Focus group discussion that emphasizes participant environmental attitudes, beliefs, worldviews, and values.**

A focus group was held to go beyond the numbers of the quantitative data and to gather information as stated by program participants. Participants were prompted with questions that focused on personal environmental attitudes, beliefs, values, and worldviews. The following examples from focus group are some comments made by participants.

*Question 3. Do you feel that humans have an impact on the environment globally?*

“Without a doubt we have an impact on the environment. Globally we are all connected and that’s something that too few people seem to realize is the interconnectedness of everything.”

“We [humans] have an impact and there are negative and positive ones.”

“Humans as a group are so busy trying to make nature adapt to us rather than working [on ourselves] to adapt to nature and I think that is what causes a lot of issues.”

Question 3a. Are these impacts felt locally (in Central Pennsylvania)?

“Yes.”

“We don’t feel our impacts as much as future generations are going to feel them. We don’t really see the results [or] the consequences. We still have the chance to turn things around at this point.”

“We can’t see how things are being affected globally, but we can see it better locally.”

Question 4. Do you feel that there is a human population limit to what the earth can sustain?

“There is definitely a limit. We can’t just support an infinite amount of people because we have limited resources.”

“We can’t supply enough food.”

“The limit is probably going to be clean drinking water.”

“[At] what point are people going to start owning our surroundings and treat them with respect?”

“Technology is going to help.”

“Globally as a whole we are reaching the limit because there are sources that are dwindling like water and food.”
“Once we find the population limit, it is going to be because we were way exceeding it.”

“Education is key.”

*Question 5. If you believe the balance of nature is delicate, please indicate the biggest threat to this balance globally.*

“Yes and humans.”

“Nonrenewable resources.”

“Yes our environment is delicate, but our environment is also adaptable.”

“There’s a fine balance.”

“[Determining] that equal balance of being able to live within nature and leave nature itself and yet still be productive.”

“Carrying capacity.”

*Question 6. What does the term ‘living well’ in the concept of ‘living well within one’s place’ mean to you?*

“Just having what you need.”

“Not taking advantage of things.”

“Never being content. Not settling for what you know. Always trying to educate yourself. Not settling for good enough.”
Research Question #2

Is There a Difference between the Pre-Program Behavioral Scores and the Post-Program Behavioral Pro-ECB Scores?

The environmental conservation and behavior scale measures the extent to which participants practice each behavior or conservation item. The responses were ranked using a Likert scale (1 = never, 2 = rarely, 3 = sometimes, 4 = usually, 5 = always).

Program participants were asked to complete the eleven-question environmental conservation and behavior (ECB) scale that measures how often participants currently (pre-program) and anticipate to (post-program) practice these items. The survey was completed by the participants before and immediately after the program.

Participants current (pre-program) behaviors showed that on average, 49.1% were practicing pro-environmental behaviors for these items. The percent pro-ECB value was created by adding the percentages of participants who responded with ‘always and ‘usually for all items. Participants anticipated post-program behaviors showed that 79.4% anticipated ‘always’ and ‘usually’ practicing these behaviors. This is an increase of 30.3% between the surveys. The data shows that people intend to practice the environmental behaviors more than they actually did previously.

Table 4.3 shows the item, mean scores, percent pro-ECB, standard deviation, the number of respondents, and the mean percent pro-ECB percentages.
Table 4.3

Comparison of Pre-Program and Post-Program ECB Scores*

<table>
<thead>
<tr>
<th>Item</th>
<th>Pre-Program</th>
<th>Post-Program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n  M</td>
<td>SD</td>
</tr>
<tr>
<td>Recycle Newspapers</td>
<td>44 3.09</td>
<td>1.273</td>
</tr>
<tr>
<td>Recycle Magazines</td>
<td>44 2.82</td>
<td>1.299</td>
</tr>
<tr>
<td>Recycle Glass Bottles</td>
<td>45 3.73</td>
<td>1.214</td>
</tr>
<tr>
<td>Recycle Jars</td>
<td>45 3.31</td>
<td>1.164</td>
</tr>
<tr>
<td>Recycle Plastic Bottles</td>
<td>45 3.93</td>
<td>1.074</td>
</tr>
<tr>
<td>Recycle Cardboard Boxes</td>
<td>45 3.18</td>
<td>1.154</td>
</tr>
<tr>
<td>Turn off Lights when</td>
<td>44 4.34</td>
<td>0.776</td>
</tr>
<tr>
<td>not in use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ride the Bus</td>
<td>44 2.98</td>
<td>1.210</td>
</tr>
<tr>
<td>Try to reduce water</td>
<td>45 3.36</td>
<td>0.908</td>
</tr>
<tr>
<td>consumption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Try to use less paper</td>
<td>45 3.00</td>
<td>0.929</td>
</tr>
<tr>
<td>towels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carpool</td>
<td>45 3.13</td>
<td>1.100</td>
</tr>
<tr>
<td>Mean % Pro ECB</td>
<td>49.1</td>
<td></td>
</tr>
</tbody>
</table>

Focus group discussion that emphasizes what participants believe makes a person with good environmental behaviors.

Participants were prompted with questions that included talking about their personal behaviors. The qualitative data was collected to understand about the participants’ behavioral practices. The following comments are examples from the focus group.

**Question 1. How would you describe someone with good environmental behaviors?**

“Someone who’s conscientious of what they are doing or how their actions are affecting their environment.”

“Trying to lower their impact on the environment but then learning new ways to make even less of an impact.”

“Going above and beyond what is convenient.”

“Going the extra step.”

“Not just doing it [and] being happy doing it yourself, but explaining to others why you do it because you can make a difference yourself, but telling other people what you do and trying to help them do the same thing.”

“Someone who is aware of their surroundings.”

“In terms of being good environmentalists, it’s important to educate people and have them be aware of what’s surrounding us and just treat it with care.”
“The teaching thing [is] telling others what you know because that gets rid of the problem with ignorance.”

“Often times you don’t even realize people don’t know that what they are doing is a problem.”
Research Question #3

Is There a Difference between the Pre-Program Survey Environmental Behaviors and the Delayed Post-Program Survey Environmental Behaviors?

Program participants were asked to complete the eleven-question environmental conservation and behavior (ECB) scale that measures how often participants practice these items prior to the start of the program and again six weeks later.

Participants’ six-week post-program behaviors showed that on average, 65.4% are ‘always’ and ‘usually’ practicing these items. This value was created by adding the percentages of participants who responded with ‘always’ and ‘usually’ for all items. The results show that participants pre-program pro-ECB score was 49.1%. This is an increase of 16.3% between the surveys. Therefore, there was an increase in practiced behavior from the pre-program survey to six-weeks after the program.

Table 4.4 shows the six-week post-program EBC values of the program participants including the item, mean scores, percent pro-ECB, standard deviation, the number of respondents, and the mean percent pro-ECB value of these two surveys.
Table 4.4
Comparison of Pre-Program and Six-Week Evaluation of ECB of Program Participants*

<table>
<thead>
<tr>
<th>Item</th>
<th>Pre-Program</th>
<th></th>
<th></th>
<th>Six-Weeks Later</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
<td>SD</td>
<td>% Pro ECB</td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td>Recycle Newspapers</td>
<td>44</td>
<td>3.09</td>
<td>1.273</td>
<td>43.1</td>
<td>41</td>
<td>3.93</td>
</tr>
<tr>
<td>Recycle Magazines</td>
<td>44</td>
<td>2.82</td>
<td>1.299</td>
<td>34.1</td>
<td>41</td>
<td>3.63</td>
</tr>
<tr>
<td>Recycle Glass Bottles</td>
<td>45</td>
<td>3.73</td>
<td>1.214</td>
<td>62.2</td>
<td>41</td>
<td>4.17</td>
</tr>
<tr>
<td>Recycle Jars</td>
<td>45</td>
<td>3.31</td>
<td>1.164</td>
<td>48.9</td>
<td>41</td>
<td>3.83</td>
</tr>
<tr>
<td>Recycle Plastic Bottles</td>
<td>45</td>
<td>3.93</td>
<td>1.074</td>
<td>73.4</td>
<td>41</td>
<td>4.12</td>
</tr>
<tr>
<td>Recycle Cardboard Boxes</td>
<td>45</td>
<td>3.18</td>
<td>1.154</td>
<td>44.4</td>
<td>41</td>
<td>3.73</td>
</tr>
<tr>
<td>Turn off Lights when not in use</td>
<td>44</td>
<td>4.34</td>
<td>0.776</td>
<td>86.4</td>
<td>41</td>
<td>4.34</td>
</tr>
<tr>
<td>Ride the Bus</td>
<td>44</td>
<td>2.98</td>
<td>1.210</td>
<td>29.5</td>
<td>41</td>
<td>3.17</td>
</tr>
<tr>
<td>Try to reduce water consumption</td>
<td>45</td>
<td>3.36</td>
<td>0.908</td>
<td>46.7</td>
<td>41</td>
<td>3.71</td>
</tr>
<tr>
<td>Try to use less paper towels</td>
<td>45</td>
<td>3.00</td>
<td>0.929</td>
<td>26.6</td>
<td>41</td>
<td>3.59</td>
</tr>
<tr>
<td>Carpool</td>
<td>45</td>
<td>3.13</td>
<td>1.100</td>
<td>44.5</td>
<td>41</td>
<td>3.32</td>
</tr>
</tbody>
</table>

Mean % Pro ECB | 49.1 | 65.4 |


**Focus group discussion that emphasizes participant environmental behaviors.**

In addition to environmental attitudes, beliefs, worldviews, and values, environmental behaviors were included in the focus group. Participants were prompted with questions that focused on personal environmental behaviors. Participants were asked to consider why they practiced the behaviors and the implications to engaging in such behaviors. The following examples from focus group are some comments made by participants.
Question 2. Have your environmental behaviors changed as a result of participating in the workshop in February?

