Effects of Pre- and Post-Trip Activities Associated with a Residential Environmental Education Experience at the New Jersey School of Conservation on Students’ Attitudes Toward the Environment

Lisa Cavern

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Effects of Pre- and Post-Trip Activities Associated with a Residential Environmental Education Experience at the New Jersey School of Conservation on Students’ Attitudes Toward the Environment

by

Lisa Cavern

A Master’s Thesis Submitted to the Faculty of Montclair State University

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ABSTRACT

Scholars of both general education and environmental education (EE) have suggested using targeted activities before and after field experiences may increase the assimilation of desired concepts by students (Ballantyne & Packer, 1996; Bogner, 1998; Dettmann-Easler & Pease, 1999; Flavell, 1979; Knapp & Poff, 2001; Marzano, Gaddy, & Dean, 2000). A search of the EE literature using the ERIC database for the years 1967-present found two studies that explored the use of additional activities to prepare for or reinforce concepts from zoo and garden programs (Farmer & Wott, 1995; Gutierrez de White & Jacobson, 1994), but none related to residential environmental education programs.

This study measured the effectiveness of pre- and post-trip in-class activities related to the residential EE program at the New Jersey School of Conservation (NJSOC) in changing 7th grade students' attitudes toward the environment as measured on the Environmental Adaptation, Environmental Trust, and Pastoralism subscales of the Children's Environmental Response Inventory developed by Bunting and Cousins (1983, 1985). The pre-trip activity was designed to activate students' prior knowledge and expectations of spending time in the outdoors in nonhuman-dominated areas. In the post-trip activity, students considered their experiences and learning at the NJSOC and expressed how it changed their beliefs and feelings about the environment.

Of the four treatment groups (NJSOC program only, pre-trip activity and NJSOC program, NJSOC program and post-trip activity, and NJSOC program with both pre-trip and post-trip activities), only the group given both additional activities showed a statistically significant change in scores on any of the subscales. This change was on the Environmental Adaptation subscale (t = -2.37, p = 0.01). Additionally, the group that
participated in both additional activities was the only one to show the expected
directional change on all three subscales.

Though the results of this study are preliminary, they offer some insight into the
effects of using classroom activities before and after a residential EE experience to
improve students’ attitudes toward the environment. It appears additional activities
conducted at the students’ school may be effective in causing students to consider their
relationship with the environment and in increasing positive attitudes toward it. The
conclusions of this study are tentative, however, and additional research is needed to
further investigate the use of pre- and post-trip activities related to residential EE.
EFFECTS OF PRE- AND POST-TRIP ACTIVITIES ASSOCIATED WITH A
RESIDENTIAL ENVIRONMENTAL EDUCATION EXPERIENCE
AT THE NEW JERSEY SCHOOL OF CONSERVATION
ON STUDENTS' ATTITUDES TOWARD THE ENVIRONMENT

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the Graduate Program of
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May 2005
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<tr>
<td>EE</td>
<td>Environmental Education</td>
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<tr>
<td>NJSOC</td>
<td>New Jersey School of Conservation</td>
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<td>ASE</td>
<td>Action Socialization Experience</td>
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<tr>
<td>CERI</td>
<td>Children's Environmental Response Inventory</td>
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<tr>
<td>JTMS</td>
<td>Jefferson Township Middle School</td>
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<tr>
<td>IRB</td>
<td>Institutional Review Board</td>
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<td>MSU</td>
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CHAPTER 1: INTRODUCTION

Need for study

Environmental education (EE) researchers have suggested programs may increase their effectiveness by combining in-class activities with field experiences (Bogner, 1998; Dettmann-Easler & Pease, 1999). In my review of published EE literature using the ERIC database for the years 1967-present, two studies were found that investigated the effectiveness of using preparatory or follow-up work in connection with a field learning experience. Gutierrez de White and Jacobson (1994) studied the effectiveness of a teacher training workshop in preparation for a zoo-based program, while Farmer and Wott (1995) measured the effectiveness of a follow-up session related to an arboretum program. No studies were found that investigated the use of in-class activities to reinforce learning related to a residential EE experience. My study was designed to measure the effectiveness of in-class pre- and post-trip activities related to a residential EE program in improving students' attitudes toward the environment.

Concern for natural resource conservation has existed for many years, but the field of EE as such has only become clearly defined since the 1960s. Concern for environmental effects of human actions increased following the publication of Rachel Carson's *Silent Spring* in 1962. The first national Earth Day was held in 1970. Following it, many educational resources were developed to help teachers help students understand environmental issues. Since that time, provisions of EE as a component of general education has increased. In 1998, for example, 18 states required EE to be provided as part of the school curriculum and 30 states had incorporated EE learning
objectives into their curriculum guidelines (Ruskey, Wilke & Beasley, 2001).

During the past 40 years, the EE research literature has grown as educators have sought the most effective methods for providing it. Published studies vary in their findings of the effects of various EE interventions, but most found some positive impact on participating students (Dresner & Gill, 1994; Gillett, Thomas, Skok, & McLaughlin, 1991; Jaus, 1982; Shepard & Speelman, 1986). Dettmann-Easler and Pease (1999) found that residential EE programs have stronger, more lasting effects on students than classroom-only instruction. Research also indicates that EE is most effective when it is provided as an integrated long-term curriculum (Ballantyne & Packer, 1996; Dettmann-Easler & Pease, 1999; Eagles & Demare, 1999). Evaluation of EE program types is essential to helping teachers and school administrators make informed decisions about how to best use their limited resources of time and money to provide EE to students (Dettmann-Easler & Pease, 1999). Evaluation of individual EE programs is vital to learning what benefits are derived from the use of resources and strategies in these programs, but this evaluative process is often overlooked (Fien, Scott, & Tilbury, 2001).

Bogner (1998) concluded that EE programs should provide "a combination of first-hand experience, participatory interaction, adequate preparation and subsequent reinforcement" (p. 28). Dettmann-Easler and Pease (1999) suggested that to further increase the impact of the residential EE experience, centers should supply pre- and post-visit classroom activities in order to reinforce concepts and become better integrated into a school's education program.

The New Jersey School of Conservation (NJSOC) provides residential EE programming for students predominantly in 5th to 8th grades. Prior to this study, only one
other research study (Semrau, 2003) had investigated the effectiveness of the NJSOC program. She found that though a select group of NJSOC lessons had no statistically significant effect on student attitudes, they did result in increased self-reporting of environmentally responsible behaviors. She also concluded that the cognitive objectives of the NJSOC lessons were not being met. My study focused on students’ attitudes toward the environment and how those attitudes were affected by participation in additional classroom activities related to selected NJSOC lessons.

Problem

It has been suggested that classroom activities designed to reinforce concepts from field learning may increase student retention of key objectives (Bogner, 1998; Dettmann-Easler & Pease, 1999; Gemake, 2001; Orion, 1993; Rudmann, 1984). Though teachers may conduct related classroom activities before and after environmental field experiences, I found only two reports of the effects of these activities in the EE literature (Farmer & Wott, 1995; Gutierrez de White & Jacobson, 1994).

One goal of the program at the NJSOC is to encourage students to develop positive attitudes, beliefs, and values related to the environment and environmental issues. At the time of this study, schools participating in the programs offered at the NJSOC were provided no formal suggestions for extending this component of the NJSOC experience to the classroom. My study investigated the effects of adding pre- and post-trip activities on students’ attitudes toward the environment.

The activities used in this study were designed to use strategies shown in education literature and practice to be effective in promoting student learning and
retention of concepts. The pre-trip activity I provided was designed to activate students' prior knowledge about the type of experience they might have at the NJSOC. The activity was intended to focus students' thinking on what they might expect from the trip and in turn enhance the thinking and learning they would experience during the NJSOC program. The post-trip activity I provided was designed to prompt students to think metacognitively about their ideas and attitudes about the environment. The school participating in the study does include EE in its 7th grade science curriculum. Additionally, all 7th grade teachers from the school make an attempt to infuse the NJSOC experience into their classroom activities. The scope of this study was only to measure the immediate effects of the NJSOC program and the additional pre- and post-trip activities developed for this study.

Research Questions

This project was designed to explore and describe the change in students' attitudes toward the environment as a result of their participation in a residential EE program and related pre- and post-trip activities. The research questions were:

1. What effect does participation in the residential EE program at the NJSOC have on students' attitudes toward the environment?

2. What effect, if any, does adding a pre-trip activity have on the ability of the NJSOC program to improve students' attitudes toward the environment?

3. What effect, if any, does adding a post-trip activity have on the ability of the NJSOC program to improve students' attitudes toward the environment?
4. What effect, if any, does adding a pre-trip and a post-trip activity have on the ability of the NJSOC program to improve students' attitudes toward the environment?

Operational definitions

Residential environmental education program: a 3 day, 2 night stay at the university-operated NJSOC in northwest New Jersey. For this study, all students participated in seven sessions including: Action Socialization Experiences (ASE's); Sensory Awareness in Nature; Eco-Discovery; Web of Life; Climbing Wall or Confidence Course; one natural science session (Black Bear Ecology, Ornithology, or Stream Geo-Ecology); and one additional session (Archery, Art in Nature, Early American Woodworking, Orienteering, Stonewall Study, or Survival).

Attitudes toward the environment: scores on the Environmental Adaptation, Environmental Trust, and Pastoralism subscales of the Children's Environmental Response Inventory.
The New Jersey School of Conservation

The New Jersey School of Conservation (NJSOC) is the environmental education field campus of Montclair State University. It is one of the oldest university-operated EE centers in the United States. The 96-hectare campus of the NJSOC is surrounded by the 6,400-hectare Stokes State Forest in Sussex County, New Jersey. Annually, nearly 9,000 students and 1,000 teachers from almost 100 schools participate in the residential EE program. The sessions offered include topics in the environmental sciences, humanities, outdoor pursuits, and social sciences.

The mission of the NJSOC is to "develop in its program participant's knowledge of how Earth systems operate and how human actions affect these systems. It is intended that this knowledge will cultivate the prolonged performance of environmentally responsible behaviors and the development of self-confidence to support the development of attitudes, beliefs, and values that will aid individuals and groups alike in the resolution of current environmental problems, the avoidance of future environmental problems, and the quest for sustainable development." (Montclair State University, n.d. [a])

Environmental Education

The first formal definition of environmental education, proposed by Stapp, his colleagues, and students, stated "Environmental Education is aimed at producing a citizenry that is knowledgeable concerning the bio-physical environment and its problems, aware of how to help solve these problems, and motivated to work toward their
solution" (Stapp, et al., 1969, p. 30). Since the publication of this definition, discussions and research in EE have produced more complex and in-depth descriptions of EE, but the basic concepts have remained.

