Evaluating Forms of Engagement with Environmental Education in Florida

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Today's IPCC report is an atlas of human suffering and a damning indictment of failed climate leadership. With fact upon fact, this report reveals how people and the planet are getting clobbered by climate change. Nearly half of humanity is living in the danger zone—now. Many ecosystems are at the point of no return—now. Unchecked carbon pollution is forcing the world's most vulnerable on a frog march to destruction—now. The facts are undeniable.
UN Secretary General António Guterres (NPR, 2022)

ABSTRACT

This research expands understanding of weaknesses and strengths in non-formal environmental education in Florida by comparing a variety of programs for effectiveness in raising awareness, changing attitudes, increasing connectedness, and prompting pro-environmental behavior among adults. Environmental education (EE) is a broad category that includes classroom programs, outdoor education, experiential education, and education for sustainability. Using qualitative research methods, we identify various opportunities and challenges for adult, non-formal EE at nature preserves and through non-governmental organizations in Pinellas County, Florida.

We apply a theoretical approach within experiential learning called engagement theory to assess the effectiveness of several types of educational activities in changing participants’ attitudes toward the environment. The engagement theory of learning is a multidimensional concept that combines different learning strategies to increase student participation and overall success. There are three components of student engagement: behavioral, emotional and cognitive engagement. Participant observation and surveys were used at four study sites: two non-governmental organizations and two nature preserves.

Results of fieldwork and analysis indicate complex patterns of impact on participants. Interestingly, events that emphasize emotional connection—a much lauded concept in EE—did not show an increased level of commitment to solving environmental issues or instill feelings of
empowerment to solving the problems. Behavioral type events appeared to lower connection to nature for some people but had a strong impact on commitment and empowerment. Adult EE in Florida might be improved through collaborative efforts to create general standards, through the development of educational programs that effectively combine cognitive, emotional and behavioral engagement and through the incorporation of a wider range of emotions beyond the positive.

**Keywords:** environmental education, Florida, engagement theory, adult learning, nature.

**INTRODUCTION**

In 2022, the United Nations’ Intergovernmental Panel on Climate Change (IPCC) released a report summarizing the dire situation humans currently face, with a very small window of opportunity to slow down the catastrophic impacts of an increasing global temperature (NPR, 2022). In 2019, Florida ended hurricane season with a total of 18 named storms, 6 hurricanes and 3 major hurricanes that were a category 3 or above with sustained wind speeds of at least 111 miles per hour (Solomon, 2019). Toward the end of 2019, Australia experienced some of the worst fires it had seen over the last several decades. Scientists estimate that as many as a billion animals have died in Australia’s wildfires (Anonymous, 2020). The fires were facilitated by extremely high temperatures as well as a prolonged drought and were detrimental throughout over 20 million acres in Australia (Anonymous, 2020). It is hard to ignore the global effects of climate change, yet in the United States, a country which is responsible for 28% of carbon emissions each year (EESI 2018), 77 million adult Americans self-reported that they do not worry much or at all about climate change (Schwartz, 2022). There is an urgent need to increase environmental literacy, specifically climate literacy, in the United States.

Today, environmental education is an increasingly important area of the K-12 curriculum throughout the United States, but there is a lack of systematic efforts to better educate adults about pressing issues of the environment. According to the North American Association of Environmental Educators (2014), forty-six states created environmental literacy lesson plans to be used throughout primary education. Environmental education (EE) is best defined as “…increasing public awareness and knowledge about environmental issues and providing the skills necessary to make informed environmental decisions and to take responsible actions” (US EPA as quoted in Potter, 2010, p.23). Since the 1970s, when environmental issues first attracted significant public attention in the US, EE programs for children have expanded exponentially (Stevenson, et al., 2016).
Most EE programs revolve around classroom-based instruction primarily directed toward elementary and middle school students, and there is ample scholarly work on environmental education for children and youth (Chapman, 2014).

While this attention to the environmental education of youth is laudable, it is equally important for adults to be exposed to EE throughout their lifespan. Environmental problems are evolving in scope and complexity, and solutions require an informed and committed citizenry. Exposing adults to continued EE is much more difficult than exposing school-aged children (a captive audience) to the same information (Wolf, 2001). Because adults have significant influence on the evolution of environmental protection and health, exposing adults to environmental problems and teaching them ways to reduce their environmental impacts are vital steps in improving environmental quality and tackling urgent issues of climate change, biodiversity loss, water scarcity, plastics, and more.

There is limited published research on EE programs focused on adults because adults rarely reenter classrooms to learn about environmental problems. Researchers have begun to ask if increasing non-formal EE settings would be an effective method of educating adults. Non-formal education is teaching and learning that takes place outside of a classroom or lecture hall (Heimlich, 1993). Non-formal EE covers a large range of topics and may be delivered through various pedagogical strategies. For example, participating in outdoor environmental action projects, such as litter removal at beaches or taking a guided hike, are considered non-formal educational activities. Having a vast array of activities is beneficial to both the community and program organizers, as it increases the number of people receiving education. Unfortunately, a majority of non-formal EE programs are unregulated, of extremely variable quality and largely untested. Previous research found that Florida has significant non-formal environmental education opportunities (Johns and Pontes, 2018). The primary focus of EE programs in the state according to a survey conducted in 2018 was to “increase wonder through the immersion in nature” (Johns and Pontes, 2018) and there was a strong emphasis on outdoor education for youth.

The purpose of this research is to increase the current knowledge of non-formal EE in Florida to determine which types of programs are most effective for raising awareness, changing attitudes, increasing connectedness, and prompting pro-environmental behavior among adults. This project will also identify various opportunities and challenges for adult, non-formal EE providers in Pinellas County, Florida.
ADULT LEARNING, EXPERIENTIAL LEARNING, AND ENGAGEMENT THEORY

Unlike education for children, the origins of which can be traced back to early Greece, adult education did not become systematically organized until the 1920s (Knowles, 1975). From 1929 to 1948 the *Journal of Adult Education* published various articles that explored the unique teaching styles required of adult learners. Many educators were not used to teaching adults, and there was a lack of research supporting the new ideas of adult EE; thus, some adult educators felt uncomfortable in this new field (Knowles, 1975). As a field, adult education did not take off until the 1960s, when new research provided insights into adult learning (Knowles, 1975). As with EE for children, environmental adult education (EAE) did not become a subject of interest until the 1970s. The first article that distinguished EAE from traditional EE was Emmelin’s 1976 publication titled *The Need for Environmental Education for Adults* (as noted in Haugen, 2009). Emmelin’s article was important in bringing awareness to the need for continuous EE, while also explaining how adult EE needs to differ from traditional EE. Unfortunately, even after 1976, adult EE did not take root internationally or in North America. The 1987 Brundtland Commission Report, *Our Common Future*, reignited the desire for adult EE (Lange, 2010). The Brundtland Report provided a global agenda for sustainable development and encouraged the International Council for Adult Education (ICAE) to establish the Learning for the Environment Program in 1991 (Lange, 2010). However, even with these advances and the media attention from the International Council for Adult Education’s 1989, 1992, 1995, and 2000 environmental education publications, adult EE lay dormant until the late 1990s (Lange, 2010). The fifth United Nations Educational, Scientific and Cultural Organization (UNESCO) international conference on adult education in 1997 produced a formal definition of adult education:

> [A] permanent process in which individuals gain awareness of their environment and acquire the knowledge, values, skills, experiences, and also the determination which will enable them to act individually and collectively to solve present and future environmental problems . . . as well as to meet their needs without compromising those of future generations (UNESCO, 1999, p. 4).