“I try to recycle.”

“I didn’t really know what I could recycle and what I couldn’t.”

“I didn’t realize that you can [recycle] paper.”

“Not drastically changing, but little things.”

“I’ve been trying to recycle as much as possible whenever I’m on campus. Unfortunately I don’t have the luxury at my apartment to recycle as much as I could.”

“It’s not as convenient as it should be.”

“I am way more consciously aware whenever I don’t do it.”

“I’m more aware of how I effect the environment.”

“I do recycle and take the extra steps down to the recycle bin for the plastics but definitely not as much as I could.”

“I’ve been recycling more than I have in the past… and I’ve been trying to decrease my water consumption.”

“[Carpooling is] something that had never crossed my mind before.”

Question 2a. What influenced this change?

“The graveyard [how long it really took] for all that stuff [to decompose].
“All the different kinds of recycle bins.”

“The different percentages of water [and] how much is in each source.”

*Question 2b. What impeded other changes in behavior you considered after the workshop?*

“The availability of being able to do it [behaviors].”

“Some trash companies charge you extra to recycle.”

“Convenience.”

**Research Question #4**

**Is There a Difference between the Post-Program Survey Environmental Behaviors and the Delayed Post-Program Environmental Behaviors?**

Program participants were asked to complete the eleven-question environmental conservation and behavior (ECB) scale that measures how often participants anticipate practicing these items immediately after the program and their actual practiced behaviors again six weeks later. Pro-ECB was calculated by adding the percentages of respondents who answered each question with ‘always’ or ‘usually’. The results show that participants post-program anticipated pro-ECB score was 79.4% and their six week later pro-ECB score was 65.4%. This is a decrease of 14% between the surveys. This data indicates that the participants anticipated practicing the behaviors more than they actually did after the program. Table 4.5 shows the item, mean scores, percent pro-ECB, standard deviation, number of respondents of these two surveys, and the mean percent pro-ECB of the two surveys.
Table 4.5
Comparisons of Post-Program and Six-Week Evaluation of ECB of Program Participants*

<table>
<thead>
<tr>
<th>Item</th>
<th>Post-Program</th>
<th></th>
<th></th>
<th></th>
<th>Six-Weeks Later</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
<td>SD</td>
<td>% Pro ECB</td>
<td>n</td>
<td>M</td>
<td>SD</td>
<td>% Pro ECB</td>
</tr>
<tr>
<td>Recycle Newspapers</td>
<td>44</td>
<td>4.20</td>
<td>0.904</td>
<td>81.8</td>
<td>41</td>
<td>3.93</td>
<td>1.081</td>
<td>65.8</td>
</tr>
<tr>
<td>Recycle Magazines</td>
<td>44</td>
<td>4.11</td>
<td>0.920</td>
<td>81.8</td>
<td>41</td>
<td>3.63</td>
<td>0.994</td>
<td>58.5</td>
</tr>
<tr>
<td>Recycle Glass Bottles</td>
<td>44</td>
<td>4.57</td>
<td>0.695</td>
<td>68.2</td>
<td>41</td>
<td>4.17</td>
<td>0.972</td>
<td>78.0</td>
</tr>
<tr>
<td>Recycle Jars</td>
<td>45</td>
<td>4.49</td>
<td>0.757</td>
<td>88.9</td>
<td>41</td>
<td>3.83</td>
<td>1.202</td>
<td>65.8</td>
</tr>
<tr>
<td>Recycle Plastic Bottles</td>
<td>45</td>
<td>4.73</td>
<td>0.580</td>
<td>97.8</td>
<td>41</td>
<td>4.12</td>
<td>0.954</td>
<td>82.9</td>
</tr>
<tr>
<td>Recycle Cardboard Boxes</td>
<td>44</td>
<td>4.50</td>
<td>0.762</td>
<td>88.6</td>
<td>41</td>
<td>3.73</td>
<td>1.001</td>
<td>70.7</td>
</tr>
<tr>
<td>Turn off Lights when not in use</td>
<td>43</td>
<td>4.67</td>
<td>0.644</td>
<td>95.3</td>
<td>41</td>
<td>4.34</td>
<td>0.883</td>
<td>90.2</td>
</tr>
<tr>
<td>Ride the Bus</td>
<td>45</td>
<td>3.29</td>
<td>1.080</td>
<td>40.0</td>
<td>41</td>
<td>3.17</td>
<td>1.116</td>
<td>43.9</td>
</tr>
<tr>
<td>Try to reduce water consumption</td>
<td>44</td>
<td>4.36</td>
<td>0.810</td>
<td>88.7</td>
<td>41</td>
<td>3.71</td>
<td>1.006</td>
<td>63.5</td>
</tr>
<tr>
<td>Try to use less paper towels</td>
<td>45</td>
<td>4.27</td>
<td>0.837</td>
<td>84.5</td>
<td>41</td>
<td>3.59</td>
<td>0.974</td>
<td>53.7</td>
</tr>
<tr>
<td>Carpool</td>
<td>45</td>
<td>3.60</td>
<td>1.074</td>
<td>57.8</td>
<td>41</td>
<td>3.32</td>
<td>1.035</td>
<td>46.4</td>
</tr>
<tr>
<td>Mean % Pro ECB</td>
<td></td>
<td>79.4</td>
<td></td>
<td></td>
<td>65.4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Research Question #5

Are There Differences in EABWV Based on Demographic Factors?

The 45 participants in the program were given the chance to provide demographic information about themselves that included major, gender, living situation, and career goal. Career goal was eliminated in the data analysis because the responses varied and were unable to be categorized effectively.
Of the 45 participants, 28 were female and 17 were male. Participants who reported their major were placed into categories depending on which college their major correlates to. Two participants did not report a major while 14 were in the College of Agricultural Sciences, seven were in Eberly College of Science, ten were in the College of Education, two were in the Smeal College of Business, two were in the College of Engineering, one was in the College of Arts and Architecture, two were in the College of Liberal Arts, three were in the College of Earth and Mineral Sciences, and two were in the College of Health and Human Development. One participant was a dual-major, which placed them in two categories. This participant was assigned to one college in the interest of data-analysis. After the majors were placed in their appropriate colleges, the colleges were then separated into two categories which included hard sciences and social sciences. The colleges were grouped this way to better compare the data since some of the numbers of participants in each college were low. It is understood that not every major in the colleges can be considered a hard or social science. The colleges categorized as hard sciences included the College of Agricultural Sciences, Eberly College of Science, the College of Engineering, and the College of Earth and Mineral Sciences. The colleges categorized as social sciences included the College of Education, the Smeal College of Business, the College of Arts and Architecture, the College of Liberal Arts, and the College of Health and Human Development.

One participant did not indicate their living situation. Fifteen of the remaining participants lived in the dormitories, 20 lived in apartments, four were single-living, and five lived in a house. The living situation ‘single living’ was omitted from the results because of the ambiguous nature of the choice. ‘Living situation’ could be interpreted by
the participant as multiple things and multiple situations, for example, living alone in a dorm, apartment, or a home. The choice was therefore omitted from the research and the table. Table 4.6, 4.7, and 4.8 shows the number of respondents, mean, standard deviation, pro-NEP percentages, and mean pro-NEP percentage of each demographic category.
Table 4.6
NEP Scores by Gender*