In 1975, the United Nations Educational, Scientific and Cultural Organisation (UNESCO) and the United Nations Environment Programme (UNEP) conduct the first international EE conference in Belgrade, Yugoslavia. A major outcome of the conference was the Belgrade Charter, which established the goal of EE as to “develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones” (UNESCO/UNEP, 1976, p.3).

In 1977, a revised EE statement, the Tbilisi Declaration, was approved by governmental representatives at a conference held in Tbilisi, Georgia, USSR. The Tbilisi Declaration outlined five categories of objectives for environmental education: 1) Awareness of the environment and environmental challenges, 2) Knowledge of the environment and environmental challenges, 3) Attitudes of concern for the environment and motivation to improve environmental quality, 4) Skills to identify and resolve environmental challenges, and 5) Participation in activities leading to the resolution of environmental challenges (UNESCO/UNEP, 1978).

Hungerford, Peyton, and Wilke (1980) described four goal levels of EE. They suggested that EE should: 1) address ecological concepts and provide knowledge to make ecologically appropriate environmental decisions; 2) promote conceptual awareness by developing an awareness of how individual and collective behaviors influence the quality
of life and the quality of the environment; 3) include issue investigation and evaluation by developing the knowledge and skills to investigate solutions for remediating environmental issues; and 4) include environmental action skills which develop skills for taking positive actions to help resolve environmental issues. All four levels of this model are required for citizens to adopt and appropriately perform environmentally responsible actions.

Sobel (1996) suggested that EE programs should be tailored to students’ developmental levels. He suggested three levels of EE be presented to students at the appropriate ages. In early childhood, ages 4 to 7, EE should focus on developing a sense of empathy between the child and nature. This connectedness becomes the framework for more abstract ecological concepts. During the elementary years, ages 8 to 11, EE should focus on exploration beginning with the backyard and expanding to the community, region, and beyond. Activities that capitalize on students’ interest in exploring are most appropriate at this time. These include following streams, gardening, caring for animals, and exploring outdoor areas. By early adolescence, ages 12 to 15, students are prepared for learning about social action related to environmental issues. Activities appropriate at this level include leading a school recycling program, attending local hearings, and planning and attending school expeditions. Sobel emphasized that many EE programs introduce students to environmental issues too early. He recommended that students be given ample opportunity to become comfortable with their local environment and develop a connectedness with it before being burdened with environmental issues.
In an effort to provide high quality EE, educators have developed many types of programs including in-class programs, outdoor classrooms on school grounds, day trips to nature centers, and residential programs involving overnight stays. Given the variety of options and the decreasing availability of funds for such programs, evaluation of these options is required for school teachers and administrators to make informed decisions about how their time and money would best be spent (Dettmann-Easler & Pease, 1999).

*Best Practices for Environmental Education*

Education research documents the effectiveness of using activities before and after a learning experience to help improve students' learning (e.g., Flavell, 1979; Marzano, Gaddy, & Dean, 2000). One of these strategies is commonly referred to in the literature as activating prior knowledge. The practice of activating students' prior knowledge is used to get students thinking in advance of the actual learning experience, about what they already know, and what they might expect to learn. Cues (hints about what students are about to experience), questions about prior knowledge, and advance organizers (frameworks that allow students to see the organization of the learning to come) are three ways teachers can effectively activate students' prior knowledge to increase learning (Marzano, et al., 2000). These techniques have been shown in multiple research studies to be effective strategies for improving learning in reading education (Campbell, 2003; Dole, Valencia, Greer, & Wardrop, 1991; Heffernan, 2003), in science education (Guzzetti, Snyder & Glass, 1993; Wise & Okey, 1983), and in general education (Marzano, et al., 2000; Redfield & Rousseau, 1981; Ross, 1988; Stone, 1983).
Another strategy used in education to help reinforce learning is metacognition. First defined by Flavell (1979), metacognition involves engaging students in thinking about their own thinking. This thinking may be related to a student’s cognitive, affective, perceptual, or motor characteristics. Many research studies have shown that encouraging students to think about their learning is an effective strategy for increasing student learning and recall of important concepts (Bonds & Bonds, 1992; Campbell, 2003; Carriedo & Alonso-Tapia, 1995; Haller, 1988; Hasselhorn, 1986; Underwood, 1997). Other studies demonstrate the effectiveness of having students explain their thinking in promoting understanding and retention of concepts (Chi, de Leeuw, Chiu, & LaVancher, 1994; Cote, Goldman, & Saul, 1998; Wong, Lawson, & Keeves, 2002).

EE researchers have also offered recommendations for maximizing effectiveness of programming (e.g., Ballantyne & Packer, 1996; Dettmann-Easler & Pease, 1999; Knapp & Poff, 2001). Active involvement in lessons, for example, has been shown to increase student retention of information and change attitudes (Knapp & Poff, 2001; Zelezny, 1999). Hewitt (1997) found that students actively involved in games related to environmental concepts showed more increase in reported environmentally responsible behaviors than students involved in class discussions. When information about environmental concepts was imbedded in the design of games and other experiential activities, students were better able to recall facts in follow-up interviews (Knapp & Poff, 2001).

For EE to be most effective, a range of teaching strategies addressing knowledge, attitudes, and behavior must be part of an integrated, long term program (Ballantyne & Packer, 1996; Hungerford & Volk, 2003). Critical thinking activities and training
included in EE programming results in increased complexity of thinking related to environmental issues and may make students better able to make knowledgeable judgments about environmental actions (Bright & Tarrant, 2002).

Constructivist teaching methods, designed to move students from basic knowledge acquisition to analysis and critical thinking about a subject, are more successful than traditional methods in helping students develop a comprehensive understanding of material presented in an environmental science class (Lord, 1999). Ballantyne and Packer (1996) applied constructivist methods in an EE setting and found similar results. They asserted that the constructivist approach is more successful in creating environmentally responsible citizens because it addresses environmental knowledge, attitudes, and behaviors in an integrated manner.

Including opportunities to discuss possible actions is also a factor in determining future actions of EE participants. Hanna (1995) found an increase in reported behavior change in groups that spent time discussing future intentions and examining strategies for reaching these goals. Other groups expressed interest in changing behaviors, but demonstrated little follow through on these plans.

Research indicates that the most effective EE programs are those which are integrated into a long-term and ongoing curriculum (Ballantyne & Packer, 1996; Eagles & Demare, 1999). In their study of residential EE programs, Dettmann-Easler and Pease (1999) found that most schools studied did not have clearly defined objectives and goals for their programs nor for the sessions they selected. In fact, in some cases their program activities were selected based on teacher or student preferences. Additionally, they found little use of a thematic approach that could have clarified the concepts for students. In
spite of these shortcomings, the residential programs produced measurable increases in pro-environment attitudes for up to three months following the experience. They concluded that the effectiveness of residential EE programs could be maximized by working with school staff to integrate the classroom and residential experiences more closely by providing a selection of pre-, during-, and post-visit activities that would enhance the school's specific objectives.

Though research suggests that EE programs should be integrated with classroom instruction and that pre- and post-trip activities could help with this integration, only two studies were found that test this supposition. Farmer and Wott (1995) studied 4th graders who visited an arboretum as part of their science study on plants. Students who participated in a related follow-up activity two weeks after the trip were compared to students who participated in an unrelated follow-up. Students who received the related follow-up activity scored higher on a post-test given immediately following the session. Their conclusions suggested that follow-up sessions related to field experiences can be valuable in cognitive retention. Gutierrez de White and Jacobson (1994) found that only students whose teachers had attended a specially designed teacher training workshop prior to their participation in a zoo-based conservation program showed a statistically significant change in knowledge and attitudes following their zoo visit. Neither the alternative treatment groups (who attended the zoo trip with and without an additional audiovisual slide show) nor the control group (who did not attend the zoo) showed any significant changes in attitudes or knowledge. The investigators concluded that the systematic preparation of teachers in the three month workshop was the most effective educational approach.
In summary, research in EE indicates that the most effective programs address knowledge, attitudes, and behavior. This is best done in an integrated fashion that actively engages students. In addition to incorporating opportunities for students to acquire action skills and strategies, programs should include a component that facilitates discussion of implementation strategies. Ideally, schools should develop and employ a long-term and integrated plan for EE. While a residential EE experience may be only one component of a school's EE plan, the education merits of it may be increased by a collaborative effort of the school staff and the EE center staff to design pre- and post-visit activities that will help link the students' residential experiences to their classroom learning.

**Attitudes**

Attitudes are defined as psychological tendencies that are expressed through evaluative responses to some object with some degree of favor or disfavor (Eagly & Chaiken, 1993; Fishbein & Ajzen, 1972; Zanna & Remple, 1988). The evaluative response, whether covert or overt, produces a tendency to respond with some degree of evaluation in subsequent encounters with the attitude object (Eagly & Chaiken, 1993). Attitudes are not directly observable, but the evaluative responses they generate can be observed (Eagly & Chaiken, 1993; Zanna & Remple, 1988).

Attitude responses are commonly described as having three components: cognitive, affective, and behavioral (Breckler, 1984; Eagly & Chaiken, 1993; Rosenberg & Hovland, 1960). Cognitive attitude responses consist of thoughts and ideas about the object including beliefs linking the object to attributes. Affective attitude responses are
feelings, moods, or emotions related to the object and span from extremely positive to extremely negative. Behavioral attitude responses, also referred to as conative attitudes, consist of overt actions as well as the expressed intention to act even if no actual behavior results. These three attitude responses are sometimes referred to as the three \textit{components} of attitudes, but attitude research has failed to empirically distinguish attitudes into these three classes (Breckler, 1984; Eagly & Chaiken, 1993; Rosenberg & Hovland, 1960). Researchers caution, therefore, against using the three-component terminology in reference to attitudes (Breckler, 1984; Eagly & Chaiken, 1993; Fishbein & Ajzen, 1972; Zanna & Remple, 1988).

As with attitude responses, the antecedents of attitudes may be divided into three classes: cognitive processes, affective processes, and behavioral processes (Eagly & Chaiken, 1993). Cognitive learning, either through direct or indirect exposure to the attitude object, provides information and a basis for beliefs about the attitude object. The extent to which the information is accepted influences the strength of beliefs. Affective experiences change attitudes by the classical conditioning method creating associations between the attitude object and a stimulus that elicits an affective response. After repeated associations, the attitude object alone comes to elicit the affective response. Thus, an attitude is formed. Attitudes are also influenced by past behaviors. People tend to infer attitudes based on their past behaviors, taking into account conditions under which the behaviors occurred. People are more likely to form attitudes based on past behaviors if, for example, they do not feel that external forces compelled them to act. Attitudes may be formed by any of these three types of influences, but all three are not necessary to create or change attitudes.
Attitudes are also defined as tendencies, meaning that they are inner states that persist for at least a short time, but many endure for a long time (Eagly & Chaiken, 1993). Strong attitudes tend to be more stable over time than weaker ones (Holland, Verplanken & Van Knippenberg, 2002). Attitudes that are unimportant to those who hold them are also generally shorter lived and more malleable than attitudes that are more important (Eagly & Chaiken, 1993).