Because it is such a new field, research regarding adult EE is severely lacking. There are a multitude of articles that analyze the success and misfortunes of EE for children, but hardly any on adult EE. According to Lange (2010), theoretical and empirical research is needed to EE to fruition and social relevance.
Environmental education is a broad category that includes classroom programs, outdoor education, experiential education, and education for sustainability. The scholarly literature on theories of learning in EE is rich and complex; however, a strong focus of this work is on experiential learning. Experiential learning was defined by Hoover and White (1975) as learning which “exists when a personally responsible participant cognitively, affectively, and behaviorally processes knowledge, skills, and/or attitudes in a learning situation characterized by a high level of active involvement” (p. 25). Today, experiential learning is recognized as an important pedagogical approach for adult learning (Caulfield and Woods 2013; Jarvis, Holford, & Griffin, 1999; Kolb, 1984; Fenwick, 2000, 2001, 2003). In environmental education, experiential learning is common in settings where non-formal education is the focus, for example, parks, zoos, aquariums and other outdoor activities (Lugg, 2007). Research strongly suggests that learning in the natural environment is critical for developing knowledge, attitudes and responsible behavior (Ballantyne and Uzzell, 1994; Ballantyne, et al., 1998; Ballantyne, et al., 2001a, 2001b; Ballantyne and Packer, 2002; Bogner, 1998; Lai, 1999; Rickinson, 2001; Tanner, 2001).

This study utilizes a theoretical approach within experiential learning called engagement theory in order to assess which type of educational activity is most effective in changing participants’ attitudes toward the environment. The engagement theory of learning is a multidimensional concept that combines different learning strategies to increase student participation and overall success. There are three components of student engagement: behavioral, emotional and cognitive engagement (Fredricks, et al., 2004). Engagement theory suggests that the most successful teaching strategy is to incorporate a multidimensional construct that uses all three engagement components; however, non-formal environmental education consists of relatively short, discrete events in which combining all three engagement strategies may be difficult (Fredricks, et al., 2004). Hence, in this study, the three components of engagement are identified separately and measured as distinct learning processes.

In this paper, behavioral engagement involves bodily engagement and physical effort in the natural environment, for example, through the building of oyster beds or removing invasive plants. Emotional engagement refers to any affective reaction that a student may feel during an activity, including “…interest, boredom, happiness, sadness, and anxiety” (Fredricks et. al., 2004). Fredricks and colleagues found that there was a lack of research solely on emotional engagement (Fredricks, et al., 2004). Cognitive engagement is connected to the concept of investment, which refers to one’s “…thoughtfulness and willingness to exert the effort necessary to comprehend complex ideas and master difficult skills” (Fredricks, et al., 2004). Cognitive engagement ranges from simple
memorization to the use of self-designed learning strategies to promote in-depth understanding and expertise of any given material.

This study applies the framework of engagement theory to non-formal environmental education programs for adults in Pinellas County, Florida, at four key sites to ascertain which specific components produce the most significant changes in attitudes toward the environment.

**Research Questions**

The primary focus of this study is to determine the impact of non-formal experiential learning on participants’ attitudes toward the environment, their level of commitment to taking action on behalf of nature, their sense of connection to the local environment, and their sense of empowerment in affecting environmental change. Additionally, we sought to identify which component of engagement was most powerful in increasing positive environmental attitudes, commitment, connection, and empowerment. For each component (behavioral, cognitive and emotional engagement), we assessed the following:

- What impact does program participation have on participants’ overall attitudes toward their local environment?
- What impact does program participation have on participants’ commitment to working to solve local environmental problems?
- What impact does program participation have on participants’ sense of connection to the local environment?
- What impact does program participation have on participants’ feelings of empowerment to solve local environmental problems?
- What impact does program participation have on participants’ mastery of the skills necessary to solve environmental problems?

**KEY CONCEPTS IN ENVIRONMENTAL EDUCATION**

The key concepts utilized in this research arise out of decades of discussion and practice in environmental education (EE). While EE can be traced to the 1970s, it was not until the passage of the National Environmental Education Act (NEEA) (Potter, 2010) that EE gained significant momentum in the United States. The NEEA gave the Environmental Protection Agency (EPA) the responsibility to create an office of EE and to strengthen and expand the discipline. In 17 years
following passage of the NEEA, the agency spent over $100 million improving and supporting EE programs around the United States. The NEEA was written in such a way that a significant number of people would be introduced to environmental concerns in their community, and, in turn, many participants would feel encouraged to protect their community’s natural resources. According to its website, the EPA has funded over 3,800 environmental education projects since 1992, totaling between $2 and $3.5 million per year (EPA, 2016). The Environmental Protection Agency’s (2016) five components of EE are considered the foundation for EE in the United States:

- **Awareness** and sensitivity to the environment and environmental challenges
- **Knowledge** and understanding of the environment and environmental challenges
- **Attitudes** of concern for the environment and motivation to improve or maintain environmental quality
- **Skills** to identify and help resolve environmental challenges
- **Participation** in activities that lead to the resolution of environmental challenges

The importance of attitudes, values, and commitment in shaping a person’s approach to the environment is widely accepted (Simmons, 2000). Scientists emphasize that environmental issues are not strictly scientific in nature; rather, they are multidisciplinary and require an interdisciplinary approach for analysis (Simmons, 2000). Environmental awareness is often the primary educational goal of EE programs (Clover, 2002; Yolerí, 2012). An increase in awareness simply means that an individual is exposed to more knowledge about the environment and environmental issues. Environmental awareness helps people become conscious of significant environmental problems and that the overall health of the environment is important, at the very least, because it provides the basis of human life support (clean air, clean water, food, fiber, and shelter). Often, environmental educators believe that an increase in awareness of environmental problems will result in behavior change (Hamid, et al., 2017), though this relationship is not straightforward (Hungerfold and Volk, 1990; Kollmus and Agyeman, 2010).

Mere awareness of, and sensitivity to, environmental issues is not enough; people must also be knowledgeable. Environmental knowledge refers to one’s understanding of the causes, extent, and possible solutions for environmental problems (Zsóka, et al., 2013). Researchers have found that environmental knowledge and pro-environmental attitudes are interconnected (Zsóka, et al., 2013; Bamberg, 2003). An increase in knowledge, awareness and sensitivity are related to the third objective of creating attitudes of concern and motivation. The hope is that by increasing knowledge
and sensitivity, an individual’s attitude will be affected and therefore he or she will be motivated to perform pro-environmental behaviors (Hungerford and Volk, 1990).

The last two objectives, skills and participation, are also interconnected. Generally, skills refer to the ability to demonstrate analytical or critical thinking about specific environmental problems; skills can also refer to the physical abilities needed to solve complex environmental problems (Hungerford and Volk, 1990; Eisenberg and Berkowitz, 1990). Without proper skills, individuals might be aware of issues and want to help solve them, but they will not be able to contribute to the development and implementation of solutions. The final objective, participation, focuses on opportunities to be actively involved in solving environmental problems (Hungerford and Volk, 1990). Ideally, participation will increase knowledge and skill level, which hopefully results in environmentally conscious and active citizens.