<table>
<thead>
<tr>
<th>#</th>
<th>Item</th>
<th>Female</th>
<th></th>
<th></th>
<th></th>
<th>Male</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>M</td>
<td>SD</td>
<td>% Pro</td>
<td>n</td>
<td>M</td>
<td>SD</td>
<td>% Pro</td>
</tr>
<tr>
<td>1</td>
<td>We are approaching the limit of the number of people the earth can</td>
<td>28</td>
<td>2.25</td>
<td>0.887</td>
<td>67.9</td>
<td>17</td>
<td>1.82</td>
<td>0.883</td>
<td>82.4</td>
</tr>
<tr>
<td></td>
<td>support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Humans have the right to modify the natural environment to suit their need</td>
<td>28</td>
<td>3.57</td>
<td>1.136</td>
<td>60.7</td>
<td>17</td>
<td>2.88</td>
<td>1.317</td>
<td>52.9</td>
</tr>
<tr>
<td>3</td>
<td>When humans interfere with nature it often produces disastrous</td>
<td>27</td>
<td>2.41</td>
<td>1.010</td>
<td>59.3</td>
<td>17</td>
<td>1.94</td>
<td>0.429</td>
<td>94.1</td>
</tr>
<tr>
<td></td>
<td>consequences</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Human resourcefulness will insure that we do NOT make the earth</td>
<td>28</td>
<td>2.61</td>
<td>1.031</td>
<td>17.9</td>
<td>17</td>
<td>2.35</td>
<td>0.862</td>
<td>5.90</td>
</tr>
<tr>
<td></td>
<td>unlivable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Humans are severely abusing the environment</td>
<td>28</td>
<td>2.07</td>
<td>0.979</td>
<td>78.6</td>
<td>17</td>
<td>2.12</td>
<td>0.993</td>
<td>70.6</td>
</tr>
<tr>
<td>6</td>
<td>The earth has plenty of natural resources if we just learn how to</td>
<td>28</td>
<td>2.21</td>
<td>1.258</td>
<td>17.9</td>
<td>17</td>
<td>2.53</td>
<td>1.179</td>
<td>17.6</td>
</tr>
<tr>
<td></td>
<td>develop them</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Plants and animals have as much right as humans to exist</td>
<td>28</td>
<td>1.43</td>
<td>0.790</td>
<td>89.3</td>
<td>17</td>
<td>1.65</td>
<td>1.057</td>
<td>82.4</td>
</tr>
<tr>
<td>8</td>
<td>The balance of nature is strong enough to survive the impacts of a</td>
<td>26</td>
<td>3.38</td>
<td>0.983</td>
<td>46.2</td>
<td>17</td>
<td>3.35</td>
<td>1.057</td>
<td>41.2</td>
</tr>
<tr>
<td></td>
<td>modern industrial nation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Despite our abilities humans are still subject to the laws of nature</td>
<td>27</td>
<td>1.74</td>
<td>0.656</td>
<td>88.9</td>
<td>17</td>
<td>1.88</td>
<td>0.857</td>
<td>82.4</td>
</tr>
<tr>
<td>10</td>
<td>The so-called “ecological crisis” facing humankind has been greatly</td>
<td>28</td>
<td>3.25</td>
<td>1.005</td>
<td>46.4</td>
<td>17</td>
<td>3.29</td>
<td>1.407</td>
<td>47.1</td>
</tr>
<tr>
<td></td>
<td>exaggerated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>The earth is like a spaceship with very limited room and resources</td>
<td>27</td>
<td>2.56</td>
<td>1.086</td>
<td>55.6</td>
<td>17</td>
<td>2.24</td>
<td>0.970</td>
<td>64.7</td>
</tr>
<tr>
<td>12</td>
<td>Humans were meant to rule over the rest of nature</td>
<td>28</td>
<td>3.79</td>
<td>1.197</td>
<td>64.3</td>
<td>17</td>
<td>3.41</td>
<td>1.417</td>
<td>64.7</td>
</tr>
<tr>
<td>13</td>
<td>The balance of nature is very delicate and easily upset</td>
<td>28</td>
<td>2.43</td>
<td>1.103</td>
<td>64.3</td>
<td>17</td>
<td>2.18</td>
<td>1.074</td>
<td>70.6</td>
</tr>
<tr>
<td>14</td>
<td>Humans will eventually learn enough about how nature works to be</td>
<td>28</td>
<td>3.14</td>
<td>1.044</td>
<td>42.9</td>
<td>16</td>
<td>3.13</td>
<td>1.147</td>
<td>37.5</td>
</tr>
<tr>
<td></td>
<td>able to control it</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>If things continue on their present course, we will soon experience</td>
<td>28</td>
<td>2.14</td>
<td>1.145</td>
<td>75.0</td>
<td>15</td>
<td>2.27</td>
<td>0.961</td>
<td>53.3</td>
</tr>
<tr>
<td></td>
<td>a major ecological catastrophe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean Pro NEP% 58.3 57.8
Although the overall percent pro-NEP scores of males and females were similar, some values for items on the NEP scale were different. Overall, females had a higher NEP score than males. If values for each item had a difference of ten or more, the items were discussed in greater detail than the others. Items 1, 3, 4, and 15 had differences of more than ten between males and females. Males pro-NEP percentage was 82.4 while females indicated a 67.9% value for item number one ‘We are approaching the limit of the number of people the earth can support’. This is a difference of 14.5%. Item number three stated, ‘When humans interfere with nature it often produces disastrous consequences’. Males showed a 94.1% pro-NEP score on this item while females showed a 59.3% value for this item. This is a difference of 34.8%. Item number four states, ‘Human resourcefulness will insure that we do NOT make the earth unlivable’. Females showed a pro-NEP percentage of 17.8%, while males showed a 5.9% score. The difference between these values is 12%. Last, item number fifteen states, ‘If things continue on their present course, we will soon experience a major ecological catastrophe’. Seventy-five percent of females ‘strongly agrees’ and ‘agreed’ with this statement while 53.3% of males believed the same. This is a difference of 21.7%.

Table 4.7
NEP Score by Science*

<table>
<thead>
<tr>
<th>#</th>
<th>Item</th>
<th>Hard Sciences</th>
<th></th>
<th></th>
<th>Social Sciences</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>M</td>
<td>SD</td>
<td>% Pro NEP</td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td>1</td>
<td>We are approaching the limit of the number of people the earth can support</td>
<td>26</td>
<td>1.83</td>
<td>0.796</td>
<td>87.5</td>
<td>17</td>
<td>2.60</td>
</tr>
<tr>
<td>2</td>
<td>Humans have the right to modify the natural environment to suit their needs</td>
<td>26</td>
<td>3.19</td>
<td>1.661</td>
<td>59.5</td>
<td>17</td>
<td>3.40</td>
</tr>
<tr>
<td>3</td>
<td>When humans interfere with nature it often produces disastrous consequences</td>
<td>25</td>
<td>2.29</td>
<td>0.769</td>
<td>76.8</td>
<td>17</td>
<td>2.14</td>
</tr>
<tr>
<td>4</td>
<td>Human resourcefulness will insure that we do NOT make the earth unlivable</td>
<td>26</td>
<td>2.70</td>
<td>1.099</td>
<td>24.4</td>
<td>17</td>
<td>2.30</td>
</tr>
<tr>
<td>5</td>
<td>Humans are severely abusing the environment</td>
<td>26</td>
<td>2.10</td>
<td>0.644</td>
<td>82.7</td>
<td>17</td>
<td>2.14</td>
</tr>
<tr>
<td>6</td>
<td>The earth has plenty of natural resources if we just learn how to develop them</td>
<td>26</td>
<td>2.10</td>
<td>1.110</td>
<td>12.5</td>
<td>17</td>
<td>2.64</td>
</tr>
<tr>
<td>7</td>
<td>Plants and animals have as much right as humans to exist</td>
<td>26</td>
<td>1.61</td>
<td>0.488</td>
<td>81.5</td>
<td>17</td>
<td>1.30</td>
</tr>
<tr>
<td>8</td>
<td>The balance of nature is strong enough to survive the impacts of a modern industrial nation</td>
<td>24</td>
<td>3.22</td>
<td>0.941</td>
<td>38.8</td>
<td>17</td>
<td>3.76</td>
</tr>
<tr>
<td>9</td>
<td>Despite our abilities humans are still subject to the laws of nature</td>
<td>25</td>
<td>1.80</td>
<td>0.527</td>
<td>94.2</td>
<td>17</td>
<td>1.66</td>
</tr>
<tr>
<td>10</td>
<td>The so-called “ecological crisis” facing humankind has been greatly exaggerated</td>
<td>26</td>
<td>3.23</td>
<td>1.075</td>
<td>37.5</td>
<td>17</td>
<td>3.50</td>
</tr>
<tr>
<td>11</td>
<td>The earth is like a spaceship with very limited room and resources</td>
<td>25</td>
<td>2.58</td>
<td>0.735</td>
<td>44.4</td>
<td>17</td>
<td>2.26</td>
</tr>
<tr>
<td>12</td>
<td>Humans were meant to rule over the rest of nature</td>
<td>26</td>
<td>3.35</td>
<td>1.567</td>
<td>61.3</td>
<td>17</td>
<td>4.00</td>
</tr>
<tr>
<td>13</td>
<td>The balance of nature is very delicate and easily upset</td>
<td>26</td>
<td>2.22</td>
<td>1.054</td>
<td>73.8</td>
<td>17</td>
<td>2.02</td>
</tr>
<tr>
<td>14</td>
<td>Humans will eventually learn enough about how nature works to be able to control it</td>
<td>26</td>
<td>2.74</td>
<td>0.819</td>
<td>28.0</td>
<td>16</td>
<td>3.04</td>
</tr>
<tr>
<td>15</td>
<td>If things continue on their present course, we will soon experience a major ecological catastrophe</td>
<td>25</td>
<td>2.21</td>
<td>0.730</td>
<td>73.2</td>
<td>16</td>
<td>2.30</td>
</tr>
</tbody>
</table>