Several studies have specifically investigated factors that are most influential on adolescent attitudes (Handley & Morse, 1984; Hill, 1995; Lazarowitz & Huppert, 1984; Talton & Simpson, 1985). Weiler (1971) found that significant factors in adolescent attitude development were not found in the formal curriculum, but in students’ peer influences and social interactions within the school setting as well as in the larger, general social context (family, television, media, etc.) This finding was supported by those reported by Talton and Simpson (1985) who found that from 6th to 8th grades individual attitudes are increasingly influenced by peer attitudes, with the peak of influence in 9th grade. Handley and Morse (1984) also found increasing associations of attitudes toward science with students’ self-concepts as they mature through 7th and 8th grades.

Some researchers have investigated the influence of specially designed programs on adolescents’ attitudes toward science. Hill (1995) found that 7th grade students’ attitudes toward science changed from neutral to positive after a semester-long program designed to improve attitudes toward science. Lazarowitz and Huppert (1984) found, however, that students’ attitudes toward science were not changed as a result of participation in an experimental biology instruction program. Together, these studies
suggest that attitudes of adolescents are highly influenced by social factors and are not easily changed by traditional teaching methods.

*Attitude Change and Environmental Education*

The ultimate goal of EE is the development of environmentally responsible citizens. The current curricular and instructional methods in place have not, however, been successful in achieving it (Hines, Hungerford, & Tomera, 1986/87; Pooley & O’Connor, 2000). In many instances, EE efforts have focused primarily on increasing students’ knowledge about the environment as a vehicle to increase their level of environmentally responsible behaviors. Pooley and O’Connor (2000) suggested, however, that affect be research more extensively. Kraus (1995) indicated that attitudes are one of the most important factors in determining behaviors. Iozzi (1989) suggested that the affective domain is the key entry point to developing environmentally responsible behaviors. Pooley and O’Connor (2000) also indicated that attitudes may be based on both beliefs (knowledge) and feelings (affect). Their findings support that of Ulrich (1983) who stated that affect is important in influencing peoples’ interactions with the environment.

Iozzi (1989) noted that much of the research that does focus on attitudes is simply descriptive. He further charged that few studies have investigated the effectiveness of interventions in improving attitudes, and those that have are weak due to poor design and use of invalid or unreliable instruments.

Researchers have found that student attitudes toward the environment flux throughout youth to early teen years after which they solidify (Eagles & Demare, 1999). Eagles and Demare (1999) found EE programs presented to high school students had less
impact on attitudes than those presented to younger participants. They also asserted that a single EE experience alone cannot change student attitudes toward the environment. Key influences on attitudes are long term and continuous. These include family discussions, media influence, and reading material. Since these attitudes are shaped over time, EE programs should “concentrate on building factual and cognitive structures upon the extant environmentally positive attitudes of the children” (Eagles & Demare, 1999, p. 37). Dettmann-Easler and Pease (1999) also suggested the best combination of approaches in EE is outdoor experiences with in-class reinforcement.

Jaus (1982) evaluated the sustained change in attitudes of 3rd graders after five sessions of classroom instruction and discussion about environmental issues. All students had slightly positive attitudes toward the environment in the pre-tests, but the treatment group showed significantly more positive attitudes after instruction. The groups were tested again after two years and the treatment group still showed positive attitudes.

Dettmann-Easler and Pease (1999) evaluated six different residential EE programs and compared these to a control group which received an in-class program on wildlife. They found the residential programs were more effective in improving student attitudes toward wildlife than the in-class program and that these results were sustained for at least three months following participation in the program.

Other studies looked at camp experiences and found mixed effects on attitudes. Three studies found no significant change in attitudes of participants (Eagles & Demare, 1999; Gillett, et al., 1991; Shepard & Speelman, 1986). Dresner and Gill (1994) found, however, a significant change in attitude among the 10-13 year old students at a 2-week nature camp. This apparent contradiction to previous findings may be explained by their
observation that children with previous similar experiences showed less change in attitudes and reported environmentally responsible behaviors. This finding supports the assertion by Eagles and Demare (1999) that attitudes toward the environment may be subject to a ceiling effect.

One problem with interpreting the results of studies attempting to measure attitudes is that many do not use instruments with established reliability and validity of the data (Iozzi, 1989; Smith-Sebasto, 2001b). Many researchers have used instruments developed for the particular study and have not indicated how or if reliability or validity of the data were established (e.g., Bogner, 1998; Dettmann-Easler & Pease, 1999; Dresner & Gill, 1994; Eagles & Demare, 1999). A number of instruments, however, exist that are designed to measure attitudes of children.

**Instruments Measuring Attitudes Toward the Environment**

The Children’s Attitudes Toward the Environment Scale (CATES) was developed by Musser and Malkus (1994) as a general measure of childrens’ attitudes toward the environment. The CATES was designed for use with students 8-12 years old. It consists of 25 four-point Likert-type items where students indicate how strongly they identify with a given statement. This format was modeled after the Perceived Competence Scale for Children (Harter, 1982). No subscales were indicated by the authors, but they did indicate that there are 8 belief statements, 9 attitude statements, and 8 behavior statements. These statements relate to recycling, conservation, animal rights, nature appreciation, and pollution. Musser and Malkus (1994) reported the test-retest reliability of the CATES as .68, p < .0001. Their reported internal-consistency reliability results for
three samples were .70, .80, and .85.

Validity of the CATES was not directly discussed by the authors, but some degree of content-related validity may be inferred. The authors used equal numbers of belief, attitude, and behavior statements, which were chosen based on the theory that attitudes have three components: beliefs, affect, and intended behaviors. Also, the authors used a field tested word bank to ensure that students would understand the statements.

The Children’s Environmental Attitude and Knowledge Scale (CHEAKS) was developed by Leeming, Dwyer, and Bracken (1995) to assess the attitudes and knowledge of children related to the environment. The CHEAKS was modeled after a scale designed for adults by Maloney, Ward, and Braught (1975). Designed for students in 1st to 7th grades, the CHEAKS has two subscales: attitude and knowledge. The attitude scale consists of 36 true-false items; 12 measure verbal commitment, 12 measure actual commitment, and 12 measure affect. The knowledge scale includes 30 multiple choice items, five from each of six content domains: animals, energy, water, recycling, pollution, and general.

The test-retest correlations for the CHEAKS for all age groups exceed .56, with the majority in the .60 to .70 range. The Cronbach's alpha coefficients for the total CHEAKS scale were .88 and .90 in two administrations indicating high internal consistency reliability. Several types of validity were established. The questions were designed to fit into the six domains mentioned above and were evaluated by experts in the field, thus establishing content-related validity. Correlations between the knowledge and attitude scales were low, indicating the two scales measure independent constructs. Factor analysis indicated that the attitude and knowledge scales each measure a single
global factor. Also, the findings of the CHEAKS closely matched teacher judgments of students’ interest and knowledge related to environmental issues.

The Millward-Ginter Outdoor Attitude Inventory (MGOAI) was developed for a study with 6th grade students to measure attitudes related to a residential outdoor setting (Millward, 1973). It consists of 43 Likert-type items and has two forms. The MGOAI has 4 subscales: environment, education, pollution, and socialization. Both forms have test-retest reliability coefficients above .80 and the internal consistency was reported as significant for both forms. The MGOAI was piloted three times during its development resulting in the revision of several statements. No further direct discussion of validity was offered.

The Children’s Environmental Response Inventory (CERI) was developed by Bunting and Cousins (1983, 1985) as an instrument for measuring environmental disposition in children ages 9 and older. The CERI includes a total of 185 items in eight subscales and a ninth communality scale. The items are scored on a five-point Likert-type scale ranging from disagree very much to agree very much. This format was based on the Environmental Response Inventory (ERI), an instrument designed for administration to adults developed by McKechnie (1974). Administration of the CERI requires a maximum of 45 minutes for the youngest students. Subscale scores for the CERI are calculated by adding the points for the positively scored items, subtracting the total of the negatively scored items, and adding a constant equal to six times the number of negatively scored items in order to prevent a negative total subscale score. The subscale scores are not designed to be summated to a composite score (Bunting & Cousins, 1983).
The CERI includes the same eight subscales as the ERI, each focused on an identified domain of environmental personality: Antiquarianism, Environmental Adaptation, Environmental Trust, Mechanical Orientation, Need Privacy, Pastoralism, Stimulus Seeking, and Urbanism.

The Antiquarianism subscale measures “emotional responsiveness to the historical past and to old-fashioned or traditional environmental design” (Taylor & Konrad, 1980, as cited in Bunting & Cousins, 1985, p. 733). The Environmental Adaptation subscale measures level of concern about the human influence on the environment and “a belief in the right of humans to use technology to adapt and dominate nature” (Bunting & Cousins, 1985, p. 732). The Environmental Trust subscale measures “a sense of confidence and trust in all types of environments, both human-made and natural” (Bunting & Cousins, 1985, p. 733). The Mechanical Orientation subscale measures “an attraction to mechanized structures and the enjoyment of manual activity” (Bunting & Cousins, 1985, p. 734). The Need Privacy subscale measures a “positive appreciation of solitude and the need to be free from distraction from the external environment” (Bunting & Cousins, 1985, p. 733). The Pastoralism subscale measures “positive responsiveness to natural environments, outdoors, and open spaces” (Bunting & Cousins, 1985, p. 731). The Stimulus Seeking subscale measures “an affinity for increased activation via stimulation from the environment and an attraction to unusual and adventurous environmental settings” (Bunting & Cousins, 1985, p. 732). The Urbanism subscale measures “attraction to the human-made environment and to the complexity and diversity of city living” (Bunting & Cousins, 1985, p. 731). A final
subscale, *Communality*, "acts as an overall check against inattentive or inappropriate test-taking behavior" (Bunting & Cousins, 1985, p. 734).

Teachers of students completing the CERI were asked to rank their students on each of the eight CERI subscales as described in brief paragraphs. Convergent validity of the CERI was confirmed by the significant correlations of teacher ratings to actual student scores on the CERI (Bunting and Cousins, 1983). Convergent validity was also established by correlations between subscale scores of 10th grade students who took both the ERI and CERI. The Pearson Product-Moment Correlation Coefficients ranged from .37 to .85 with a median of .79; all were significantly related at p < .05, indicating that the CERI subscales measure the same constructs as the ERI subscales. Bunting and Cousins (1985) asserted that these statistics show that the two instruments were measuring the same domains and that the strong validation of the ERI may be generalizable to the CERI to some extent. Convergent validity was further shown through associations between scale scores and behaviors. High scores on the Pastoralism subscale, for example, were significantly correlated with activities such as taking care of pets and interest in animal and nature related books and television. Discriminant validity was established by differences in scale scores among gender, sex, and place of residence (rural vs. urban). Scores on Environmental Trust, for example, increased with age and differed by gender.