Connection

An individual who has a direct connection to nature will be more likely to engage in pro-environmental behaviors than someone who lacks such a connection (Hinds and Sparks, 2008). In the context of environmental education, connection is commonly described as the emotional affinity individuals have with nature, which has been shown to predict protective behaviors towards nature and natural environments (Hinds and Sparks, 2008). Understanding one’s connection to the environment and gaining insight as to how to strengthen one’s connection to the environment is imperative to EE.

Empowerment

In addition to first attaining the skills to successfully make positive environmental changes, one must then feel personally empowered to actually follow through with the changes. Empowerment is a broad term that refers to the way in which power is gained or given (Staples, 2017) and is closely linked to the strength needed to confidently make decisions and act for oneself. Powerless individuals, after being empowered are then able to “…become active participants in the creation and implementation of the policies, decisions, and processes which affect them” (Staples, 2017, p. 31). Empowerment is often studied in terms of community/team empowerment or individual empowerment. Individual empowerment focuses on personal growth and development and team empowerment is a shared perception of success and growth between multiple individuals working as a greater unit (Chen, et al., 2007). In all areas of empowerment, research has shown that when people feel more empowered, they innately feel better about themselves and have increased
self-respect and self-esteem (Staples, 2017). For this research study, we emphasize individual empowerment.

Hungerford and Volk (1990) identified specific variables that predispose individuals to take an interest in the environment; these include specific empowerment variables such as ones' skill in using environmental action strategies and the belief that one can be successful (Chawla and Cushing, 2007). Stern (2000) found that for individuals to be motivated to act on solving environmental issues they need to feel empowered; in other words, they need to believe that they can have an effect on solving environmental issues (Chawla and Cushing, 2007).

Measuring Attitudes

In this study, we begin by measuring adult participants’ environmental attitudes, as environmental awareness and a positive attitude toward nature are the baseline for greater environmental literacy and increased action. Attitudes are described in the psychology field as the “…favorable or unfavorable feelings toward a characteristic of the physical environment or toward a related problem” (Metin, 2010, p.3). Attitudes are considered a latent construct, meaning that attitudes are theoretical in nature and cannot be directly observed (Mifront and Duckitt, 2010) and must be inferred from overt responses. Determining attitudes from overt responses can be done with either direct self-report methods or implicit measurement techniques; this research used methods from each category. Surveys are considered direct self-report methods and are the primary methods used in environmental attitude research (Mifront and Duckitt, 2010). This research also used participant observation, which is considered an implicit measurement technique. In social science research attitudes are often measured using scales.

Attitudinal Scales

Attitudinal scales are a common tool for measuring human attitudes toward nature. The New Ecological Paradigm (NEP) scale has been identified as reliable and valid by Milfront and Duckitt and is widely used by scholars for measuring environmental attitudes. The NEP was created to avoid becoming outdated by using only general environmental topics and measuring the overall relationship between humans and the environment. Another unique aspect of the NEP scale is that it measures an ecocentric system of beliefs instead of an anthropocentric system of beliefs (Milfront and Duckitt, 2010). Dunlap and Van Liere published the original NEP scale in 1978, and it was revised in 2000. The revised NEP scale is a list of 15 statements; participants are asked to disagree or agree with them on a Likert scale. Examples of such statements are “despite our special abilities humans are still subject to the laws of nature,” and “humans will eventually learn enough about how
nature works to be able to control it” (Dunlap, et al., 2000). The 15 questions, including six from the original scale, were created to mention five hypothesized facets of an ecological worldview (Dunlap, et al., 2000): “the reality of limits to growth, anti-anthropocentrism, the fragility of nature’s balance, rejection of exceptionalism, and the possibility of an Eco crisis” (Dunlap, et al., 2000). In this research, the NEP scale was incorporated into a larger survey. The supplemental survey questions were designed to address variables and questions that are specific to this research. The NEP scale was used to determine participant’s environmental attitudes before and after a specific educational activity. To determine if participation in the activity elicited a change in attitude, pre- and post-surveys were administered, and the results were compared for each individual participant.

STUDY SITES

Four environmental education organizations provided the study sites for this research. Data was collected at two natural preserves, Weedon Island Nature Preserve and Boyd Hill Nature Park during activities such as nature walks, invasive plant removal programs and lectures hosted at the preserves. Data was also collected at events held by two environmental non-profits, Keep Pinellas Beautiful (KPB) and Tampa Bay Watch. These two organizations conduct many environmental activities such as beach clean-ups and the construction of sustainable ecological habitats. A combination of qualitative research techniques, discussed below, were used at each site.

Weedon Island Nature Preserve

Weedon Island Preserve is a 3,190-acre natural area located in Pinellas; it is a natural oasis surrounded by a bustling suburban community (Weedon Island, 2017). The current mission of the preserve is “to empower citizens to make informed decisions about natural and cultural resources” clearly demonstrating the park’s commitment to EE (Weedon Island, 2017). One of the learning activities offered at Weedon Island is the monthly anthropology lecture, while the preserve also has more active events such as guided mangrove hikes.

Boyd Hill Nature Preserve

Boyd Hill Nature Preserve is a 245-acre preserve located in the heart of Saint Petersburg (Boyd Hill Nature Preserve, 2017). One of the adult programs currently offered at Body Hill is the natural history speaker series. The speaker series features a diverse range of speakers on Florida’s natural and cultural history (Boyd Hill Nature Preserve, 2017).
Keep Pinellas Beautiful

Keep Pinellas Beautiful, a Keep America Beautiful affiliate, is a non-profit organization founded in 1992 that serves the entire Pinellas County area. “The mission of Keep Pinellas Beautiful is to conserve and beautify the natural environment through community engagement and education” (Anonymous, 2017). Every month KPB hosts various interactive environmental cleanups throughout the county. Cleanups can range from simple beach cleanups to more extensive mangrove cleanups.

Tampa Bay Watch

Tampa Bay Watch is an environmental non-profit established in 1993. The main goal of Tampa Bay Watch is to help the bay recover from its environmental problems; the goal is accomplished through habitat restoration and protection activities hosted by the organization throughout the year (Tampa Bay Watch, 2017). Tampa Bay Watch is most known for its salt marsh and oyster restoration projects. As of today, Tampa Bay Watch has restored over 249 acres of wetland habitat and planted 334,204 plugs of salt marsh grass (Tampa Bay Watch, 2017).

STUDY POPULATION

This research focuses solely on adult environmental education in Pinellas County, Florida. Only individuals aged 18 and older were asked to participate in this study. The adult population of Pinellas County is over 900,000 people (U.S. Census Bureau, 2020). However, the study population for this research was those adults who attended non-formal EE in Pinellas County, while the sample frame for this research are adults who attended the same events as the researcher. A total of 126 adults participated in this study, 15 of whom are older than 65. This study was approved by the USF Internal Review Board.

METHODS

Participant Observation

Participant observation was conducted at each of the four study sites. At Weedon Island Nature Preserve, seven events were attended with a total of 10 hours of participant observation. Seven events were attended at Boyd Hill Nature Preserve, for a total of 11 hours of participant observation. Tampa Bay Watch events were the longest in time and attending only three events resulted in 25 hours of participant observation. Finally, attendance at six Keep Pinellas Beautiful events led to 11.5 hours of participant observation.
Observations were recorded in field notes following each event. The primary purpose of participant observation was to identify the nature of each activity, i.e., whether it entailed behavioral, emotional or cognitive engagement practices for participants; to determine if skills were acquired during the activity; and if participants felt empowered after the attended events. Field notes were analyzed using traditional coding techniques (Dewalt and Dewalt, 2002).