Mean Pro NEP% 58.4 60.7
Although the average pro-NEP percentages for the hard and social sciences were similar, some items differed in relation to pro-NEP percentage. Items that were further discussed were those items with a difference greater than ten. Items number 1, 4, 5, 8, 10, and 11 showed a difference of more than ten between the sciences. Item number one states ‘we are approaching the limit of the number of people the earth can support’. Participants categorized in the hard sciences showed an 87.5% pro-NEP score while participants in the social sciences showed a 56% pro-NEP score. There was a difference of 31.5%. Item number four states, ‘Human resourcefulness will insure that we do NOT make the earth unlivable’. This reverse-scored item showed that hard science participants were 24.4% pro-NEP, while social science participants were 4% pro-NEP. There was a difference of 20.4%. Item number five stated, ‘Humans are severely abusing the environment’. Participants in the hard sciences showed an 82.7% pro-NEP response to this item while social science participants showed a 72% pro-NEP score. There was a difference of 10.7%. Item number eight stated, ‘The balance of nature is strong enough to survive the impacts of a modern industrial nation’. Participants in the hard sciences showed a pro-NEP score of 38.8% while participants in the social sciences showed a 76% pro-NEP score. This item, with a difference of 37.2%, was the most varied item in table
4.7. Item number ten stated, ‘The so-called “ecological crisis” facing humankind has been greatly exaggerated’. Participants in the hard sciences show a 37.5% pro-NEP score, while social science participants show a 62% pro-NEP score. This is a difference of 24.5%. Finally, item number eleven stated, ‘The earth is like a spaceship with very limited room and resources’. The participants in the hard sciences showed a 44.4% pro-NEP score, while participants in the social sciences showed a 74% pro-NEP score. This was a difference of 29.6%. The difference between the overall average pro-NEP percentages was not that different, but some items showed vast differences between the sciences.
Table 4.8
NEP Scores by Living Situation*

<table>
<thead>
<tr>
<th>#</th>
<th>Item</th>
<th>Dorm</th>
<th>Apartment</th>
<th>House</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>We are approaching the limit of the number of people the earth can support</td>
<td>n 15 M 2.33</td>
<td>SD 1.047</td>
<td>% Pro 66.7</td>
</tr>
<tr>
<td>2</td>
<td>Humans have the right to modify the natural environment to suit their needs</td>
<td>n 15 M 3.07</td>
<td>SD 1.163</td>
<td>% Pro 40.0</td>
</tr>
<tr>
<td>3</td>
<td>When humans interfere with nature it often produces disastrous consequences</td>
<td>n 15 M 2.40</td>
<td>SD 0.828</td>
<td>% Pro 66.7</td>
</tr>
<tr>
<td>4</td>
<td>Human resourcefulness will insure that we do NOT make the earth unlivable</td>
<td>n 15 M 2.53</td>
<td>SD 1.060</td>
<td>% Pro 20.0</td>
</tr>
<tr>
<td>5</td>
<td>Humans are severely abusing the environment</td>
<td>n 15 M 2.40</td>
<td>SD 1.121</td>
<td>% Pro 66.7</td>
</tr>
<tr>
<td>6</td>
<td>The earth has plenty of natural resources if we just learn how to develop them</td>
<td>n 15 M 2.53</td>
<td>SD 1.302</td>
<td>% Pro 20.0</td>
</tr>
<tr>
<td>7</td>
<td>Plants and animals have as much right as humans to exist</td>
<td>n 15 M 1.40</td>
<td>SD 0.828</td>
<td>% Pro 93.3</td>
</tr>
<tr>
<td>8</td>
<td>The balance of nature is strong enough to survive the impacts of a modern industrial nation</td>
<td>n 13 M 3.46</td>
<td>SD 1.050</td>
<td>% Pro 53.8</td>
</tr>
<tr>
<td>9</td>
<td>Despite our abilities humans are still subject to the laws of nature</td>
<td>n 14 M 1.71</td>
<td>SD 0.825</td>
<td>% Pro 78.6</td>
</tr>
<tr>
<td>10</td>
<td>The so-called “ecological crisis” facing humankind has been greatly exaggerated</td>
<td>n 15 M 3.47</td>
<td>SD 1.187</td>
<td>% Pro 53.3</td>
</tr>
<tr>
<td>11</td>
<td>The earth is like a spaceship with very limited room and resources</td>
<td>n 15 M 2.80</td>
<td>SD 1.265</td>
<td>% Pro 40.0</td>
</tr>
<tr>
<td>12</td>
<td>Humans were meant to rule over the rest of nature</td>
<td>n 15 M 3.87</td>
<td>SD 1.302</td>
<td>% Pro 73.3</td>
</tr>
<tr>
<td>13</td>
<td>The balance of nature is very delicate and easily upset</td>
<td>n 15 M 2.40</td>
<td>SD 1.183</td>
<td>% Pro 66.7</td>
</tr>
<tr>
<td>14</td>
<td>Humans will eventually learn enough about how nature works to be able to control it</td>
<td>n 15 M 3.00</td>
<td>SD 1.363</td>
<td>% Pro 46.7</td>
</tr>
<tr>
<td>15</td>
<td>If things continue on their present course, we will soon experience a major ecological catastrophe</td>
<td>n 15 M 2.47</td>
<td>SD 1.302</td>
<td>% Pro 60.0</td>
</tr>
</tbody>
</table>

Mean Pro NEP %

<table>
<thead>
<tr>
<th></th>
<th>Dorm</th>
<th>Apartment</th>
<th>House</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Pro NEP %</td>
<td>56.4</td>
<td>59.9</td>
<td>60.0</td>
</tr>
</tbody>
</table>

The pro-NEP percentages as categorized by living situation do not differ much for each category. As was the case with both the gender and major of the participants, some items differed greatly while the overall average pro-NEP percent did not differ as much. The ‘single living’ option was omitted because of the multiple meaning that the participant could have interpreted it as. A participant could live alone in a dorm, apartment, or in a house. The ambiguity of this question prompted removing it from the data. There were four participants who identified themselves as ‘single living’.

Items 4, 5, 6, 7, and 9 showed two or more of the three categories were scored very high or very low. Items that were further discussed were those that exceeded 75% pro-NEP or were lower than 25% pro-NEP. Item number four stated, ‘Human resourcefulness will insure that we do NOT make the earth unlivable’. All three living situation categories showed a value of 20% pro-NEP or less, with the lowest percentage being zero. Item number five stated, ‘Humans are severely abusing the environment’. Participants identified as living in an apartment or a house scored 85% and 80% pro-NEP, respectively, while participants living in a dorm scored 66.6% pro-NEP. This item correlates with statements from the focus group, which is discussed in chapter five. Item number six stated, ‘The earth has plenty of natural resources if we just learn how to develop them’. Each category showed a 20% pro-NEP score for this item. Item number seven stated, ‘Plants and animals have as much right as humans to exist’. The pro-NEP scores ranged from 85% to 100% for this item. Item number nine stated, ‘Despite our abilities humans are still subject to the laws of nature’. The pro-NEP scores for this item ranged from 78.6% to 100%.
Participants who identified themselves as living in a house were more likely to show higher pro-NEP scores. Many of the items showed a 100% pro-NEP score as opposed to the other living options.

**Additional Focus Group Responses**

In addition to the direct quotations taken from the focus group, common themes among questions emerged. Table 4.9 shows the question posed to the focus group and the common themes of each question.
### Table 4.9

**Common Themes of the Focus Group Session**

<table>
<thead>
<tr>
<th>Question</th>
<th>Common Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How would you describe someone with good environmental behaviors?</td>
<td>Someone who…&lt;br&gt;• Goes above and beyond what is convenient&lt;br&gt;• Takes extra steps to recycle or turn off lights&lt;br&gt;• Looks to educate themselves and others about their environmental impact&lt;br&gt;• Is conscious of their effect on the environment&lt;br&gt;• Learns how to make less of an impact</td>
</tr>
<tr>
<td>2. Have your environmental behaviors changed as a result of participating in the workshop in February?</td>
<td>Behaviors have not changed a lot because some were already conscious and practicing the behaviors before the program&lt;br&gt;• Reported taking extra trips to the recycling bins&lt;br&gt;• Were more conscious of when and when not practicing the behaviors&lt;br&gt;• Are more considerate of the behaviors they had not considered before</td>
</tr>
<tr>
<td>2a. What influenced this change?</td>
<td>Others around them&lt;br&gt;• The program&lt;br&gt;• Inner morality</td>
</tr>
<tr>
<td>2b. What impeded other changes in behavior you considered after the workshop?</td>
<td>The convenience of available recycling facilities&lt;br&gt;• The lack of recycling facilities&lt;br&gt;• Their location (home vs. school)</td>
</tr>
<tr>
<td>3. Do you feel that humans have an impact on the environment globally?</td>
<td>Yes&lt;br&gt;• Everything is connected&lt;br&gt;• Humans have both a positive and a negative impact on the environment</td>
</tr>
<tr>
<td>3a. Are these impacts felt locally?</td>
<td>Yes&lt;br&gt;• Not felt as much in State College as their hometowns&lt;br&gt;• The participants will not see the impacts as much as future generations will</td>
</tr>
<tr>
<td>4. Do you feel there is a human population limit to what the earth can sustain?</td>
<td>Yes and no&lt;br&gt;• We will never reach the limit because of war, food and water shortages, and disease&lt;br&gt;• Technology can help&lt;br&gt;• If we reach the capacity, it will because the limit has been far exceeded&lt;br&gt;• There is a need for sustainability and an end to the blame game&lt;br&gt;• More education and awareness is needed</td>
</tr>
</tbody>
</table>
Table 4.9 continued