Bunting and Cousins (1985) reported reliability data for the CERI subscales. The Cronbach’s alpha for the subscales range from .78 to .91 indicating very strong (Davis, 1971) levels of homogeneity among items of the same subscale. The median item-to-scale correlations range from .37 to .56 indicating the responses to items correlate moderately to substantially (Davis, 1971) to scores on the subscales. The Spearman-
Brown split-half coefficients range from .87 to .94 indicating very strong (Davis, 1971) test-retest reliability.

Several published studies have employed the CERI both as an intact instrument and by modifying it. Bunting and Cousins (1983, 1985) used the CERI to find correlations between childrens' environmental dispositions and their interests and hobbies. They also found differences in scores related to age, gender, and place of residence. Feigin (2001) used the full CERI to measure the relationship between students' environmental dispositions and participation in a school ground naturalization program. Salmivalli (1998) administered the full CERI along with the Directing Traits Test (DTT) and found correlations between the instruments on two subscales: Stimulus Seeking (CERI) and Love of Adventure (DTT); and Environmental Trust (CERI) and Need for Security (DTT). As a part of her study, she confirmed the reliability of the CERI subscales finding a range of alpha values from .67 to .89.

Salmivalli also developed a shortened version of the CERI that consisted of only 81 items. She reported high correlations between the original CERI scores and the shortened CERI scores. In another study, Miller (2001) reported using items from the CERI along with other items covering content material and extracurricular activities to create an instrument. Careful review of this instrument revealed little evidence that the questions were taken directly from the CERI. This concern along with other problems with the experimental design makes interpretation of his findings difficult.

Two researchers used selected subscales of the CERI in order to target their particular areas of interest. Orren (2003) used the Environmental Adaptation, Environmental Trust, and Communality subscales with the Tennessee Self-Concept
Survey to investigate a variety of outdoor programs ranging from day programs to overnight trips. Though no significant differences in scores were found for the treatment group, differences were found based on ethnicity. Zimmerman (1996) used the Environmental Adaptation, Pastoralism, and Urbanism subscales to create a short form with 31 items. This shortened version was created for use in subsequent studies involving parent/child investigations. Clearly, a precedent for using subscales of the CERI has been set in the published literature.
CHAPTER 3: METHODS

Research Design

This quasi-experimental research employed a Pre-test Post-test Control Group Design (Campbell & Stanley, 1963). Every attempt was made to conform to the guidelines for conducting quantitative EE research as outlined by Smith-Sebasto (2001a).

Subjects

Each year, nearly 9,000 students and 1,000 teachers from almost 100 schools participate in the residential EE program at the NJSOC. The students who were scheduled to attend the NJSOC in the 2004-05 academic year were from both public (92%) and private (8%) schools, and from urban (18%), suburban (81%), and rural (1%) areas.

It was not feasible to randomly select students to attend the NJSOC, so an intact school group was used. The student group in this study was the 2004-2005 7th grade class at Jefferson Township Middle School (JTMS). In October of each year, all 7th graders at JTMS attend the NJSOC for three days and two nights.

The treatment groups were intact classes within the 7th grade. Students are not randomly assigned to classes at JTMS. Instead, intact classes were randomly assigned to treatment conditions.

Of the 277 students that attended the NJSOC, five students were excluded from this study due to lack of signed consent forms. Further, the responses from 32 students were excluded because they did not complete both the pre-test and post-test. The
responses from 71 more students were also excluded for either leaving answers blank or giving two answers for the same item. As a result, the responses from 169 students comprised the data sample.

Instrument

While there are several measures of childrens’ attitudes toward the environment (Bunting & Cousins, 1985; Leeming, Dwyer & Bracken, 1995; Millward, 1973; Musser & Malkus, 1994), I chose the CERI for the following reasons. First, the CERI is age appropriate for the students I worked with in this study. Second, it has established reliability and validity of the data for the subscales as reported by Bunting and Cousins (1983, 1985) and confirmed by Salmivalli (1998). Third, the CERI includes subscales that specifically target the attitude components that may be influenced by the NJSOC program. I used three CERI subscales: Environmental Adaptation, Environmental Trust, and Pastoralism. These CERI subscales were selected over others in order to most closely match the study design and the attitude components of interest: attraction to nature, human relationships with nature, and comfort level with being in different environments.

All of the CERI subscales consist of 5-point Likert-type items with the following response options: disagree very much, disagree, don’t know/don’t care, agree, and agree very much. The Environmental Adaptation subscale consists of 22 5-point Likert-type items related to human relationships with nature. Sample items are: “People’s activities don’t really hurt nature,” and “People have the right to change nature whenever they need to.” A low score on this subscale indicates a fundamental respect for the environment.
Low scores on this subscale were considered indicators of positive attitudes toward the environment.

The Environmental Trust subscale consists of 20 5-point Likert-type items related to trust in all types of environments. Sample items are: “Blizzards are frightening,” and “I don’t feel really safe in places where I have never been before.” High scores on this subscale indicate a general comfort and trust in all types of environments, both human-made and non-human made. High scores on this subscale were considered indicators of positive attitudes toward the environment.

The Pastoralism subscale consists of 22 5-point Likert-type items related to childrens’ attraction to non human-dominated environments. Sample items are: “I enjoy watching the sky on summer nights,” and “I feel good when I am close to nature.” A high score on the Pastoralism subscale indicates a high affinity for non-human dominated areas and the outdoors in general. High scores on this subscale were considered indicators of positive attitudes toward the environment.

The items for these three subscales were placed in random order and formatted as a questionnaire (Appendix A). Some items were revised slightly in order to remove gender biased language. Other than these changes, the items were not changed in any way from the original CERI.

**Treatment**

The pre- and post-trip activities were designed to complement the experiences offered at the NJSOC by having students consider their role in the environment. These activities were adapted from those developed by Cohen (1996). His activities are
designed to help participants consider their relationship with nature and encourage them to enhance their connectedness with it. The modified activities were designed to take no more than 45 minutes, which allowed them to be conducted within one regular class period. I piloted the activities in the spring 2004 semester with four classes of 7th grade students at JTMS. The pilot included conducting the activity with students and then collecting their feedback on it. Piloting of the activities allowed an opportunity for adjustments prior to using the activities with the treatment groups.

The activity used for the pre-trip activity was modified from Cohen’s Activity 8: Separation from Nature. In this activity (Appendix B), students were asked to consider how their preset expectations can cloud their understanding of situations. This activity was selected because it is designed to activate students’ prior knowledge and expectations of spending time in the outdoors in nonhuman-dominated areas. The activity used for the post-trip activity was based on Cohen’s Activity 6: Learning from Sensory Nature Connecting. In this activity (Appendix C), students considered their experiences and learning at the NJSOC and expressed how it has changed their beliefs and feelings about the environment. This activity was selected because it encourages metacognition and reflection on the students’ experience and feelings related to the environment.

Procedure

Students at JTMS belong to one of three academic groups on their campus: gold, white, or blue. Due to occupancy limitations at the NJSOC, each of these three groups attended at separate times.

Each color group consisted of four levels of the treatment: 1) participation in the
NJSOC program with no additional activities; 2) pre-trip activity one school day before participation in the NJSOC program; 3) participation in the NJSOC program and post-trip activity on the first school day after the trip; and 4) pre-trip activity one day before participation in the NJSOC program and post-trip activity on the first school day after the trip (Table 1).

Table 1. Treatment Group Interventions

<table>
<thead>
<tr>
<th>Treatment group</th>
<th>Pre-test CERI subscales</th>
<th>Pre-trip activity</th>
<th>NJSOC trip</th>
<th>Post-trip activity</th>
<th>Post-test CERI subscales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment group A</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Treatment group B</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Treatment group C</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Treatment group D</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

All students participated in seven sessions including: Action Socialization Experiences (ASEs); Sensory Awareness in Nature; Eco-Discovery; Web of Life; Climbing Wall or Confidence Course; one natural science session (Black Bear Ecology, Ornithology, or Stream Geo-Ecology); and one additional session (Archery, Art in Nature, Early American Woodworking, Orienteering, Stonewall Study, or Survival).

Lesson plans for these sessions are in Appendix D.

ASEs are “designed to encourage small groups of students to cooperatively decide on a solution to a carefully designed problem and then carry out their plan of action as quickly and efficiently as possible.... As a result, [they] realize that through communication and cooperation they are able to solve numerous challenges.” (Montclair State University, n.d.[b], Outdoor Pursuits section, para. 1)
Sensory Awareness in Nature guides students to “explore the use of their senses in developing and enhancing their abilities to observe, appreciate and interpret the natural environments on the NJSOC campus.” (Montclair State University, n.d.[b], Humanities section, para. 3)

Eco-Discovery helps students become acquainted with the NJSOC facility by interpreting symbols from the campus map. This scavenger hunt style activity provides students an opportunity to become more comfortable in their new setting. (Montclair State University, n.d.[b] Outdoor Pursuits section, para. 7)

Web of Life is “an exciting game of predator and prey. Students simulate how the food pyramid operates in nature. As herbivores, omnivores, and carnivores, they scavenge the NJSOC campus in search of their basic needs while avoiding predators, humans, pesticides, etc. In addition to learning about the structure of survival and bioaccumulation, students learn that 1) everything is connected; 2) everything goes somewhere; 3) nature knows best; and 4) there is no such thing as a free lunch; what Barry Commoner called the Four Laws of Ecology.” (Montclair State University, n.d.[b], Environmental Sciences section, para. 15)

Both the Climbing Wall and Confidence Course sessions are designed to offer physical challenges and develop students’ personal self-confidence. The former provides students an opportunity to climb a constructed wall with hand and foot holds. A belay rope and harnesses are used to minimize risk to the climber. The later is a low ropes challenge course designed to build trust within the group and self-confidence in individual students. (Montclair State University, n.d.[b], Outdoor Pursuits section, paras. 4 & 5)
The natural science courses at the NJSOC are designed to give students an opportunity to explore a given habitat or organism. Each student participated in one of the following natural science sessions while at the NJSOC: Black Bear Ecology, Ornithology, or Stream Geo-Ecology.