Surveys

The key data collection instrument for this study was a survey. To determine participants’ attitudes towards the environment before and after each educational event, the New Ecological Paradigm (NEP) scale was used. Additional statements were added to Dunlap’s scale to measure participants’ feelings of connection to their environment, their sense of empowerment in solving environmental problems and their commitment to solving environmental problems.

Surveys were distributed at 19 educational events across the four study sites. To allow for ample time, the pre-survey was distributed to participants who arrived early. Hard copies of the survey were then distributed. Participants were asked to initial their surveys at the top so that pre and post surveys could be correctly linked. Immediately following the activity, the same set of participants were given the post-survey. Each survey contained an informed consent form that was signed before completing the pre-survey. One hundred and twenty-six pre- and post-surveys were completed. Thirty-four adult participants were surveyed at Weedon Island Preserve and Boyd Hill Nature Preserve. Twenty-eight adults were surveyed at Keep Pinellas Beautiful events and thirty participants were surveyed at Tampa Bay Watch events.

Survey Data Analysis

Data from the survey was analyzed using percentages. This type of analysis was further used to determine how the results changed depending on the given variables. Variables that were used in this percent analysis were commitment, connection and empowerment. Survey data was also analyzed to determine environmental attitudes using the NEP scale. The NEP scale contains 15 statements that incorporate, “…five hypothesized facets of an ecological worldview: the reality of limits to growth (1, 6, 11), anti-anthropocentrism (2, 7, 12), the fragility of nature’s balance (3, 8, 13), rejection of exceptionalism (4, 9, 14) and the possibility of an eco-crisis (5, 10, 15)” (Dunlap, et al., 2000, p.432). The odd-numbered statements were worded so that agreement indicates a pro-ecological view. Conversely, the even-numbered statements were worded so that disagreement indicates a pro-ecological view (Dunlap, et al., 2000).
To each statement participants were asked to select one of the following: strongly agree, mildly agree, unsure, mildly disagree, or strongly disagree. Responses were summed using the scale’s original rubric. Each statement response was given a number 1 through 5. There were eight odd-numbered questions that indicate a pro-ecological view when agreed upon. These eight questions were coded as follows: strongly agree was counted as 5 points and strongly disagree was counted as 1 point. There were seven even numbered questions that indicated a pro-ecological view when disagreed upon. These seven questions were coded as follows: strongly disagree was given 5 points per question and strongly agree was given 1 point. When looking at the survey results, there was a possible 75 points that could have been obtained depending on statement responses. Following Thomson (2013), participants with NEP scores between 79-100 percent are considered to have a pro-ecological view, participants with a NEP score between 54-78 percent are considered to have a mid-ecological view and participants with scores 53 percent or less are considered to have an anti-ecological view.

NEP survey scores were calculated for each participant for both the pre and post event and the two scores were compared to see if there were any changes. For participants whose post survey results placed them into a different category, their surveys were individually analyzed to see which particular responses changed. Any of the statements in which a participant changed their response by at least two measures, such as from strongly agree to unsure were considered significant.

ANALYSIS: APPLICATION OF ENGAGEMENT THEORY OF LEARNING

We sought to identify which component of engagement (behavioral, emotional, cognitive) was most powerful in increasing positive environmental attitudes, commitment, connection, and empowerment among participants. To be able to determine the effectiveness of each engagement strategy, each event was categorized by its primary type of engagement only. The events that were determined to be primarily behavioral events were most often the events in required physical participation. Events in which the primary outcome was a positive emotional response were considered to incorporate emotional engagement; this included excitement, happiness, and interest. For example, the alligator walk was listed as an emotional engagement event, as the main focus of the event was centered around the excitement in spotting alligators in their natural habitat. This statement supports existing literature that indicates animal encounters invoke emotional responses that can influence environmental beliefs (Jacobs, 2012). The events in which the researcher noted that participants put in extra effort to understand the educational topics scientifically or intellectually or learn necessary skills were said to incorporate cognitive engagement. Cognitive events were
characterized by the dominance of a direct attempt to transfer or convey knowledge to participants, and thus required a high level of intellectual focus and attention, for example, lectures, films, guided hikes. Out of 23 total events, nine were categorized as behavioral engagement, six as emotional engagement, and eight as cognitive engagement (see Table 1).

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<tr>
<th>Behavioral Engagement ( (n=52) )</th>
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<tbody>
<tr>
<td>Tampa Bay Watch</td>
<td>10/16/2018: Constructing oyster beds</td>
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<td>Tampa Bay Watch</td>
<td>10/19/2018: Filling oyster bags</td>
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<td>Tampa Bay Watch</td>
<td>11/6/2018: Constructing oyster beds</td>
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<tr>
<td>Keep Pinellas Beautiful</td>
<td>10/13/2018: Treasure Island Cleanup</td>
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<td>Keep Pinellas Beautiful</td>
<td>10/20/2018: Invasive Removal</td>
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<td>Keep Pinellas Beautiful</td>
<td>11/16/2018: Street Cleanup</td>
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<td>Keep Pinellas Beautiful</td>
<td>11/18/2018: SAH Cleanup</td>
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<tr>
<td>Keep Pinellas Beautiful</td>
<td>12/2/2018: Gandy Cleanup</td>
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<th>Emotional Engagement ( (n=32) )</th>
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<td>Weedon Island Preserve</td>
<td>9/20/2018: Anthropology Lecture</td>
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<tr>
<td>Weedon Island Preserve</td>
<td>11/10/2018: Guided Hike</td>
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<tr>
<td>Boyd Hill Nature Preserve</td>
<td>9/16/2018: Aviary Tour</td>
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<td>Boyd Hill Nature Preserve</td>
<td>10/14/2018: Alligator Walk</td>
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<th>Cognitive Engagement ( (n=42) )</th>
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<td>9/1/2018: Guided Hike</td>
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<td>Weedon Island Preserve</td>
<td>9/14/2018: Sub-Irrigated Plant Lecture</td>
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Weedon Island Preserve  9/15/2018: Bird Watching Hike
Weedon Island Preserve  10/5/2018: Lecture on Composting
Weedon Island Preserve  10/10/2018: Lecture on Microplastics
Boyd Hill Nature Preserve  10/2/2018: Lecture on Climate Change
Boyd Hill Nature Preserve  10/9/2018: Bringing wildlife to your backyard lecture
Keep Pinellas Beautiful  9/29/2018: Gandy Beach Cleanup

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<tr>
<th>Location</th>
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<td>Weedon Island Preserve</td>
<td>9/15/2018</td>
<td>Bird Watching Hike</td>
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<td>Weedon Island Preserve</td>
<td>10/5/2018</td>
<td>Lecture on Composting</td>
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<td>Weedon Island Preserve</td>
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<td>Lecture on Microplastics</td>
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<td>Boyd Hill Nature Preserve</td>
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<td>Lecture on Climate Change</td>
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<td>Boyd Hill Nature Preserve</td>
<td>10/9/2018</td>
<td>Bringing wildlife to your backyard lecture</td>
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<td>Keep Pinellas Beautiful</td>
<td>9/29/2018</td>
<td>Gandy Beach Cleanup</td>
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Table 1: Classification of events by Engagement Theory.  \( n = \) number of participants

**Macroscale Analysis: Overall Changes in NEP Scores**

The core of this research was based on analyzing environmental attitudes using the NEP scale. In this data, participants with NEP scores between 79-100 percent are considered to have a pro-ecological view, participants with a NEP score between 54-78 percent are considered to have a mid-ecological view and participants with scores 53 percent or less are considered to have an anti-ecological view. The pre-survey results revealed that 41.27% of the 126 participants had a pro-ecological view, 58.73%, had a mid-ecological view, and no participants were found to have an anti-ecological view. It seems reasonable to expect that participants in activities organized by Tampa Bay Watch and Keep Pinellas Beautiful would begin with a relatively positive attitude toward the environment. It is not clear if this is the norm for visitors to nature parks, however, which can be important tourist attractions for out of state visitors.