Common Themes of the Focus Group Session

<table>
<thead>
<tr>
<th>Question</th>
<th>Themes</th>
</tr>
</thead>
</table>
| 5. If you believe the balance of nature is delicate, please indicate the biggest threat to this balance globally. | - Nature is delicate and adaptable  
- Big business is a threat  
- Using nonrenewable resources is also a threat  
- The balance is felt globally  
- There is a balance and the environment must be treated with respect |
| 6. What does the term ‘living well’ in the concept of ‘living well within one’s place’ mean to you? | - We should live with only the necessities  
- We should not mistreat the things that we live with  
- We should not live extravagantly  
- It is important to educate yourself and never settle for ‘good enough’ |
Summary

Of the 45 participants, 28 were female and 17 were male. On average, 58.3% of females and 57.8% of males were pro-NEP. Twenty of the participants lived in apartments, fifteen lived in the dormitories, and five lived in houses. The mean percent Pro-NEP values ranged between 56.4% - 60%. Two did not indicate their living situation and the option ‘single living’ was omitted due to its ambiguity. Of the forty five participants, twenty-six were in the hard sciences and seventeen were in the social sciences. On average, the mean percent pro NEP for the hard sciences was 58.4% and was 60.7% for the social sciences. One participant did not indicate his/her major. The demographic ‘career choice’ was omitted because of the variation in responses.

The pre-program NEP score shows that out of the 45 participants, 58.2% were pro NEP. The post-program NEP score showed that 66.9% were pro NEP. This value indicates that there was a difference of an 8.7% increase in pro NEP values. The pre-program ECB scores indicated that participants were, on average, 49.1% pro ECB. The post-test scores show that the likeliness of participants to practice these conservation practices and behaviors was 79.4%. This is a difference of a 30.3% increase from the pre-program scores. Forty-one out of the original 45 participants showed a 65.4% pro ECB score when asked to what extent they practice the behaviors outlined in the ECB survey six weeks after the completion of the program. This value shows a difference of a 16.3% increase from the pre-program ECB scores and a difference of a 14% decrease from the post-program ECB scores.
The focus group responses were analyzed for common themes and show that overall, students were conscious of the environment as well as the behaviors that they and others do and do not practice. The participants of the focus group expressed pro-environmental views in relation to the five categories of the NEP scale, which were limits to growth, respect for the balance of nature, anti-anthropocentrism, perception of an eco-crisis, and rejection of exemptionalism.
CHAPTER 5

Conclusions and Discussion

Chapter five summarizes the purpose, objectives, research questions, and procedures followed throughout the course of this research study. Findings and conclusions, as well as recommendations for future studies are also given in this chapter.

Purpose

The purpose of the research study was to determine the effect of a one-day environmental education program focused on sustainability on participant’s environmental attitudes, beliefs, world views, and values (EABWV) as well as their environmental behavioral practices. This research study was guided by the following set of research questions.

Research Questions

1. Is there a difference between the pre-program survey EABWV pro-NEP scores and the post-program survey EABWV pro-NEP scores?
2. Is there a difference between the pre-program behavioral scores and the post-program behavioral pro-ECB scores?
3. Is there a difference between the pre-program survey environmental behaviors and the delayed post-program survey environmental behaviors?
4. Is there a difference between the post-program survey environmental behaviors and the delayed post-program survey environmental behaviors?
5. Are there differences in EABWV based on demographic factors?
Summary of Procedures

The population for this research study consisted of college students who were participants in the program ‘Environmental Education through Sustainability: My Place in the Green Movement’. Forty-five people participated in the program. Forty-one of the forty-five program participants completed the six-week post-program survey. Nine of the forty-five participants engaged in the focus group.

Program participants signed an informed consent form before the start of the program. The participants were then given a pre-program New Ecological Paradigm (NEP) and Environmental Conservation and Behavior (ECB) survey. At the conclusion of the program, the participants were again given the post-program NEP and ECB survey. The post-program ECB survey measured behavioral intent. Six-weeks later, participants were sent the link to the final ECB survey that prompted participants to comment on their current behavior. All surveys were Likert-style scales. A focus group was also utilized to qualitatively understand participant’s environmental attitudes and behavior change. The focus group was comprised of participants in the program who stated their interest in and availability to take part in the focus group. Every aspect of the research was voluntary for the participant.

Limitations

There were some limitations present in this study. First, the environmental behaviors and attitudes that each participant had before the program could not be controlled. Some participants practiced these behaviors and had pro-environmental attitudes, which could result in low, if any, changes in the ECB and NEP scales.
Another limitation could be the availability of participation in pro-environmental behaviors. Some participants may not have recycling programs readily usable or may not be able to carpool and are unable to participate in such actions.

During the focus group portion of the research, participants may not have wanted to offend other participants with a controversial response. They may not have stated their true feelings or behaviors because of a fear of being judged. The focus group participants were self-selected, which could present a limitation to the research.

Last, the limitation of response truthfulness should be included. It was the hope that the participants would answer each question truthfully, but may not for some unknown reason.

**Research Question #1**

**Is there a difference between the pre-test survey EABWV pro-NEP scores and the post-test survey EABWV pro-NEP scores?**

The program participants who responded to the questions on the pre-program NEP scale averaged a 58.2% pro-NEP score. The participants who responded to the post-program NEP scale questions reported a 66.9% pro-NEP score. The difference of the pro-NEP score was 8.7% from the post-program to the pre-program surveys.

The increase in mean pro-NEP scores from the pre-program to the post-program survey indicates that as a whole, participants environmental attitudes, beliefs, world views, and values increased over the duration of the program. This data does not mean that every question was necessarily more pro-NEP, but as a whole, participants results showed an increase in pro-NEP scores. Even though participant pro-NEP scores
increased from the pre-program survey to the post-program survey, this information does not mean that pro-environmental behaviors will change. Dunlap et al. (2000) state that,

“In short, a proecological orientation or “seeing the world ecologically,” reflected by a high score on the NEP Scale, should lead to proenvironmental beliefs and attitudes on a wide range of issues (Pierce, Dalton, & Zaitsev, 1999; Stern, Dietz, & Guagnano, 1995 (as cited by Dunlap et al., 2000)). Although such beliefs may also influence behavior, the barriers and opportunities that influence proenvironmental behaviors in specific situations caution against expecting a strong NEP-behavior relationship (Gardner & Stern, 1996 (as cited by Dunlap et al., p. 428)).

However, the behavior change model, a summary of the models of multiple authors (Ajzen, 1991; Evans et al., 2007; Hines, Hungerford & Tomera, 1986/1987; Hungerford & Volk, 1990; Kollmuss & Agyeman, 2002; Kyburz-Graber, Hofer, & Wolfensberger, 2006; Scott & Willits, 1994; Stern, 2000; Strife, 2010) who developed logic models to change behavior, believe that beliefs and values indeed have an effect on behavior change. Even though the pro-NEP score of participants increased from the pre-program to the post-program survey, it could not be certain that these responses would have an effect on behavior change.

The focus group question “Do you feel that there is a human population limit to what the earth can sustain” received the most responses. Responses were varied. Some respondents believed that the earth would never reach its carrying capacity for humans because of factors such as war and famine, while some believed that when the earth does
reach carrying capacity, they will know because it is too late. It was interesting that the participants brought up carrying capacity because it was a theme of ‘limits to growth’ in the NEP survey. While participants did not agree on the amount of people the earth could support, they did agree that we would reach it in some way.

The final focus group question yielded the second-highest response number from participants, which stated “What does the term ‘living well’ in the concept of ‘living well within one’s place’ mean to you?” Participants agreed that this phrase meant that humans should not live extravagantly and that the necessities are what are important. Debate occurred when the extent to which ‘extravagant’ was discussed. This concept, a theme of Ecological Literacy by David Orr (1992) shows how different the term ‘well’ means. This phrase meant something different to each participant and can be interpreted as such, but participants did agree that in general, living well means not using more than you need to live. While everyone’s level of ‘extravagant’ is different, the theme was the same.

The participants in the focus group reported attitudes, worldviews, values, and beliefs about the environment that seemed to trend toward a pro-NEP response. They tended to believe that humans had an impact on the earth. This value corresponds with ‘limits to growth’, ‘anti-anthropocentrism’, and ‘anti-exemptionalism’.