Two school days prior to each trip, a designated teacher at JTMS administered the CERI subscales to each of the four groups. Administration instructions are in Appendix E. The student booklet is in Appendix A. On the school day immediately prior to each trip, I went to JTMS to conduct the pre-trip activity with treatment groups B and D (Table 1). On the school day immediately following the trip, I returned to JTMS to conduct the post-trip activity with treatment groups C and D. On the following school day, the designated teacher at JTMS administered the CERI to each of the four groups. The testing and activities were scheduled as close in time as possible to the NJSOC trip in order to minimize interference by other factors on the treatment.

**Data-Analytic Methods**

The student responses were entered into Microsoft® Excel 2002 and the scores for the subscales were calculated using macros in Excel. The scores were then loaded into the Statistical Package for the Social Sciences (SPSS) version 12.0 for the analysis. The independent variable was the treatment that students received. The dependent variables were the three CERI subscale scores (Environmental Adaptation, Environmental Trust, and Pastoralism). For each of the four treatment levels, I looked for a change in score from the pre-test to the post-test on each of the three CERI subscales. The unit of analysis was the treatment group (cf. Leeming, Dwyer, Porter, &
Cobern, 1993, p. 18). Paired samples t-tests were used to measure whether changes in the subscale scores were statistically different from zero. An alpha level for statistical significance of 0.05 was established a priori.

**Ethical considerations**

This study was non-invasive and posed no physical harm to students. Approval through the Institutional Review Board (IRB) at Montclair State University (MSU) was applied for and granted in the spring of 2004. Students and their parents were informed of the study and participating students and their parents signed an informed consent page approved by the MSU IRB (Appendix F). Results of the study were made available to all interested parties. The potential for a difference in richness of the NJSOC experience did, however, exist since the control group received only the NJSOC experience while the treatment groups received additional related experiences. In order to compensate for this, the staff of JTMS was offered training on the activities so they could conduct them after the data collection for the study ended.

**Limitations**

Campbell and Stanley (1963) outlined several threats to validity that may have an effect on the results of experimental research. Each of the possible threats is outlined here in relation to this study.

Because students attended in three separate trips, the possible interference of history exists. For this reason, the teams were scheduled to attend as close in time as possible to minimize this effect. Additionally, one of the three teams had not started their
study of environmental science before the trip while the others had. This may or may not have produced an effect in the data.

Maturation effects were not a likely concern since the window of time during the study was only three weeks and students were all of the same grade level.

The interference of testing is a possible threat to validity. The post-test scores could have been influenced by exposing students to the measurement items in the pre-test.

Since the same instrument was used for both pre- and post-tests and the scoring was objective, instrumentation is not a threat to validity.

Since intact class groups were used, random assignment to levels of treatment was not possible. According to the staff at JTMS, the students are arbitrarily assigned to classes, so the possibility of differential selection does exist and must be considered. Students in each color group have the same teachers for their core courses and the school uses a common curriculum for all classes. These factors may help equalize the groups. Pre-test data were used to help detect initial differences in the students.

Since the pre- and post-testing and activities occurred during classes at the school, mortality in this study was expected to be minimal. Some students did not complete both the pre- and post-tests due to absence from class on the date of administration.

Diffusion of treatment effects was minimized by having the trips close in time and by having the treatment groups be intact classes. It is possible that students shared information with others in different treatment groups.

Finally, compensatory effects must be considered. It is possible that students became aware of the differential treatments received.
pre- and post-trip activities during their regular class rather than as an additional event, such as an assembly, this effect should be reduced. Additional activities at the school had minimal impact on the difference in pre- and post-test scores because the CERI was given within two days of the students’ trip to the NJSOC.
CHAPTER 4: RESULTS

This chapter will outline the results of the study including the analysis pertaining to the research questions. The student responses on the CERI subscales were transcribed into Excel and the scores were calculated using macros in Excel. The subscale scores for each student were then loaded into SPSS version 12.0 for analysis.

Data

In addition to using the collected data to answer my research questions, I used it to establish the reliability of the CERI subscales that I used in this study. The Cronbach's alpha, a measure of homogeneity among items in a scale, was calculated for the Environmental Adaptation (.46), Environmental Trust (.53), and Pastoralism (.73) subscales. The median item-to-total correlations were also calculated for the Environmental Adaptation (.14), Environmental Trust (.19), and Pastoralism (.38) subscales. In my study, the students did not all attend the NJSOC at the same time, and because of this, there was a possibility that differences in weather or other uncontrolled factors could have affected the students' scores on the CERI subscales. In order to look for differences between the groups that attended on different dates, I examined the between group differences of the three color groups. The means and standard deviations for these groups are shown in Table 2. The ANOVA results for between group differences are shown in Table 3. The p-values for between group differences are above 0.05 for all three CERI subscales indicating that the groups attending the NJSOC at different times did not have significantly different pre-test scores from one another.
Table 2. Pre-test Scores by Color Groups

<table>
<thead>
<tr>
<th>Color group</th>
<th>Environmental Adaptation</th>
<th>Environmental Trust</th>
<th>Pastoralism</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Gold</td>
<td>51.58</td>
<td>9.2</td>
<td>54.48</td>
</tr>
<tr>
<td>White</td>
<td>52.42</td>
<td>10.28</td>
<td>57.06</td>
</tr>
<tr>
<td>Blue</td>
<td>53.45</td>
<td>9.35</td>
<td>58.77</td>
</tr>
</tbody>
</table>

Table 3. ANOVA of Between Color Group Differences on Pre-test

<table>
<thead>
<tr>
<th>CERI subscale</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Adaptation</td>
<td>2</td>
<td>102.27</td>
<td>51.135</td>
<td>0.555</td>
<td>0.575</td>
</tr>
<tr>
<td>Total</td>
<td>166</td>
<td>15299.446</td>
<td>92.165</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Trust</td>
<td>2</td>
<td>532.654</td>
<td>266.327</td>
<td>1.704</td>
<td>0.185</td>
</tr>
<tr>
<td>Total</td>
<td>166</td>
<td>25939.346</td>
<td>156.261</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pastoralism</td>
<td>2</td>
<td>98.06</td>
<td>49.03</td>
<td>0.28</td>
<td>0.756</td>
</tr>
<tr>
<td>Total</td>
<td>166</td>
<td>29098.177</td>
<td>175.29</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In order to determine if uncontrolled factors may have differentially affected the groups that attended at different times, I looked at the post-test scores for the three color groups. The means and standard deviations of the post-tests are shown in Table 4. The ANOVA results for between group differences are shown in Table 5. The p-values for between group differences were not significant for the Environmental Adaptation or Pastoralism subscales. The between group difference was significant \( (F = 6.032, p = 0.003) \) for the Environmental Trust subscale. To better understand this difference, I looked at the pairwise comparisons. These showed that the only pair with a significant difference was the white and blue groups \( (t = 2.241, p = 0.002) \). This difference could be related to a number of factors. There may have been some difference in the type or
degree of preparation the students were given by their school teachers prior to the trip. This may have created a difference in the students’ comfort level in visiting a new place.

Also, the blue group attended the NJSOC during the last week of October and participated in pumpkin carving and a costumed dance party led by their school teachers. The other two teams did not have a pumpkin carving activity as part of their trip and the dance they attended was not a costume event. These factors may be related to the difference in the Environmental Trust post-test scores.

A difference in post-test scores was only found between two color teams and only on one subscale. For purposes of this study, this single difference was not considered important enough to warrant dividing the data by color teams for the purpose of analysis.

The data from the three color groups were, therefore, treated as equivalent and combined in the subsequent analyses. For all subsequent analysis reported, the unit of analysis is the treatment group.

Table 4. Post-test Scores by Color Groups

<table>
<thead>
<tr>
<th>Color group</th>
<th>Environmental Adaptation</th>
<th>Environmental Trust</th>
<th>Pastoralism</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Gold</td>
<td>49.96</td>
<td>11.30</td>
<td>52.85</td>
</tr>
<tr>
<td>White</td>
<td>52.21</td>
<td>10.62</td>
<td>57.58</td>
</tr>
<tr>
<td>Blue</td>
<td>54.03</td>
<td>11.23</td>
<td>60.62</td>
</tr>
</tbody>
</table>
Table 5. ANOVA of Between Color Group Differences on Post-test

<table>
<thead>
<tr>
<th>CERI subscale</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Adaptation</td>
<td>2</td>
<td>478.365</td>
<td>239.182</td>
<td>1.953</td>
<td>0.145</td>
</tr>
<tr>
<td>166</td>
<td>20334.535</td>
<td>122.497</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
<td>20812.899</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Trust</td>
<td>2</td>
<td>1749.947</td>
<td>874.973</td>
<td>6.032</td>
<td>0.003</td>
</tr>
<tr>
<td>166</td>
<td>24078.846</td>
<td>145.053</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
<td>25828.793</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pastoralism</td>
<td>2</td>
<td>410.179</td>
<td>205.089</td>
<td>0.884</td>
<td>0.415</td>
</tr>
<tr>
<td>166</td>
<td>38505.288</td>
<td>231.960</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
<td>38915.467</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Research Questions

This study was designed to answer several questions related to students’ attitudes toward the environment. Each of those questions is outlined here along with the results of statistical analysis used to answer them. In order to determine the change in attitudes toward the environment, I looked at the change in score on each of the subscales from the pre-test to the post-test. Also, paired samples t-tests were used to compare the means of the pre-test and post-test for each subscale. The t-test measures whether the average difference is statistically different from zero.

1. What effect does participation in the residential EE program at the NJSOC have on students’ attitudes toward the environment?

Because I used three subscales to measure students’ attitudes toward the environment, there are three hypotheses associated with this question.

\[ H_0 \text{ Environmental Adaptation: } \text{post-test} - \text{pre-test} = 0 \]
\[ H_a \text{ Environmental Adaptation: } \text{post-test} - \text{pre-test} < 0 \]

\[ H_0 \text{ Environmental Trust: } \text{post-test} - \text{pre-test} = 0 \]
\[ H_a \text{ Environmental Trust: } \text{post-test} - \text{pre-test} > 0 \]

\[ H_0 \text{ Pastoralism: } \text{post-test} - \text{pre-test} = 0 \]
\[ H_a \text{ Pastoralism: } \text{post-test} - \text{pre-test} > 0 \]
The null hypothesis for each subscale was that there would be no statistically significant change in score from the pre-test to the post-test. The alternative hypothesis was that there would be a change from the pre-test to the post-test. It was expected that if the Environmental Trust and Pastoralism scores changed, they would increase from the pre-test to the post-test. If the Environmental Adaptation score changed, it was expected that it would decrease from the pre-test to the post-test. Because the alternate hypotheses were directional, single tailed p-values were needed. The 2-tailed p-values generated by SPSS were transformed into 1-tailed p-values. To do this, I divided each 2-tailed p-value by two (Moore & McCabe, 2003).