The post-survey results were also analyzed using the NEP scale. The post-survey indicated an increase in pro-ecological view, with 46.83% of participants now falling into this range from the original 41.27%. The post-survey also revealed the participants who had a mid-ecological view decreased to 50.79% from the 58.73% noted in the pre-survey. The 8% change was divided between those participants who increased their pro-ecological attitude and those whose attitude shifted toward a more negative view. The participants with an anti-ecological view, which was 0% prior to the activity, actually increased to 2.38% after the environmental activity. It is difficult to determine exactly what made the participants’ views change after the activity, as these three participants were not personally interviewed after the event. However, the shift in attitudes of participants was complex.
When comparing pre- and post- NEP scores, it was found that 113 out of the 126 participants had overall changes in their scores. Of these 113 participants, 55 of the participants’ post survey NEP scores actually decreased after the activity, while 58 of the participants scores increased. However, a one-step change on the Likert Scale was not considered significant, as many factors may influence how an individual responds to a survey item. Out of the 113 participants who showed a change in the score after the activity, only 28 individuals had a great enough change in NEP score that resulted in an altered NEP classification. Thus, participation in experiential learning in the environment resulted in a significant change in attitude for 22% of participants. However, only 10% of participants saw an increase in their pro-environmental attitude. Twelve participants’ scores increased enough that their environmental view classification shifted from a mid-environmental category to a pro-environmental category. Conversely, thirteen participants had decreased post survey scores that actually dropped them from the pro-environmental category to the mid-environmental category and, to the researchers’ surprise, three participants were found to have anti-ecological views after the event as discussed above. While the drop in overall positive environmental attitude by 10% of participants is puzzling, some possible reasons for this decline become clear when the data is examined at a microscale below.

Of the group whose ratings fell from pro to mid-ecological attitudes, the primary activities in which the participants were engaged were classified as “behavioral.” These activities are physically demanding, and the simple exhaustion of participation and the eagerness of the participants to leave the site at the end of the day may have influenced their responses. Follow-up interviews with these individuals might have helped clarify their reaction to the event. We explore behavioral events more fully below.

<table>
<thead>
<tr>
<th>Event Location</th>
<th>Activity</th>
<th>Engagement Theory</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weedon Island</td>
<td>Anthropology Lecture</td>
<td>Emotional</td>
<td>1</td>
</tr>
<tr>
<td>(9/20/18)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boyd Hill (10/14/18)</td>
<td>Alligator Walk</td>
<td>Emotional</td>
<td>1</td>
</tr>
<tr>
<td>KPB (9/29/18)</td>
<td>Gandy Beach Cleanup</td>
<td>Cognitive</td>
<td>1</td>
</tr>
<tr>
<td>Event Location</td>
<td>Activity</td>
<td>Engagement Theory</td>
<td>Number of Participants</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------------------------</td>
<td>-------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Tampa Bay Watch</td>
<td>Construction of Oyster Beds</td>
<td>Behavioral</td>
<td>3</td>
</tr>
<tr>
<td>(11/6/18)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KPB</td>
<td>Gandy Beach Cleanup</td>
<td>Behavioral</td>
<td>2</td>
</tr>
<tr>
<td>Tampa Bay Watch</td>
<td>Filling Oyster Bags</td>
<td>Behavioral</td>
<td>2</td>
</tr>
<tr>
<td>(10/19/18)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weedon Island</td>
<td>Anthropology Lecture</td>
<td>Emotional</td>
<td>2</td>
</tr>
<tr>
<td>(9/20/18)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boyd Hill (9/16/18)</td>
<td>Aviary Tour</td>
<td>Emotional</td>
<td>1</td>
</tr>
<tr>
<td>Boyd Hill (9/9/18)</td>
<td>Alligator Walk</td>
<td>Emotional</td>
<td>1</td>
</tr>
<tr>
<td>Boyd Hill (10/9/18)</td>
<td>Bringing wildlife to your backyard Lecture</td>
<td>Cognitive</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Event Location</th>
<th>Activity</th>
<th>Engagement Theory</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tampa Bay Watch</td>
<td>Constructing Oyster Domes</td>
<td>Behavioral</td>
<td>4</td>
</tr>
<tr>
<td>(10/16/18)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tampa Bay Watch</td>
<td>Filling Oyster Bags</td>
<td>Behavioral</td>
<td>1</td>
</tr>
<tr>
<td>(10/19/18)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KPB (11/16/18)</td>
<td>Street Cleanup</td>
<td>Behavioral</td>
<td>3</td>
</tr>
<tr>
<td>KPB (11/18/18)</td>
<td>SAH Cleanup</td>
<td>Behavioral</td>
<td>2</td>
</tr>
<tr>
<td>KPB (12/2/18)</td>
<td>Gandy Beach Cleanup</td>
<td>Behavioral</td>
<td>1</td>
</tr>
<tr>
<td>Weedon Island</td>
<td>Sub-irrigated Planter Lecture</td>
<td>Cognitive</td>
<td>1</td>
</tr>
<tr>
<td>(9/14/18)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KPB (9/29/18)</td>
<td>Gandy Beach Cleanup</td>
<td>Behavioral</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2: Participants whose pre-survey and post-survey NEP categorization changed.
Microscale Analysis: Connection

The first research question that was addressed during the research process was “what impact does program participation have on participants’ sense of connection to their local environment?” In order to determine the level of environmental connection, participants were asked to identify if they strongly agree, mildly agree, were unsure, mildly disagree or strongly disagree with the following statements:

- Question 2: Humans and nature are separate entities.
- Question 6: I think of the natural world as a community to which I belong.
- Question 9: Plants and animals have as much right as humans to exist.

Each question was analyzed using pre- and post-survey data as well as participant observation, to determine if there were changes to connectivity.

Connection: Emotional Engagement

Based on participant observation, four of the six emotionally engaged events fostered a deeper sense of connection to the local environment. These four particular events were all outdoor events in which participants were actively engaging in the natural world. An example was a nature hike through the Boyd Hill preserve in search of alligators (Figure 1). The guides gave participants tips on how to search for the alligators and encouraged participants to be present in the activity, further fueling human and environmental connectivity. Two of the emotional engagement events that the researcher felt increased levels of connectivity were a wildflower walk through Boyd Hill and a guided hike at Weedon Island. During these events participants were actively looking for plant and animal species and were encouraged to ask questions throughout the experience (field notes). The other event that inspired feelings of connection to the environment was a Keep Pinellas Beautiful beach cleanup at Gandy Beach. The events in which individuals have positive experiences in nature and feel connected to their environment can predict protective behaviors towards natural environments (Hinds and Sparks, 2008).
Results for the emotional engagement events indicated that originally 81.25% strongly or mildly disagreed with question 2, “Humans and nature are separate entities.” After the event, the number of participants who strongly or mildly disagreed to the same question was increased to 84.37%. This is a negatively scored statement, hence the increase in disagreement indicates a stronger connection to the environment after participation in the emotionally engaging event. Responses to question 6 did not change after the survey. In regard to question 9, “plants and animals have as much right as humans to exist”, during the pre-survey 93.75% strongly or mildly agreed, and the post-survey results indicated that after the event, 84.37% now strongly or mildly agreed. This is a startling drop of over 9%.