Since the only factor that was different from the beginning of the program to the end of the program was the program itself, and because overall NEP scores increased, the program could have influenced higher pro-NEP scores. The higher NEP scores may result in a positive behavior change among participants because behavior is influenced in part by values, knowledge, and beliefs.
To provide a more conclusive response, a question may be added to the post-program survey that asks if the program had an influence on the EABWV of participants, which would reflect NEP scores. This question may be open-ended and ask for an explanation in addition to the choices of ‘yes’, ‘no’, or ‘unsure’. The purpose of this question would be to determine the extent to which participants believed the program actually influenced their post-program values or beliefs.

**Research Question #2**

**Is there a difference between the pre-test behavioral scores and the post-test behavioral pro-ECB scores?**

The eleven-question environmental conservation and behavior scale (ECB) was adapted from a survey by Lee (2008). This survey gages participant self-reported behaviors. Program participants were given this survey before the program began to document how often participants currently practice the listed behaviors. On average, participants practiced these behaviors 49.1% of the time. This means that under half of participants ‘always’ or ‘usually’ practiced these behaviors. Although statistics show that some people are practicing more pro-environmental behaviors, such as recycling, the population of this study did not participate in these behaviors over half of the time.

The same ECB survey was given to participants immediately following the program to document how often the population planned to participate in these behaviors. On average, participants anticipated ‘always’ or ‘usually’ practicing these behaviors 79.4% of the time. This is a large difference from the pre-program ECB survey. There was an increase of 30.3% between the two surveys. The cause of this anticipated behavior is uncertain, but the program may have had an influence in the participants’ responses.
Like the authors D’Eon, (2004), D’Eon, Sadownik, Harrison, & Nation (2008) believed, information learned in programs is reflected by the scores of a pre and post-test. The authors report higher values on a knowledge and skill post-test than a pre-test. This research is similar with the findings of the aforementioned authors with respect to the higher post-program score than pre-program score. Knowledge, as presented in the behavior change model influences behavior change. Since the only variable that changed over the course of the day was the occurrence of the program itself, the program can be a reason why intended behavior change increased from the pre-test to the post-test.

The ECB survey could include an open-ended section of each question that asks how the participant will practice each behavior. For example, for the question ‘carpool’, a response could read ‘I will try to carpool by…’. Self-efficacy and planning are ways to increase intended behavior (Schwarzer, 2008). If a participant writes specifically how they will achieve their behavior, they may be more likely to practice that behavior because they will have a plan. The purpose of adding the additional open-ended question is to determine how each participant plans to change their behavior.

**Research Question #3**

**Is there a difference between the pre-test survey environmental behaviors and the delayed post-test survey environmental behaviors?**

As previously described, program participants were asked to complete an environmental conservation and behavior survey that prompted them about their current (pre-program) behaviors. The percent of participants who responded that they ‘always’ or ‘usually’ practice these behaviors was 49.1%. This value was obtained to determine how often participants practiced the behaviors in the survey.
Six weeks after the completion of the program, participants were asked to complete the same ECB survey that they took before the program began (pre-program). The questions were worded the same as the pre-program survey. The purpose of the six-week survey was to determine if the behaviors of the program participants had changed from their initial responses to their actions six weeks later. On average, the participants who responded (n=41) to the six-week ECB were ‘always’ or ‘usually’ practicing the behaviors 65.4% of the time. This value is an increase of 16.3% from the pre-program survey. However, 34.6% of the time, behaviors were not practiced for some reason.

A focus group question asked “What impeded other changes in behavior you considered after the workshop?” The respondents reported that convenience, ability, and location are all things that impeded their behavior change. For some participants, the availability of recycling or participating in other sustainable behaviors in other areas was more difficult than practicing those behaviors at Penn State. Penn State has put tremendous efforts into becoming sustainable. Resources are there for students to use to help them go green. As easy as it is to practice sustainability on campus, it may be more difficult for them to practice these behaviors at home due to the lack of resources available. The self-efficacy takes effect in the students when they are told that they could make the difference. Areas with abundant sustainable resources did not start out that way, but were changed because of the efforts of one or a group of people who wanted to see a change. The participants of the program could be that change in their community, resulting in more green technology and resources.

When asked what influenced their behavior change, the respondents responded with answers that included the program, the interactive displays at Shaver’s Creek, and
their inner-guilt. It was interesting to see that the respondents commented that the program influenced their behavior change. The purpose of this research was to determine if a short program influenced behavior change, and according to participants in the focus group, it did. This says that a program as short as a few hours indeed makes a difference in the lives of the participants. Since the program did make a difference on the behavior of the participants, more programs can be used to teach others about various subjects. These programs could even be supplemented with classes or required every year or two years as part of a graduation requirement.

The responses that the participants gave during the focus group session drew some parallels to the pre-survey and delayed post-survey responses. The pre-program survey percentage may have been lower than the delayed post-test survey due to the lack of knowledge about participating in environmental behaviors. The participants mentioned multiple times in the focus group discussion that when they knew about the opportunities to practice pro-environmental behaviors, they did.

The results indicate that participants are practicing the behaviors that were on the survey more after the program than they were before the program started. This value does not mean that every participant increased their behavior practices. The percentages of most behaviors did increase, however. The only behavior that did not change was ‘turn off lights when not in use’. The reason that this behavior did not change could be because the initial practice was high.

It is possible that the program had an influence on the six-week post-program behavior change, but cannot be credited with completely changing the behaviors due to
outside influences in the six weeks between testing periods. Outside influences may include inability to practice these behaviors or societal pressure.

To determine if the program had an impact on behavior change, an open-ended question could be included that asks why the participant felt that their behavior changed (if it did) or if they think that the program had an influence on their behavior change. Allowing each participant the chance to qualitatively respond to these questions allows the researcher to determine the effectiveness of the program on changing behavior as reported from the respondents.

**Research Question #4**

*Is there a difference between the post-test survey environmental behaviors and the delayed post-test survey responses?*

This research question addressed the longevity of behavior change. Participants were asked to complete an environmental conservation and behavior survey immediately after the end of the program and again six-weeks later. The survey administered at the end of the program asked how often the participants anticipated practicing these behaviors while the six-week survey asked how often the participants currently practiced the behaviors. The results of the post-program survey were that participants anticipated ‘always’ and ‘usually’ practicing the behaviors 79.4% of the time. Participants reported that they ‘always’ and ‘usually’ practiced the behaviors 65.4% of the time six-weeks later. This is a decrease of 14% from the post-program to the six-week surveys.

A possible reason that the score decreased over time could be due to a number of outside influences. These influences may include the inability to participate in these behaviors and societal pressure to not participate in the behaviors. The high percentage of
post-program pro-ECB responses could be because of the immediate recollection of the information presented in the program. Participants may have had the information fresh in their minds and were thinking of how they would change their behavior. Then as time progressed, they may have thought of or became preoccupied with other things, so practicing the behaviors may have been forgotten. Schwarzer, 2008, states, “people often do not behave in accordance with their intentions” (p. 1) and goes on to suggest some reasons that behavior does not follow intentions. These reasons include that “unforeseen barriers could emerge, or people might give in to temptations” (Schwarzer, 2008, p. 1).

As suggested by Schwarzer, 2008, in order to increase behaviors from behavioral intentions, a specific action plan could have been created by each participant to help practice the behaviors. For example, if a participant intended to use less water, they could create a statement that reads ‘I will use less water by… (taking a three-minute shorter shower than I usually do)’ or ‘I will turn out the lights when… (I am not using them by making a sign to put on my light switches that remind me to do so)’. Planning actions may increase the behavior that was intended.

To determine the effect that the program had on the participants, open-ended questions could be added. The questions would include ‘what influenced the changes in behavior?’, ‘how would you change your behavior?’ (specific actions), as well as ‘did the program influence your behavior?’. This information would help the participant create a plan to practice the behaviors and determine if the program did indeed effect behavior.
Research Question #5

Are there differences in EABWV based on demographic factors?

The 45 participants were asked to complete demographic information about themselves. The demographic questions included college major, gender, living situation, and career goal. Career goal was omitted in the analysis because of the wide variety of responses and the inability to categorize the answers. ‘Major’ was categorized into colleges and then into hard and social sciences. The colleges were grouped in this manner to better compare the data because of the low numbers of some participants in each college. It is understood that not every major in the colleges can be considered a hard or social science. The colleges categorized as hard sciences included the College of Agricultural Sciences, Eberly College of Science, the College of Engineering, and the College of Earth and Mineral Sciences. The colleges categorized as social sciences included the College of Education, the Smeal College of Business, the College of Arts and Architecture, the College of Liberal Arts, and the College of Health and Human Development. The living situation ‘single living’ was omitted due to the ambiguity of the choice.

Demographic questions were included in the research because Lee (2008) who utilized the ECB and NEP scales to determine the relatedness of EABWV and perceived environmental behavior among African American college students states that “young, single-family dwelling, and well educated women demonstrate more proenvironmental attitudes and behaviors” (Barr, 2007; Zelezny, Chua, & Aldrich, 2000 (as cited in Lee, 2008, p. 32)). Van Liere & Dunlap, (1980) agree that various demographics respond
differently to environmental attitudes and behaviors and some are predictors of these same attitudes and behaviors.