The first hypothesis related to changes in students' attitudes as measured by the Environmental Adaptation subscale. For the group that only participated in the NJSOC program, the mean score increased by 0.50 points between the pre-test and the post-test (Table 6). The 1-tailed p-value for the paired samples t-test was 0.747 (Table 7), indicating that this change was not statistically significant; therefore, I retained the null hypothesis.

The second hypothesis related to changes in students' attitudes as measured by the Environmental Trust subscale. For the group that only participated in the NJSOC program, the mean score increased by 0.24 points between the pre-test and the post-test (Table 6). The 1-tailed p-value for the paired samples t-test was 0.425 (Table 7), indicating that this change was not statistically significant; therefore, I retained the null hypothesis.

The final hypothesis related to changes in attitudes as measured by the Pastoralism subscale. For the group that only participated in the NJSOC program, the
mean score decreased by 2.05 (Table 6). The 1-tailed p-value for the paired samples t-test is 0.948 (Table 7), indicating that this change was not statistically significant; therefore, I retained the null hypothesis.

Table 6. Scores for NJSOC Trip Only

<table>
<thead>
<tr>
<th>CERI subscale</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Environmental Adaptation</td>
<td>52.37</td>
<td>10.03</td>
<td>52.87</td>
</tr>
<tr>
<td>Environmental Trust</td>
<td>54.18</td>
<td>14.59</td>
<td>54.42</td>
</tr>
<tr>
<td>Pastoralism</td>
<td>76.05</td>
<td>14.43</td>
<td>74.00</td>
</tr>
</tbody>
</table>

Table 7. Paired Samples t-test for NJSOC Trip Only

<table>
<thead>
<tr>
<th>CERI subscale</th>
<th>M</th>
<th>SD</th>
<th>t-Ratio</th>
<th>df</th>
<th>One-tailed probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Adaptation</td>
<td>0.500</td>
<td>4.596</td>
<td>0.671</td>
<td>37</td>
<td>0.747</td>
</tr>
<tr>
<td>Environmental Trust</td>
<td>0.237</td>
<td>7.653</td>
<td>0.191</td>
<td>37</td>
<td>0.425</td>
</tr>
<tr>
<td>Pastoralism</td>
<td>-2.053</td>
<td>7.601</td>
<td>-1.665</td>
<td>37</td>
<td>0.948</td>
</tr>
</tbody>
</table>

2. What effect does the addition of a pre-trip activity have on the ability of the NJSOC program to change in students' attitudes?

As with the previous question, there are three hypotheses because I used three measures of attitudes toward the environment.

\[ H_0 \text{ Environmental Adaptation: } \text{post-test} - \text{pre-test} = 0 \quad H_a \text{ Environmental Adaptation: } \text{post-test} - \text{pre-test} < 0 \]

\[ H_0 \text{ Environmental Trust: } \text{post-test} - \text{pre-test} = 0 \quad H_a \text{ Environmental Trust: } \text{post-test} - \text{pre-test} > 0 \]

\[ H_0 \text{ Pastoralism: } \text{post-test} - \text{pre-test} = 0 \quad H_a \text{ Pastoralism: } \text{post-test} - \text{pre-test} > 0 \]

The first hypothesis related to changes in students' attitudes as measured by the Environmental Adaptation subscale. For the group that was provided with a pre-trip activity and then participated in the NJSOC program, the mean score increased by 0.47
points between the pre-test and the post-test (Table 8). The 1-tailed p-value for the paired samples t-test was 0.644 (Table 9), indicating that this change was not a statistically significant; therefore, I retained the null hypothesis.

The second hypothesis related to changes in students’ attitudes as measured by the Environmental Trust subscale. For the group that was provided with a pre-trip activity and then participated in the NJSOC program, the mean score increased by 0.33 points between the pre-test and the post-test (Table 8). The 1-tailed p-value for the paired samples t-test was 0.639 (Table 9), indicating that this change was not a statistically significant; therefore, I retained the null hypothesis.

The final hypothesis related to changes in attitudes as measured by the Pastoralism subscale. For the group that was provided with a pre-trip activity and then participated in the NJSOC program, the mean score decreased by 2.89 (Table 8). The 1-tailed p-value for the paired samples t-test was 0.962 (Table 9), indicating that this change was not a statistically significant; therefore, I retained the null hypothesis.

Table 8. Scores for Pre-trip Activity and NJSOC Trip

<table>
<thead>
<tr>
<th>CERI subscale</th>
<th>Pre-test M</th>
<th>Pre-test SD</th>
<th>Post-test M</th>
<th>Post-test SD</th>
<th>Change M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Adaptation</td>
<td>52.98</td>
<td>9.75</td>
<td>53.44</td>
<td>12.46</td>
<td>0.47</td>
</tr>
<tr>
<td>Environmental Trust</td>
<td>57.63</td>
<td>13.07</td>
<td>57.30</td>
<td>11.59</td>
<td>-0.33</td>
</tr>
<tr>
<td>Pastoralism</td>
<td>76.91</td>
<td>15.39</td>
<td>74.02</td>
<td>17.74</td>
<td>-2.89</td>
</tr>
</tbody>
</table>

Table 9. Paired Samples t-test for Pre-trip Activity and NJSOC Trip

<table>
<thead>
<tr>
<th>CERI subscale</th>
<th>M</th>
<th>SD</th>
<th>t-Ratio</th>
<th>df</th>
<th>One-tailed probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Adaptation</td>
<td>0.465</td>
<td>8.195</td>
<td>0.372</td>
<td>42</td>
<td>0.644</td>
</tr>
<tr>
<td>Environmental Trust</td>
<td>-0.326</td>
<td>5.971</td>
<td>-0.358</td>
<td>42</td>
<td>0.639</td>
</tr>
<tr>
<td>Pastoralism</td>
<td>-2.884</td>
<td>10.427</td>
<td>-1.814</td>
<td>42</td>
<td>0.962</td>
</tr>
</tbody>
</table>
3. What effect does the addition of a post-trip activity have on the ability of the NJSOC program to change in students' attitudes?

As with the other questions, there are three hypotheses because I used three measures of attitudes toward the environment.

\[ H_0 \text{ Environmental Adaptation: post-test} - \text{pre-test} = 0 \quad H_a \text{ Environmental Adaptation: post-test} - \text{pre-test} < 0 \]

\[ H_0 \text{ Environmental Trust: post-test} - \text{pre-test} = 0 \quad H_a \text{ Environmental Trust: post-test} - \text{pre-test} > 0 \]

\[ H_0 \text{ Pastoralism: post-test} - \text{pre-test} = 0 \quad H_a \text{ Pastoralism: post-test} - \text{pre-test} > 0 \]

The first hypothesis related to changes in students' attitudes as measured by the Environmental Adaptation subscale. For the group that participated in the NJSOC program and then was provided with a post-trip activity, the mean score decreased by 0.40 points between the pre-test and the post-test (Table 10). The 1-tailed p-value for the paired samples t-test was 0.398 (Table 11), indicating that this change was not statistically significant; therefore, I retained the null hypothesis.

The second hypothesis related to changes in students' attitudes as measured by the Environmental Trust subscale. For the group that participated in the NJSOC program and then was provided with a post-trip activity, the mean score increased by 0.75 points between the pre-test and the post-test (Table 10). The 1-tailed p-value for the paired samples t-test was 0.274 (Table 11), indicating that this change was not statistically significant; therefore, I retained the null hypothesis.

The final hypothesis related to changes in attitudes as measured by the Pastoralism subscale. For the group that participated in the NJSOC program and then was provided with a post-trip activity, the mean score decreased by 1.15 (Table 10). The
The 1-tailed p-value for the paired samples t-test was 0.732 (Table 11), indicating that this change was not statistically significant; therefore, I retained the null hypothesis.

### Table 10. Scores for NJSOC Trip and Post-trip Activity

<table>
<thead>
<tr>
<th>CERI subscale</th>
<th>Pre-test M</th>
<th>SD</th>
<th>Post-test M</th>
<th>SD</th>
<th>Change M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Adaptation</td>
<td>52.93</td>
<td>10.78</td>
<td>52.53</td>
<td>11.94</td>
<td>-0.40</td>
</tr>
<tr>
<td>Environmental Trust</td>
<td>56.30</td>
<td>11.48</td>
<td>57.05</td>
<td>12.83</td>
<td>0.75</td>
</tr>
<tr>
<td>Pastoralism</td>
<td>74.43</td>
<td>12.25</td>
<td>73.28</td>
<td>15.71</td>
<td>-1.15</td>
</tr>
</tbody>
</table>

### Table 11. Paired Samples t-test for NJSOC Trip and Post-trip Activity

<table>
<thead>
<tr>
<th>CERI subscale</th>
<th>M</th>
<th>SD</th>
<th>t-Ratio</th>
<th>df</th>
<th>One-tailed probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Adaptation</td>
<td>-0.40</td>
<td>9.684</td>
<td>0.261</td>
<td>39</td>
<td>0.398</td>
</tr>
<tr>
<td>Environmental Trust</td>
<td>0.75</td>
<td>7.821</td>
<td>-0.607</td>
<td>39</td>
<td>0.274</td>
</tr>
<tr>
<td>Pastoralism</td>
<td>-1.15</td>
<td>11.657</td>
<td>0.624</td>
<td>39</td>
<td>0.732</td>
</tr>
</tbody>
</table>

4. **What effect does the addition of both a pre-trip and post-trip activity have on the ability of the NJSOC program to change in students’ attitudes?**

As with the other questions, there are three hypotheses because I used three measures of attitudes toward the environment.

\[ H_0 \text{ Environmental Adaptation: post-test} - \text{pre-test} = 0 \quad H_a \text{ Environmental Adaptation: post-test} - \text{pre-test} < 0 \]
\[ H_0 \text{ Environmental Trust: post-test} - \text{pre-test} = 0 \quad H_a \text{ Environmental Trust: post-test} - \text{pre-test} > 0 \]
\[ H_0 \text{ Pastoralism: post-test} - \text{pre-test} = 0 \quad H_a \text{ Pastoralism: post-test} - \text{pre-test} > 0 \]

The first hypothesis related to changes in students’ attitudes as measured by the Environmental Adaptation subscale. For the group that was provided with a pre-trip activity, then participated in the NJSOC program, and finally was provided with a post-test activity, the mean score decreased by 1.67 points between the pre-test and the post-test (Table 12). The 1-tailed p-value for the paired samples t-test was 0.011 (Table 13),
indicating that this change was statistically significant; therefore, I rejected the null hypothesis.

The second hypothesis related to changes in students' attitudes as measured by the Environmental Trust subscale. For the group that was provided with a pre-trip activity, then participated in the NJSOC program, and finally was provided with a post-test activity, the mean score increased by 0.77 points between the pre-test and the post-test (Table 12). The 1-tailed p-value for the paired samples t-test was 0.191 (Table 13), indicating that this change was not statistically significant; therefore, I retained the null hypothesis.