<table>
<thead>
<tr>
<th>Emotional Engagement</th>
<th>Before Event</th>
<th>After Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 2 (SD or MD)</td>
<td>81.25%</td>
<td>84.37%</td>
</tr>
<tr>
<td>Question 6 (SA or MA)</td>
<td>96.88%</td>
<td>96.88%</td>
</tr>
<tr>
<td>Question 9 (SA or MA)</td>
<td>93.75%</td>
<td>84.37%</td>
</tr>
</tbody>
</table>

Table 3: Emotional engagement participant response to connection survey questions
**Connection: Cognitive Engagement**

Participant observation led to the conclusion that 62.5% of the events actively incorporated the idea of connection into the activity. Unlike behavioral events, which stressed environment connection by physically surrounding the participants in natural environments, cognitive events stressed intellectual and abstract environmental connectivity. During the cognitive events, lecturers were forced to create a feeling of environmental connectivity without actually exposing the participants to natural environments. An example was the climate change lecture at Boyd Hill. This lecture used a movie and discussion to show that although climate change is a global issue, the effects of climate change personally affect many individuals. This educational tactic is used to incite a feeling of attachment to the environment on both a global and personal level, without the need to use nature physically as a learning tool. Of participants who attended events primarily characterized by cognitive engagement, 83.33% of participants in both the pre- and post-survey responded with *strongly or mildly disagree* to question 2: “humans and nature are separate entities”. For question 6, “I think of the natural world as a community to which I belong” the pre-survey results showed that 92.9% of participants responded with *strongly or mildly agree* while 97.61% responded with *strongly or mildly agree* after the event. Responses to question 9 did not change after the event.

<table>
<thead>
<tr>
<th>Cognitive Engagement</th>
<th>Before Event</th>
<th>After Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 2 (SD or MD)</td>
<td>83.33%</td>
<td>83.33%</td>
</tr>
<tr>
<td>Question 6 (SA or MA)</td>
<td>92.9%</td>
<td>97.61%</td>
</tr>
<tr>
<td>Question 9 (SA or MA)</td>
<td>92.86%</td>
<td>92.86%</td>
</tr>
</tbody>
</table>

Table 4: Cognitive engagement participant response to connection survey questions.

**Connection: Behavioral Engagement**

Out of all the behavioral engagement events, five were identified that included an obvious connection to the local environment. The behavioral events were typically more physically demanding than any of the other events. Behavioral events included the removal of invasive plants and the building of oyster domes as opposed to other events that were primarily lecture-based. An example of this is when Tampa Bay Watch participants volunteered to build concrete oyster domes
and bag oyster shells that were used to prevent shoreline erosion and create new habitats for local sea life. The bags were immediately taken via boat ride to the local shoreline and placed in the water.

Survey data from these events had some startling results. For question 2, “humans and nature are separate entities,” 90.38% of participants strongly or mildly disagreed prior to the event and this number dropped to 86.54% after the event. For question 6, “I think of the natural world as a community to which I belong”, 100% of participants strongly or mildly agreed when questioned in the pre-survey, while afterwards only 94.23% strongly or mildly agreed. This change would indicate that participants’ levels of connectivity decreased. We speculate that the drop in sense of connection could have been a result of physical exhaustion as most behavioral engagement events were more physically demanding compared to the emotional and cognitive engagement events. Participants often conducted hard physical labor in the Florida heat for several hours at a time. For the final question 9, there was no change from pre- to post-surveys. Overall, participation in behavioral events resulted in a drop in sense of connection to nature.

<table>
<thead>
<tr>
<th>Behavioral Engagement</th>
<th>Before Event</th>
<th>After Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 2 (SD or MD)</td>
<td>90.38%</td>
<td>86.54%</td>
</tr>
<tr>
<td>Question 6 (SA or MA)</td>
<td>100%</td>
<td>94.23%</td>
</tr>
<tr>
<td>Question 9 (SA or MA)</td>
<td>94.23%</td>
<td>94.23%</td>
</tr>
</tbody>
</table>

Table 5: Behavioral engagement participant response to connection survey questions.

**Microscale Analysis: Commitment**

Commitment was measured through research question 4 on the post-survey: Question 4: “After participating in this activity, I feel more motivated to act on behalf of the environment.”

**Commitment: Behavioral Engagement**

One hundred percent of participants in the behavioral engagement events responded to statement 4 with strongly or mildly agree. As mentioned previously, most of the behavioral engagement events were events that required varying levels of physical labor, such as environmental cleanups.
Each of these events demanded commitment and effort from the participants to complete; some level of commitment must already be present for people to show up in the first place. Participants expressed their desire to return and continue volunteering for these organizations. This commitment was seen during many of the Tampa Bay Watch events. During these events there were a large group of volunteers who came to every single event, regardless of the time or location, clearly representing their continued commitment to solving environmental problems (field notes). This finding appears to be in contradiction to results for connection at behavioral events. We will return to this issue in the discussion.

**Commitment: Cognitive Engagement**

Ninety-three percent of participants in cognitive engagement events strongly or mildly agreed to statement 4, “after participating in this activity, I feel more motivated to act on behalf of the environment.” Participant observation suggested that only 50% of the cognitive engagement events instilled a personal level of commitment. Two of the events that were observed to emphasize commitment to bettering the environment were lectures at Weedon Island. One of the lectures was on microplastics, the negative environmental impact they have and how to reduce microplastic usage. The other lecture was on a basic introduction to composting. Both offered simple, feasible changes that participants could make to better the local environment. The simplicity of these changes facilitates commitment to making the effort to improve and positively impact the environment (field notes). Participants of the two events expressed feelings of commitment to solving environmental issues. During the microplastics lectures, participants were interested in learning ways to reduce their contribution to the plastics issue and inquired about how to find more environmentally friendly alternatives to everyday objects (field notes). Many of the participants who attended the composting lecture explained that they were already composting at home but wanted to improve the system they were using. Also, during this lecture each participant was given a device to store kitchen scraps to encourage the participants to start composting. Many of the participants were happily surprised to have been given this device and said they intended to use it (field notes).

**Commitment: Emotional Engagement**

The events that were least likely to result in feelings of commitment to environmental betterment were the emotional engagement events. Even though emotional engagement influences feelings of environmental connectivity, this may not always correlate to a feeling of environmental commitment. Only 59.38% of the participants who attended emotional engagement events responded to statement 4, “after participating in this activity, I feel more motivated to act on behalf of the
environment”, with either strongly or mildly agree. Based on participant observation, the researcher found that none of the emotional engagement events instilled commitment. A majority of the engagement events were nature walks or animal observation events and were primarily focused on participant entertainment. The topics of focus, such as the alligator observation hike, were educational and pleasurable, but they did not instill a sense of environmental commitment or create a desire to improve local environments (field notes).