Twenty-eight participants were female and seventeen were male. The females showed a 58.3% pro-NEP score while the males showed a 57.8% pro-NEP score. There was a difference of .5% between the surveys. Although there is a difference is less than one percent between genders, the results are consistent with Lee (2008) in that women have stronger proenvironmental attitudes. Sundstrom and McCright (2013) also believe that “women express slightly greater environmental concern than men” (p. 4).

Although the overall NEP scores were similar for both genders, some individual questions differed in scores. Males agreed more than females with the items ‘We are approaching the limit of the number of people the earth can support’, and ‘When humans interfere with nature it often produces disastrous consequences’. Females agree more than males with the items ‘Human resourcefulness will insure that we do NOT make the earth unlivable’ and ‘If things continue on their present course, we will soon experience a major ecological catastrophe’. Sundstrom and McCright (2013) state that female-dominated gender differences can be seen in the studies that measure “pro-environmental attitudes or an ecological worldview” (Stern, Dietz, & Kalof, 1993; Xiao & McCright, 2012 (as cited in Sundstrom & McCright, 2013, p. 4)). The authors continue to explain these differences by determining that females tend to worry about environmental concerns that include types of health risks as well as family-centered situations. This may be why females tended to agree with some of the items while males tended to agree with others.
Participants categorized in the hard sciences showed a 58.4% pro-NEP score while those in the social sciences showed a 60.7% pro-NEP score. This difference of 2.3% is not a large number, but there were some differences between the sciences per item. Participants categorized into the hard science colleges scored a higher pro-NEP percentage on the items ‘We are approaching the limit of the number of people the earth can support’, ‘Human resourcefulness will insure that we do NOT make the earth unlivable’, and ‘Humans are severely abusing the environment’. Participants categorized into the social sciences scored a higher pro-NEP percentage on the items ‘The balance of nature is strong enough to survive the impacts of a modern industrial nation’, ‘The so-called “ecological crisis” facing humankind has been greatly exaggerated’, and ‘The earth is like a spaceship with very limited room and resources’. Social science is defined as “A branch of science that deals with the institutions and functioning of human society and with the interpersonal relationships of individuals as members of society” (Merriam-Webster, n.d.). Hard science is defined as “Any of the natural or physical sciences, as chemistry, biology, physics, or astronomy, in which aspects of the universe are investigated by means of hypotheses and experiments” (Dictionary.com, n.d.). These definitions may shed light as to why certain participants responded stronger than others to each item. The items that the hard science majors tend to agree more with can be measured. For example, statistics show that the earth’s population will reach 9 billion by 2050 (United States Census Bureau, 2011). Participants in the social sciences may tend to agree with the other items more because they deal with society and are not concrete numbered data. For example, there are different degrees to which the “ecological crisis”
may be exaggerated by different demographics. Even though there are some differences in scale items, the hard and social science majors have a similar total NEP score.

The conclusions cannot be drawn regarding whether one type of science is more environmentally aware than another. This information could be useful, however, to recommend that each student take an environmental science or sustainability class. Some colleges and universities are becoming more sustainable through practices that include recycling, energy conservation, composting, and green technology. The Pennsylvania State University has developed a strategic sustainability initiative with the pillars to ‘learn, live, and lead’ the future of students into a new era of sustainability (Sustainability Institute, 2013). Viewers of the website are able to learn about initiatives, outreach and research in sustainability, as well as what they can do to be more sustainable. Since sustainability and environmentalism can be applied to every career, freshmen seminars could focus on sustainability in incoming freshmen’s intended field. By allowing new students to learn and understand that sustainability is important to all fields as well as applying principles of sustainability specifically to their major, these students would be able to build upon their knowledge in their field while considering sustainable choices. Not every student may be able to attend specific programs, but freshman seminar is a prime place to incorporate sustainable ways early in their college career.

Lee (2008) states that “single-family dwellings” show stronger pro-environmental attitudes (Barr, 2007; Zelezny, Chua, & Aldrich, 2000 (as cited in Lee, 2008, p. 32)). Of the 45 participants, fifteen reported living in dorms, twenty lived in an apartment, five reported that they lived in a house, and four were single-living. One participant did not indicate their living situation. There was a difference of 3.6% between the highest and
lowest NEP score for each category. These results were consistent with what Lee (2008) reported. Participants who lived in houses were more pro-NEP than any of the other groups. In fact, those who identified themselves as home living showed 100% agreement with more of the items than did any of the other groups. Possible reasoning for this result is that homeowners may be steadily involved in their community and may be able to influence community decisions about situations that include greening their area. Another explanation could be that the homeowners have a stronger sense of responsibility for their area because theirs is a more permanent living situation. This explanation is consistent with results from the focus group in which some participants agreed that as a student, they are expected to learn, not to clean up the area.

Similarly to the other demographic factors, the living situation sections were similar with regard to total NEP score, but differed for some items. Living situations that showed a 75% or greater or a 25% or lower NEP score on two of the three situations were more closely examined. The items ‘Human resourcefulness will insure that we do NOT make the earth unlivable’ and ‘The earth has plenty of natural resources if we just learn how to develop them’ showed a less than 20% pro-NEP score for all categories. The items ‘Humans are severely abusing the environment’, ‘Plants and animals have as much right as humans to exist’, and ‘Despite our abilities humans are still subject to the laws of nature’ showed a higher than 75% pro-NEP score for two of the three categories.

Although there are multiple organizations on campus that encourage the involvement of students in their community, some do not participate in these opportunities. One way to help the students who live on campus to appreciate greening their lifestyle would be to create a website with up-to-date information about energy use,
the amount of products recycled and composted for the day, and tips to becoming more sustainable. Perhaps seeing a real-time stream of these things would encourage campus-dwellers to change their lifestyle.

While the living arrangement section of the survey confirmed some of the comments made during the focus group, environmental attitudes between the groups were similar overall. The living arrangement section of the demographic survey should have been worded differently for clarification. Participants could have had to circle their living situation instead of complete it in an open-ended manner. The living option ‘single living’ could apply to a range of living arrangements and should have been specified. By clarifying this choice, results may have been different.

**General Discussion of the Focus Group**

In addition to the individual focus group questions that were discussed in conjunction with research questions, some general observations were made. A reoccurring theme that kept coming up in the discussion was that of education and caring for our planet. In almost every question, a respondent mentioned one of the two aforementioned themes. Some respondents believe that humans have a duty to the earth and influence what it will become in the future. Maya Angelou states, “When you know better, you do better”. The importance of educating oneself is summed up in this quote. We must always be pursuing knowledge so that we can make ourselves better. In this case, ‘better’ may represent participating more in environmental behaviors. Education was important to many of the participants. Some agreed that education is necessary to teach others about the world and that people should never stop at knowing ‘enough’
about the world in which they live. Environmental education, as a changing field, can always teach us something new about the world in which we live and interact. Bettering ourselves through education can equate to bettering our relationship with the world around us.

The focus group was a chance to allow the participants to openly respond to questions without the restrictions of a numbered scale. The responses collected during the focus group were helpful in determining the effectiveness of an environmental education program on behavior change. To collect more open-ended responses from a larger portion of the participant population, each survey should include an optional open-ended question portion of the survey. This will allow participants to express their unique opinion about this topic. This question would be helpful to include because many of the original participants were not able to be involved in the focus group due to scheduling conflicts or lack of time.

**Recommendations**

**Based on the findings of this study, the following recommendations are offered.**

1. A control group of non-program participants should be given the NEP and ECB surveys as well as the program participants to determine if the responses of each group differ. This is one way that the researcher can determine if the program had an effect on participants’ environmental behaviors and attitudes.

2. To obtain more qualitative data, the questions that were asked during the focus group could be included in the six-week follow-up survey. In this way,
the researcher could obtain more qualitative answers to the questions from a larger portion of the participant population.

3. There should be more open-ended questions in each portion of the surveys. At the very least, the question of ‘did/will the program affect your behaviors’ be included in the post-program and six-week follow up surveys. This will allow the researcher to better determine if the program did indeed affect participant behavior.

4. Freshmen seminars could be utilized to teach incoming and new students about sustainability in their field. The freshmen seminar should include major-specific sustainable practices that each student should continue to consider throughout their college career.

5. Since participants stated that the workshop had an influence on their behavior change, more workshops should be held to help participants understand ways to become more sustainable in their lifestyle. Students should be encouraged to participate in at least one of these workshops every year or every two years.

6. Reinforcement of the environmental behaviors should be sent to program participants once a week that detail other ways to ‘go green’. Reinforcements could include helpful websites, links, and reading material that would encourage sustainable living. An open anonymous discussion board could also be implemented via ANGEL for students to post ways that they go green as well as things that they see around their area that encourage them to go green or that could be changed to encourage sustainability.
7. An environmental class could be mandatory for every student as environmental science can be applied to every discipline. This could be in the form of a short program.

**Summary**

The results of this study show that program participants’ environmental attitudes, beliefs, world views, and values became more positive from the beginning of the program to the end of the program. The participants’ environmental conservation and behaviors also became more positive from the beginning of the program to six-weeks after the end of the program. The anticipated pro-environmental behavior that was reported by participants was also higher than the actual practice of the behaviors before the program began. The anticipated behavior, however, was higher than the six-week post-program practice of behavior.