The final hypothesis related to changes in attitudes as measured by the Pastoralism subscale. For the group that was provided with a pre-trip activity, then participated in the NJSOC program, and finally was provided with a post-test activity, the mean score increased by 1.44 (Table 12). The 1-tailed p-value for the paired samples t-test was 0.074 (Table 13), indicating that this change was not statistically significant; therefore, I retained the null hypothesis.

Table 12. Scores for NJSOC Trip with Pre-trip and Post-trip Activities

<table>
<thead>
<tr>
<th>CERI subscale</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Adaptation</td>
<td>52.02</td>
<td>50.35</td>
<td>-1.67</td>
</tr>
<tr>
<td>Environmental Trust</td>
<td>58.98</td>
<td>59.75</td>
<td>0.77</td>
</tr>
<tr>
<td>Pastoralism</td>
<td>78.19</td>
<td>79.63</td>
<td>1.44</td>
</tr>
</tbody>
</table>
Table 13. Paired Samples t-test for NJSOC trip with Pre-trip and Post-trip Activities

<table>
<thead>
<tr>
<th>CERI subscale</th>
<th>M</th>
<th>SD</th>
<th>t- Ratio</th>
<th>df</th>
<th>One-tailed probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Adaptation</td>
<td>-1.667</td>
<td>4.857</td>
<td>-2.377</td>
<td>47</td>
<td>0.011</td>
</tr>
<tr>
<td>Environmental Trust</td>
<td>0.771</td>
<td>6.040</td>
<td>0.884</td>
<td>47</td>
<td>0.191</td>
</tr>
<tr>
<td>Pastoralism</td>
<td>1.438</td>
<td>6.776</td>
<td>1.470</td>
<td>47</td>
<td>0.074</td>
</tr>
</tbody>
</table>

These results indicate that for the Environmental Trust and Pastoralism subscales, students' attitudes toward the environment did not change as a result of participation in the pre-trip and post-trip activities. For the Environmental Adaptation subscale, however, the change in score was statistically significant. This indicates that the combination of the pre-trip and post-trip activities in addition to the NJSOC program did have an effect on students' attitudes toward the environment as measured on the Environmental Adaptation subscale.

In summary, the results indicate that with one exception, students' attitudes toward the environment did not change significantly in the expected direction. The NJSOC trip alone did not change students' attitudes toward the environment as measured on the Environmental Adaptation, Environmental Trust, and Pastoralism subscales of the CERI. The addition of a only pre-trip or a post-trip activity only also did not lead to significant changes in the students' attitudes toward the environment on any of the three subscales. The combination of both the pre-trip and post-trip activities in addition to the NJSOC trip did significantly change the students' scores on the Environmental Adaptation subscale.
CHAPTER 5: DISCUSSION

The purpose of this research was to explore and describe the effects of a residential EE experience on students’ attitudes toward the environment and to determine if the addition of in-class activities before and/or after the experience would have an effect on the change in attitudes. This chapter summarizes results of the study and suggests any implications the study has for the NJSOC and EE in general as well as provides recommendations for future study.

Interpretation of Results

For all hypotheses in this study, the directional change in score for the three subscales was the same. The Pastoralism score was expected to increase, indicating a higher affinity for non-human dominated environments and the outdoors. The Environmental Adaptation score was expected to decrease, indicating a greater concern for the impact of human influence on the environment and a reduced belief in the right of humans to use technology to dominate nature. The Environmental Trust score was expected to increase, indicating an improved confidence and trust in all types of environments.

The first research question in this study asked what effect participation in the residential EE program at the NJSOC has on students' attitudes toward the environment. I used three subscales to measure attitudes toward the environment, the Environmental Adaptation, Environmental Trust, and Pastoralism subscales of the CERI.
The change in the Environmental Trust score was very small (0.24), but was in the expected direction. Perhaps the experience in a previously unfamiliar setting gave students the opportunity to increase their confidence in that type of environment. The change in Environmental Adaptation score was also small (0.50), but not in the expected direction. Perhaps the program sessions at the NJSOC did not clearly communicate to the students the need for humans to minimize their negative impact on the environment. Neither change was statistically significant, indicating the change may be due to random fluctuation in scores.

The change in Pastoralism score was over 2 points in the opposite direction of the expected change. Though this result was also not statistically significant, it is interesting. Although this result was not expected, there is a possible explanation for it.

The literature on misconceptions in science shows clearly that both children and adults hold ideas of their own about concepts they have little experience with or knowledge of (Ballantyne & Packer, 1996; Brody, 1996; Cross & Pitekethly; 1988; Hellden, 1998; Hills, 1989; Hulland, 1990; NEETF, 1999; Vosniadou & Brewer, 1989; Winer & Cottrell, 1996). Multiple studies have shown that classroom instruction is often not sufficient to induce students to change their naïve ideas about the subject (e.g., Brody, 1996; Hewson & Beeth, 1993; Mahadeva, 1989; Smith, 1983). When allowed to explore the phenomena for themselves in hands-on experiences, however, students often accept and assimilate new knowledge and experience into their conception of the phenomena (Cross & Pitekethly; 1988; Hellden, 1998; Narode, 1987; Ogunsola-Bandele & Oyedokun, 1998).
It is possible that the students participating in the NJSOC trip had created for themselves a naïvely positive impression of what it is like to spend time in the outdoors, perhaps only considering those aspects of the outdoors that they find attractive or comfortable, such as playing in their backyard. When these students attended the NJSOC, they may have discovered that being in the outdoors means being exposed to aspects that are not so appealing to them. Students in the NJSOC programs spend at least seven hours per day outdoors. If students were not properly attired for the weather, they may have been uncomfortable. Also, the physical demands of hiking as far as three miles over uneven terrain may have made students tired leading them to a less positive perception of the outdoors. Finally, the students in this study attended the NJSOC early in the fall when mosquitoes and other insects are still in abundance. Students’ experiences with these insects, commonly considered pests, may also have affected their attitudes toward spending time in the outdoors. Since the Pastoralism subscale measures affinity for spending time in non-human dominated areas, these eye-opening experiences may have had a negative effect on students’ attitudes toward the environment.

Though the directional changes discussed here may have been influenced by some aspect of the NJSOC program or students’ perceptions of the experience, because the changes were not statistically significant, the change in score may be due to random variation on scores.

For the students who participated in the pre-trip activity before participating in the NJSOC program, the results indicate that they did not have a significant change in attitudes on any of the three subscales. Again, as with the group that only participated in the NJSOC, the Pastoralism score decreased by over 2 points. It is possible that the
immersion experience in the outdoors had a negative effect on the students’ affinity for
the outdoors and non-human dominated areas.

Students who participated in the NJSOC program followed by the post-trip
activity showed a small increase in their Environmental Trust scores and a small decrease
in their Environmental Adaptation scores. Though neither of these changes was
statistically significant, it was noted that they were both in the predicted direction. It is
possible that the combination of the NJSOC experience and the post-trip activity had
some effect on students’ attitudes as measured on these subscales.

The Pastoralism score, as with the previous two groups, decreased rather than
increased. It was noted though that the decrease for this group was much smaller than
that for the previous two groups. It is possible that some aspect of the post-trip activity in
some way tempered the students’ negative response on the Pastoralism subscale
questions. The activity asked students to reflect on their time at the NJSOC and how it
may have changed their level of respect for the environment. Also, students went
outdoors to their school yard and interacted with the plants growing there during the post-
trip activity. Perhaps this outdoor experience in a more familiar area also served to
temper or re-orient the students’ perception of the outdoors.

The students who participated in both the pre-trip and post-trip activities showed a
change of almost two points on the Environmental Adaptation subscale. This change was
statistically significant. The combination of both the pre-trip and post-trip activities in
addition to the NJSOC program resulted in a change in students’ fundamental respect for
the environment. The post-trip activity asked students to reflect on their experience at the
NJSOC and their relationship to the environment. Though the students who had the post-
trip activity did have a change in their Environmental Adaptation score, the difference was less than half a point. Given this result, it seems that the combination of both the pre-trip and post-trip activities may have produced a more dramatic effect on students’ attitudes toward the environment as measured on the Environmental Adaptation subscale.

The changes in scores on the other two subscales, Pastoralism and Environmental Trust, are also of interest. While these changes were not statistically significant, they were in the expected direction of more positive attitudes toward the environment. In fact, the group that participated in both the pre-trip and post-trip activities was the only one of the four groups whose scores on all three subscales changed in the expected direction of more positive attitudes toward the environment. Again, the combination of both additional activities in addition to the NJSOC experience was needed to produce the expected change in attitudes toward the environment.

Relevance

Scholars in both EE and general education have suggested that using targeted activities before and/or after a field experience may increase the assimilation of the desired concepts by students (Ballantyne & Packer, 1996; Dettmann-Easler & Pease, 1999; Flavell, 1979; Knapp & Poff, 2001; Marzano, et al., 2000). My search of the current literature in EE found two studies exploring the use of additional activities to prepare for or reinforce concepts presented during a field learning experience (Farmer & Wott, 1995; Gutierrez de White & Jacobson, 1994). Neither of these was conducted in the context of a residential EE program.
My research was designed to be a preliminary exploration of the relationship between participation in pre-trip and post-trip activities related to a residential EE program and students' attitudes toward the environment. According to my results, the addition of only one activity, either before or after the field experience, was not sufficient to produce the expected change in attitudes, but the use of both activities produced the expected directional change in all three subscales used to measure attitudes.

While the results of this study are very preliminary, they suggest that the use of activities before and after a field experience may be helpful in reinforcing the concepts presented during the trip. Further research needs to be conducted in this area before more definitive statements can be made. If further research also finds that the use of additional activities before and after field experiences is effective in changing students' attitudes, EE centers and school teachers should consider the use of additional activities as a way to reinforce the goals of the residential experience.

This study has relevance on a smaller scale to the NJSOC program. Though participation in both of the additional activities did result in the expected change in attitudes toward the environment, the NJSOC program alone did not. This result supports that of Semrau (2003; Smith-Sebasto & Semrau, 2004) who also found no significant change in students' attitudes toward the environment using a different assessment instrument after participation in the NJSOC program. They did find, however, an increased self-reporting of environmentally responsible behaviors. According to its mission statement, part of the goal of the NJSOC program is to develop students' awareness of how human actions affect Earth systems and to develop attitudes, beliefs, and values that will aid students in becoming environmentally responsible citizens.
Given the results of my study along with those of Semrau (2003; Smith-Sebasto & Semrau, 2004), it appears that the NJSOC program is not meeting this goal. Further investigation of the NJSOC program sessions and whether they are designed to help students develop positive attitudes toward the environment is needed to understand why the program appears not to be positively affecting students' attitudes toward the environment.