<table>
<thead>
<tr>
<th></th>
<th>After Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral Engagement</td>
<td></td>
</tr>
<tr>
<td>Question 4 (SA or MA)</td>
<td>100%</td>
</tr>
<tr>
<td>Cognitive Engagement</td>
<td></td>
</tr>
<tr>
<td>Question 4 (SA or MA)</td>
<td>92.86%</td>
</tr>
<tr>
<td>Emotional Engagement</td>
<td></td>
</tr>
<tr>
<td>Question 4 (SA or MA)</td>
<td>59.38%</td>
</tr>
</tbody>
</table>

Table 6: Participant response to commitment survey question.

In conclusion, behavioral engagement events were the most likely to increase personal commitment to solving environmental problems. This was followed by cognitive events and, lastly, emotional events. This is an interesting finding, given that the data shows a drop in pro-ecological attitude for some participants in behavioral engagement events.

Microscale Analysis: Empowerment

Four statements from the survey were used to determine if events instilled a sense of empowerment in participants. Two were from the post-survey section and two were from the environmental attitudes portion of the survey: Question 2: This activity made me feel that my actions can make a difference for the environment; Question 6: After participating in this activity, I feel our environmental problems are so large we can’t do much to help; Question 14: I don’t think my actions will have an impact on solving environmental problems; and Question 19: I am very confident that my actions will make a difference in protecting our environment.
**Empowerment: Behavioral Engagement**

Through participant observation, it was determined that all the behavioral engagement events instilled a sense of empowerment. Field observations supported the idea that being able to see the immediate impact one’s actions can have, such as removing excess trash from waterways, can make participants feel as if they can make a tangible difference on the environment (field notes). Many participants also explained that they felt as though they accomplished something after these physically demanding events and were eager to do the events again (field notes).

Ninety-two percent of individuals who participated in behavioral engagement events *strongly* or *mildly agreed* with statement 2: “This activity made me feel that my actions can make a difference for the environment,” while 94.23% *strongly or mildly disagreed* with statement number 6: “After participating in this activity, I feel our environmental problems are so large we can’t do much to help.”

The pre-survey results for question 14, “I don’t think my actions will have an impact on solving environmental problems,” showed that 82.68% of participants *strongly or mildly disagreed* with this statement; after the event, this increased to 86.54%. In the pre-survey, 71.15% of individuals *strongly or mildly agreed* to statement 19, “I am very confident that my actions will make a difference in protecting our environment,” and similarly, this increased to 82.69% during the post-survey.

<table>
<thead>
<tr>
<th>Behavioral Engagement</th>
<th>Before Event</th>
<th>After Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 2 (SA or MA)</td>
<td></td>
<td>92.30%</td>
</tr>
<tr>
<td>Question 6 (SD or MD)</td>
<td></td>
<td>94.23%</td>
</tr>
<tr>
<td>Question 14 (SD or MD)</td>
<td>82.68%</td>
<td>86.54%</td>
</tr>
<tr>
<td>Question 19 (SA or MA)</td>
<td>71.15%</td>
<td>82.69%</td>
</tr>
</tbody>
</table>

Table 7: Behavioral engagement participant response to empowerment survey questions.

**Empowerment: Cognitive Engagement**

Field work indicated that more than half of the attended events were designed to instill empowerment. An example was a lecture at Boyd Hill that gave ten ways to increase animal life in
one’s backyard. During this event the participants were given small changes that could be made to bring more wildlife onto one’s yard, regardless of the property size. The changes were modest and manageable, and participants seemed to be willing to implement these small changes. A few participants mentioned how easy some of the suggestions were and were shocked they did not think of them for themselves. For example, the lecturer mentioned making sure one’s bird bath was kept clean with fresh water but do not use any chemicals to clean it. A few participants mentioned they didn’t even consider regularly cleaning their bird baths and were going to start doing so.

Eighty-six percent of participants in cognitive engagement activities strongly or mildly agreed with statement 2: “this activity made me feel that my actions can make a difference for the environment.” Furthermore, 76.19% of participants strongly or mildly disagreed with statement 6: “after participating in this activity, I feel our environmental problems are so large we can’t do much to help.”

Pre-survey data indicated that 78.57 % of participants strongly or mildly disagreed with statement 14, “I don’t think my actions will have an impact on solving environmental problems”, and this increased to 80.95% of participants in the post-survey. For statement 19, “I am very confident that my actions will make a difference in protecting our environment”, 69.04% of participants strongly or mildly agreed in the pre-survey which increased to 83.33% after the event. Clearly, cognitive engagement has a strong impact on the participants’ sense of empowerment.

<table>
<thead>
<tr>
<th>Cognitive Engagement</th>
<th>Before Event</th>
<th>After Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 2 (SA or MA)</td>
<td></td>
<td>85.70%</td>
</tr>
<tr>
<td>Question 6 (SD or MD)</td>
<td></td>
<td>76.19%</td>
</tr>
<tr>
<td>Question 14 (SD or MD)</td>
<td>78.57%</td>
<td>80.95%</td>
</tr>
<tr>
<td>Question 19 (SA or MA)</td>
<td>69.04%</td>
<td>83.33%</td>
</tr>
</tbody>
</table>

Table 8: Cognitive engagement participant response to empowerment survey questions.

**Empowerment: Emotional Engagement**

Field work indicated that none of the emotional engagement events attended were designed to instill a sense of empowerment. The events that were classified as emotionally engaging were typically fun and entertaining but lacked a lasting impact on participants to make environmental changes.
Unlike the two previous categories in which a high percentage of individuals positively responded to statement 2, “this activity made me feel that my actions can make a difference for the environment”, only 53.12% of emotional engagement participants *strongly or mildly agreed* to this statement. However, 81.25% of participants responded *strongly or mildly disagree* to statement 6: “after participating in this activity, I feel our environmental problems are so large we can’t do much to help.” Data revealed that 78.13% of emotional engagement participants *strongly or mildly disagreed* to statement 14, “I don’t think my actions will have an impact on solving environmental problems”, both before and after the event. While only 50% of participants originally *strongly or mildly agreed* to statement 19, “I am very confident that my actions will make a difference in protecting our environment”, this number increased to 59.4% in the post-survey.

<table>
<thead>
<tr>
<th>Emotional Engagement</th>
<th>Before Event</th>
<th>After Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 2 (SA or MA)</td>
<td>53.12%</td>
<td></td>
</tr>
<tr>
<td>Question 6 (SD or MD)</td>
<td>81.25%</td>
<td></td>
</tr>
<tr>
<td>Question 14 (SD or MD)</td>
<td>78.13%</td>
<td>78.13%</td>
</tr>
<tr>
<td>Question 19 (SA or MA)</td>
<td>50%</td>
<td>59.4%</td>
</tr>
</tbody>
</table>

Table 9: Emotional engagement participant response to empowerment survey questions.

In conclusion, it was found that behavioral engagement events produced the strongest feelings of empowerment, followed by cognitive events and then emotional events.

<table>
<thead>
<tr>
<th></th>
<th>Behavioral</th>
<th>Cognitive</th>
<th>Emotional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2 (SA or MA)</td>
<td>92%</td>
<td>86%</td>
<td>53%</td>
</tr>
<tr>
<td>Q6 (SD or MD)</td>
<td>94%</td>
<td>76%</td>
<td>81%</td>
</tr>
</tbody>
</table>

Table 10: Relative impact of behavioral, cognitive and emotional engagement.
**Microscale Analysis: Skills**

Field work indicated that over 55% of behavioral engagement events resulted in learned skills. Out of the cognitive events, 50% of the events attended resulted in learned skills. For the emotional engagement events, it was determined that none of the events resulted in a learned skill.