Demographics show participants with a variety of college majors participated in the program, as well as a variety of living situations. Overall, females showed stronger environmental attitudes than males, while participants who lived in houses reported higher pro-NEP scores. Lee (2008) agrees that females have stronger pro-environmental attitudes, but also states that single-family dwellings are also more pro-environmentally strong with regards to attitudes. The data suggests that homeowners show a higher pro-NEP score. The major of a student cannot be used to predict pro-environmental attitudes.

The focus group results showed that the program did indeed have some effect on the environmental behaviors of the participants. Overall, respondents favored using education as a communication tool in environmental sustainability, with an emphasis on not settling for ‘good enough’ with respect to knowledge. Education could manifest itself
in the form of classroom learning, extension work, or personal growth. Respondents also felt that, in general, humans have a duty to protect and take care of the earth and should become more environmentally responsible. The focus group was a useful tool to gauge the thoughts of the participants about their environmental attitudes and beliefs, as well as their behavior changes.

The results of the data collection suggest that the environmental education program had a positive effect on behavior change. There are many other factors that must be accounted for when changing behavior, so the program cannot be solely responsible for the overall behavior change. Education is one way to reach numerous people and help create this change. Short programs that highlight environmental topics are a way to reach various audiences.

**Future Research**

Further study should be done in this area to address the effect that short term programs have on participants. Studies can include knowledge gain, behavior change, attitudes, and whether or not the information learned during these programs is used by participants in the more distant (greater than six-weeks) future. Longitudinal studies would also be useful to studying program effectiveness. Above all, self-efficacy, which could be gained through education, is needed to make a positive difference in the world.

“Unless someone like you cares a whole awful lot, nothing is going to get better. It’s not.”

Dr. Seuss – *The Lorax*
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transformation in formal and nonformal settings. Journal of Transformative 
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http://www.epa.gov/epawaste/nonhaz/municipal/index.htm


APPENDIX A - SURVEYS
Please answer the following questions about yourself

Gender: ____________________________

Career Goals: ____________________________

Major: ____________________________

Type of Living Arrangement (apartment, dorm, single living, roommate etc.): ____________________________

Below are statements that describe different environmental behaviors. Read through each statement and circle the number that corresponds to what extent you CURRENTLY engage in this behavior. The values are on a scale from 1 = Never perform this behavior to 5 = Always perform this behavior. There is no right or wrong answer. Please answer all of the questions truthfully.

<table>
<thead>
<tr>
<th>Environmental Behaviors Survey: E. Bun Lee. Permission to use this survey was granted by E. Bun Lee.</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recycle newspapers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Recycle magazines</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Recycle glass bottles</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Recycle jars</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Recycle plastic bottles</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Recycle cardboard boxes</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Turn off lights when not in use</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Ride the bus</td>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Try to reduce water consumption</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Try to use less paper towels</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Carpool</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
</tbody>
</table>
## PRE-PROGRAM NEP SURVEY

This survey seeks to determine your attitudes toward the environment. Because the questions ask for your opinion, there is no right or wrong answer. Read each statement carefully before deciding on an answer. Please check before you turn the survey in to be sure that you do not miss any questions.

Circle the number beside the sentence that best describes how you feel about the sentence. Circle only one answer. There are always 5 possible answers that go from 1 to 5 (1 = strongly agree, 5 = strongly disagree).

<table>
<thead>
<tr>
<th>Item</th>
<th>Statement</th>
<th>Strongly agree</th>
<th>Mildly agree</th>
<th>Unsure</th>
<th>Mildly disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>We are approaching the limit of the number of people the earth can support</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Humans have the right to modify the natural environment to suit their needs</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>When humans interfere with nature it often produces disastrous consequences</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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</tr>
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<td>4</td>
<td>Human resourcefulness will insure that we do NOT make the earth unlivable</td>
<td>1</td>
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<tr>
<td>5</td>
<td>Humans are severely abusing the environment</td>
<td>1</td>
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<tr>
<td>6</td>
<td>The earth has plenty of natural resources if we just learn how to develop them</td>
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<tr>
<td>7</td>
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<tr>
<td>8</td>
<td>The balance of nature is strong enough to survive the impacts of a modern industrial nation</td>
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<tr>
<td>9</td>
<td>Despite our abilities humans are still subject to the laws of nature</td>
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<td>5</td>
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<tr>
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<td>The so-called &quot;ecological crisis&quot; facing humankind has been greatly exaggerated</td>
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</tr>
<tr>
<td>11</td>
<td>The earth is like a spaceship with very limited room and resources</td>
<td>1</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>Humans were meant to rule over the rest of nature</td>
<td>1</td>
<td>2</td>
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<tr>
<td>13</td>
<td>The balance of nature is very delicate and easily upset</td>
<td>1</td>
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<tr>
<td>14</td>
<td>Humans will eventually learn enough about how nature works to be able to control it</td>
<td>1</td>
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The New Ecological Paradigm: R.E. Dunlap and K.D. Van Liere, A. Mertig, and R.E. Jones. Permission to use the NEP was granted by R.E. Dunlap.
POST-PROGRAM ECB SURVEY

Below are statements that describe different environmental behaviors. Read through each statement and circle the number that corresponds to what extent you ARE GOING TO engage in this behavior. The values are on a scale from 1 = Never **going to** perform this behavior to 5 = Always **going to** perform this behavior. There is no right or wrong answer. Please answer all of the questions truthfully.

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Environmental Behaviors Survey: E. Bun Lee. Permission to use this survey was granted by E. Bun Lee.
**POST-PROGRAM NEP SURVEY**

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The New Ecological Paradigm: R.E. Dunlap and K.D. Van Liere, A. Mertig, and R.E. Jones. Permission to use the NEP was granted by R.E. Dunlap.
### SIX-WEEK FOLLOW-UP SURVEY

Below are statements that describe different environmental behaviors. Read through each statement and circle the number that corresponds to what extent you **CURRENTLY** engage in this behavior. The values are on a scale from 1 = Never perform this behavior to 5 = Always perform this behavior. There is no right or wrong answer. Please answer all of the questions truthfully.

<table>
<thead>
<tr>
<th>Behavior</th>
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<tbody>
<tr>
<td>Recycle newspapers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Recycle magazines</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
</tr>
<tr>
<td>Recycle glass bottles</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Recycle jars</td>
<td>1</td>
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<td>5</td>
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</tr>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Ride the bus</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Try to reduce water consumption</td>
<td>1</td>
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<tr>
<td>Try to use less paper towels</td>
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<td>Carpool</td>
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<td>5</td>
</tr>
</tbody>
</table>

Environmental Behaviors Survey: E. Bun Lee. Permission to use this survey was granted by E. Bun Lee.
FOCUS GROUP QUESTIONS

1. How would you describe someone with good environmental behaviors?

2. Have your environmental behaviors changed as a result of participating in the workshop in February?
   a. If yes, the main behavioral change I see in myself is:
   b. What influenced this change?
   c. What impeded other changes in behavior you considered after the workshop?

3. Do you feel that humans have an impact on the environment globally?
   a. Positive Impacts?
   b. Negative Impacts?
      i. Are these impacts felt locally (in Central PA)?
      ii. Positive Impacts?
      iii. Negative Impacts?

4. Do you feel that there is a human population limit to what the earth can sustain?
   a. What is that limit?

5. If you believe the balance of nature is delicate, please indicate the biggest threat to this balance globally?
   a. Locally?

6. What does the term “living well” in the concept of ‘living well within one’s place’ mean to you?
Appendix B – IRB Approval
IRB APPROVAL

Date: January 18, 2013
From: The Office for Research Protections - FWA#: FWA00001534
Stephanie L. Krout, Compliance Coordinator
To: Jessica A. Shilladay
Re: Determination of Exemption

IRB Protocol ID: 42058
Follow-up Date: January 17, 2018
Title of Protocol: The Effectiveness of an Environmental Education Program on Increasing Environmentally Conscientious Behavior in College Students

The Office for Research Protections (ORP) has received and reviewed the above referenced eSubmission application. It has been determined that your research is exempt from IRB initial and ongoing review, as currently described in the application. You may begin your research.

COMMENT: FYI Regarding the Focus Group Consent Form – Please be sure to add the focus group statement to the “Statement of Confidentiality” section, “If you speak about the contents of the focus group outside the group, it is expected that you will not tell others what individual participants said.”

The category within the federal regulations under which your research is exempt is:
45 CFR 46.101(b)(2): Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Given that the IRB is not involved in the initial and ongoing review of this research, it is the investigator’s responsibility to review IRB Policy III “Exempt Review Process and Determination” which outlines:

- What it means to be exempt and how determinations are made
- What changes to the research protocol are and are not required to be reported to the ORP
- Ongoing actions post-exemption determination including addressing problems and complaints, reporting closed research to the ORP and research audits
- What occurs at the time of follow-up

Please do not hesitate to contact the Office for Research Protections (ORP) if you have any questions or concerns. Thank you for your continued efforts in protecting human participants in research. This correspondence should be maintained with your research records.