Skills acquisition was emphasized in 5 out of the 9 behavioral engagement events. For example, in behavioral engagement events, participants were taught how to identify and remove invasive plants, build oyster domes and create oyster bags used in connection with coastal restoration (field notes). Four out of the eight cognitive engagement events were found to also teach skills. An example of this was during the composting and sub-irrigation lectures at Weedon Island. In the composting lecture the participants were given tips on how to compost properly and were also given the materials needed to start a small kitchen compost. During the sub-irrigation lecture experts explained how to build one's own sub-irrigation system and participants were given the opportunity to buy a system already made to jump start the irrigation process. Skills acquisition was not present in any of the emotional engagement activities.

**CONCLUSION**

This research explored which type of engagement strategy, behavioral, emotional or cognitive, increased environmental concern the most effectively. When comparing the differing engagement strategies, the factors that were weighed were the overall connection participants felt to the environment, the commitment they felt for solving environmental problems, the sense of empowerment they felt after completing the events, and any skills obtained at the event that were needed to solve the environmental problems.

Even though research in engagement theory does not find one subset to be superior to the others, many scholars mention the benefits of emotional connection in regard to nature and pro-environmental attitudes (Lumber, et al., 2017). That being said, the data collected during this research did not confirm those findings. While emotional engagement may increase connectivity, it did not show an increased level of commitment to solving environmental issues or instill feelings of empowerment to solving the problems. Indeed, the emotional engagement events in this research yielded mixed results, with participant scores increasing in connectivity on one measure but dropping significantly on another.

Another interesting finding of the research is that all the experiential activities which included emotional engagement prioritized positive emotions. All the emotional events were
oriented toward encouraging positive emotions (joy, excitement, love); however, negative emotions can also be used to instill greater concerns and higher levels of commitment. Invoking negative emotions has shown to be a valuable tool, especially in environmental marketing. For example, the recent desire to ban plastic straws can be linked to a disturbing video where a plastic straw is removed from a sea turtle’s nose, thus invoking negative connotation to plastic straws in consumerism (Rosenbaum, 2018). An important line of investigation would be the impact of emotional engagement activities that utilize negative emotions on commitment and empowerment, which was negligible in events that emphasized only positive emotions. Are negative emotions more effective in prompting a person’s desire and confidence to act?

The results of changes in responses to the overall NEP scale, combined with the microscale analysis, also suggest a need for additional research on the impact of engaging in physically demanding (behavioral engagement) type activities on participants’ attitudes toward the environment. This category of engagement produced the most complex, and sometimes contradictory, results. Surely participating in EE events of any type should not reduce a person’s positive attitude toward the environment, yet there was a drop in 10% of participants’ scores on the attitude scale. Notably, while participation in behavioral engagement events led to a drop in sense of connection, it did result in a strong sense of commitment and empowerment. Clearly, participants respond in complex ways to events in which they engaged with nature in a bodily manner that may be difficult and tiring. Further research into these phenomena is needed.

There are many opportunities for environmental learning for adults in Pinellas County. However, most organizations did offer significantly more programs for children than for adults. A majority of the programs offered are structured for families, therefore, even though adults attend them, the educational content is not as complex as it would be if the program was for adults only. Although there are EE programs available to adults in Pinellas County, there is still plenty of room for growth and innovation. A recent development at Boyd Hill Nature Preserve is the addition of “nature camps for adults.” This is an important innovation because adults whose kids are enrolled in nature camps at the park may also be interested in experiential learning. The program creates separate activities for parents, which are pitched at an appropriate level of complexity for adults, to engage in at the same time that their kids are in camp. This program launched in 2022, and it is too soon to know how successful it might be.

Environmental educators and environmental NGOs might consider creating programs that effectively combine cognitive, emotional and behavioral engagement elements. For example,
behavioral events, which were highly effective, lacked specific cognitive components. Facilitating a discussion prior to engaging in the activity, or a summary afterwards, would meld cognitive learning with behavioral engagement. NGOs such as Tampa Bay Watch could require volunteers to attend a film or discussion on the specific ecological problem being addressed by the activity, prior to participation. Cognitive engagement events, such as a film on marine species, could incorporate an emotional component by creating an opportunity for viewers to interact with live marine animals. Layering of cognitive, emotional and behavioral components would likely increase the effectiveness of adult EE programming.

Additionally, educational designers could consider using a scaffolding approach in program design that incorporates Vygotsky’s Zone of Proximal Development model (Harland, 2003; Sanders and Welk, 2005). Vygotsky emphasized the relational aspect of learning; learning takes place in the interchange between learners and instructors (Sanders and Welk, 2005). A clear limitation of a traditional lecture or film viewing is the lack of engagement between instructors and participants. Sanders and Welk suggest that teaching strategies incorporating active learning such as modeling, feedback and questioning can effectively assist learners in moving through the zones of intellectual development. In Vygotsky’s model, students move through levels of assisted learning to independent learning in which concepts and skills are internalized, and the process of engaging in multiple ways—doing, reading, listening, and discussing—is the engine of development (Sanders and Welk, 2005). Multilevel environmental education events which combine hands-on activities with cognitive learning and provide the opportunity for emotional engagement are likely to be highly successful. Based on this research and building off of previous work (see Johns and Pontes, 2018; Johns and Pontes, 2019; Johns and Pontes, 2020a; Johns and Pontes, 2020b; see also Johns and Beach, forthcoming), we argue that successful environmental education programs for adults must be complex and multilayered, incorporating a variety of pedagogies and processes of engagement, and move beyond dualistic concepts of the human-nature relationship, as illustrated in Table 11.

✓ Share knowledge through cognitive engagement
✓ Boost commitment and empowerment through hands-on, behavioral engagement
✓ Stimulate joy, wonder and connection through emotional engagement
✓ Incorporate negative emotions to spark commitment when appropriate
✓ Use active learning strategies to move participants through levels of development to internalize concepts and skills
Layer aspects of cognitive, behavioral and emotional engagement in discrete EE events
Create opportunities for participants to share in knowledge creation
Provide opportunities for sensory engagement in nature and encounters with non-human others
Engage participants in critical thinking and problem-solving
Apply systems thinking to multiscale problems
Challenge dualistic notions of nature as separate from humans
Encourage sustainable actions at the individual scale
Identify specific opportunities for collective action at the community scale

Table 11: Checklist of Strategies for Effective Adult EE.

Florida as a whole offers a wide range of non-formal EE opportunities for adults (Johns and Pontes, 2018). While EE events in this study resulted in an increase in positive attitudes for the environment for 10% of the participants, it is also true that just as many saw a drop in their scores on the attitude scale. Participants began with already pre-established positive attitudes toward nature, and it would be useful to focus specifically on a population of participants that begin at a lower level of environmental awareness to judge the overall impact of non-formal, experiential EE more accurately on ecological attitudes. Furthermore, there is a significant variation in the impact of different events on the participants in terms of their level of connection, commitment to pro-active behavior, and their sense of empowerment in enacting change. Adult EE in Florida might be improved through collaborative efforts to create general standards and through the development of educational programs that effectively combine cognitive, emotional and behavioral engagement. Further research can illuminate the possibilities in leveraging negative as well as positive emotions in educational events, and in appropriate ways to counter the possible negative impacts of strenuous physical engagement on overall attitudes toward the environment.
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