In his book, *Beyond Ecophobia*, Sobel (1996) asserted that EE is often not provided to children using developmentally appropriate approaches. He suggests the following sequence for outlining EE programs for students. In early childhood, ages 4 to 7, activities should focus on developing in children empathy for the natural world. In middle childhood, ages 8 to 11, exploration of the natural world should take precedence. In early adolescence, age 12 to 15, social action should take a central role in EE programs. Given this sequence, programs like the NJSOC, which serves primarily students age 12 to 15, should center their program focus on helping students become active in environmental issues. If EE programs are presented out of sequence, however, or have missing stages, then even older students may need exposure to lower stages. This may be the most important role for the NJSOC: to provide students with the opportunity to develop empathy for the environment.

Sobel (1996) also strongly recommended that the issues students focus on be local. This recommendation affirms the finding of Yerkes and Haras (1997) that programs most effective in changing adolescents' attitudes toward the environment focus on specific issues with a local connection. They also recommended that programs working with adolescents include problem solving, development of environmental action
skills, small group discussions, and time for reflection. Another study by Yerkes and Biederman (2003) found that programs most effective in changing adolescent attitudes to the environment focus on developing students’ locus of control for reinforcement, critical thinking, and environmental action skills.

Several of the sessions at the NJSOC include mention of environmental issues and the instructors offer suggestions for how students can help the environment by doing things such as turning off unneeded light and not wasting water. The sessions, however, are primarily informational field sessions on natural history, physical science, or life science. Perhaps if the NJSOC included sessions that provide students more opportunities to learn about and discuss local environmental issues and develop environmental action skills (Sobel, 1996; Yerkes & Biederman, 2003; Yerkes & Haras; 1997), the program would have a greater impact on students’ attitudes toward the environment. Also, Coons (1973) found that a residential camp program designed to develop positive self-concept and improve environmental attitudes was more effective in making these changes than a ‘traditional’ camp program.

In addition to his suggested framework for developmentally appropriate EE, Sobel (1996) further suggested that in recent times people have become more and more removed from nature and are in need of time for reconnection to the environment. He suggests taking time to explore areas outdoors and appreciate the details and intricacies of what goes on there. This recommendation echoes the message by Cohen (1996) who developed the series of activities designed to help people reconnect with nature on which the activities in this study were based. Perhaps the students attending the NJSOC would experience a greater positive change in their attitudes toward the environment if they
spent more time in observation of nature and in activities specifically designed to foster reconnection to nature.

Limitations

This study was limited in a number of ways. First, it only studied the effect of the interventions on students in one grade from one school. Effects of attending the NJSOC and the additional activities may be different for different grade levels. Also, students from different areas (urban, rural, and suburban) may likewise respond differently. Consequently, the results of this study may not be representative of those found with other populations. The generalizability of the results is, therefore, limited.

The administration of the instruments may have also confounded the results. The instruments were given to students by teachers from their school rather than by me. When the answer sheets were collected from the school, it was discovered that many students skipped items. Their responses could not, therefore, be included in the analyses. Given the number of incomplete instruments, the students may not have taken the research seriously and their responses also may not reflect their true attitudes. If this is the case, the results may not be a valid representation of the students’ change in attitudes.

Another limitation of this study is the statistical procedure used to answer the research questions. In order to answer all of the research questions, several t-tests were required. The use of many statistical tests increases the chances of a Type I error, rejecting the null hypothesis when it is in fact true (Moore & McCabe, 2003). It is possible that the one null hypothesis that was rejected was, in fact, true. Replication of this study may confirm the results found here.
Further Research

Given the preliminary nature of this study, much research is needed to better understand the results found here. First, further research on the effectiveness of the NJSOC program itself is needed to understand why the program alone did not result in a change in students' attitudes toward the environment. Semrau (2003) conducted a preliminary qualitative assessment of some of the program sessions offered at the NJSOC. She found five sessions that have some affective component, but concluded that these sessions needed modifications in order to more directly affect students' attitudes. She made recommendations for improvements to some lesson plans. Further investigation of the rest of the NJSOC lesson plans would potentially illuminate areas of improvement for the program in this area.

Also, this study only included students from one school in one town in New Jersey. The results of this study are very limited in generalizability. Studies of this kind with other populations are needed in order to determine if these results would be found with other groups as well.

The additional activities used in this study were modified from those developed by Cohen (1996) as part of a larger unit of activities intended to help people reconnect with nature and reflect on their relationship with nature. Perhaps using only one or two of these activities has minimal effect on the students' attitudes toward the environment. Further research could investigate whether multiple activities are more effective.

Also, further research is needed to determine if other types of additional activities would produce different results. The two additional activities used in this study were different in approach. The pre-trip activity was designed to give students an opportunity
to consider what they expect of the NJSOC trip and the post-trip activity was designed to have students directly consider their relationship to plants and other natural resources and the value of those natural resources to life on Earth (both human and other life). This study suggests that the combination of both activities was most effective in increasing students’ positive attitudes to the environment. Further research using different types of activities may produce different results. This additional research would help in determining the most effective type of activities to provide.

Conclusion

Though the results of this study are preliminary, they offer some insight into the effects of using classroom activities before and after a residential EE experience to reinforce students’ attitudes toward the environment. It appears additional activities conducted at the students’ school may be effective in causing students to consider their relationship to the environment and in increasing positive attitudes toward the environment. The conclusions of this study should be regarded with caution, however, until further study is conducted related to the use of this type of activities.
REFERENCES


Winer, G.A., & Cottrell, J.E. (1996). Does anything leave the eye when we see? 
Extramission beliefs of children and adults. *Current Directions in Psychological Science, 5*(5), 137-143.


Appendix A: CERI Instrument used in this study
Please do not write on or in this booklet!

Form code: ______

Directions:
The statements in this booklet are about different things related to the environment and your daily life. Each one describes an opinion or a feeling about something. The way you answer will help in understanding how students think and feel about these topics. Read each sentence carefully. Then decide how much you agree or disagree with what it says. Then carefully mark the choice on the answer sheet that best indicates how strongly you agree or disagree with the statement. Only choose one response for each statement.

Response choices:

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<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<tbody>
<tr>
<td></td>
<td>disagree very much</td>
<td>disagree</td>
<td>don’t know don’t care</td>
<td>agree</td>
<td>agree very much</td>
</tr>
</tbody>
</table>

Examples:

1) I like to go shopping.  [A] [B] [C] [D] [E]  
2) Watching sports games on TV is boring.  [A] [B] [C] [D] [E]  
3) Pizza is a healthy food.  [A] [B] [C] [D] [E]  

In the first example, the person answering agrees very much that he/she likes to go shopping.  
In the second example, the person disagrees that watching sports games on TV is boring.  
In the last example, the person indicated that he/she does not know or does not care if pizza is a healthy food.  

In your answers, please only select don’t know/ don’t care (3) when you are absolutely sure that no other choice expresses how you feel.  

Because these items all relate to opinions, there are no right or wrong answers. It is important that you answer truthfully according to how you feel about each statement.  

This has nothing to do with your school grades. No one from your school will read your answers.
Response choices:

<table>
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<th>A</th>
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<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>disagree very much</td>
<td>disagree</td>
<td>don't know don't care</td>
<td>agree</td>
<td>agree very much</td>
</tr>
</tbody>
</table>

1. People should learn how to control the weather.
2. Polluted water can always be cleaned up.
3. I feel good when I am close to nature.
4. I don’t think it would be safe to travel alone.
5. Machines and other inventions are going to make life a lot better.
6. I like the sounds that a stream makes.
7. It is safer to stay close to home.
8. I would like to live in a cabin in the woods.
9. People have the right to change nature whenever they need to.
10. People are stronger than the forces of nature.
11. I worry about what will happen to the environment in the future.
12. Factories spoil the look of the countryside.
13. I like walking through the leaves in the fall.
14. I don’t worry much about wasting a few things.
15. Most bugs and insects are scary.
16. The world may soon run out of lots of things.
17. It is silly to get upset about dirty air from factories.
Response choices:

<table>
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<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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</thead>
<tbody>
<tr>
<td>disagree</td>
<td>disagree</td>
<td>don’t know</td>
<td>agree</td>
<td>agree</td>
</tr>
<tr>
<td>very much</td>
<td>disagree</td>
<td>don’t care</td>
<td></td>
<td>very much</td>
</tr>
</tbody>
</table>

18. There will always be enough of everything for everybody.

19. I would be afraid to hike too far away from home.

20. You can never trust people you don’t know.

21. I would like to get a job working outdoors.

22. I often find it hard to figure out how to use new things.

23. I would be afraid of getting lost in the woods.

24. Sometimes I am a little afraid of thunder and lightning.

25. We must use less energy although it will be hard to do.

26. Strange noises in the night bother me.

27. People should be able to cut down trees whenever they want to.

28. I am glad that people can change nature.

29. I enjoy watching the sky on summer nights.

30. Sometimes I feel like hiding when things scare me.

31. People should spend even more time outdoors.

32. I like TV programs about nature better than most other programs.

You are almost finished! Remember, there are no right or wrong answers!
Response choices:

<table>
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<tr>
<th></th>
<th>A</th>
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<td></td>
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<td>agree</td>
<td>agree very much</td>
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<tr>
<td></td>
<td>very much</td>
<td></td>
<td>don’t care</td>
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</table>

33. Sometimes I worry about getting lost when I go to places by myself.
34. Some jobs would be too dangerous for me.
35. It does not matter if people change parts of the environment.
36. It is dangerous to climb tall trees.
37. It is fun to walk in the rain even if you get wet.
38. All playgrounds should have artificial grass.
39. I don’t feel really safe in places where I have never been before.
40. It is wrong to use lots of chemicals to kill weeds and insects.
41. I like the smell of a lawn right after it has been cut.
42. Going on a long hike is boring.
43. I enjoy pictures of birds and animals.
44. There will always be enough land for people to live on.
45. There are really a lot of unsafe places around us.
46. I like things to wear out quickly because then I can get new ones.
47. I would not want to walk in a lonely area at night.
48. There should be more laws to punish people who harm the environment.
Response choices:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
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<td>agree</td>
<td>agree very much</td>
</tr>
</tbody>
</table>

49. I worry about things that I don’t understand.

50. I wish I knew more about nature.

51. People will soon be able to solve all the world’s problems.

52. It would be fun to go to a nature camp for a weekend.

53. People’s activities don’t really hurt nature.

54. Walking in the woods is a waste of time.

55. Every person must work to solve pollution problems.

56. I like sitting beside a quiet pond.

57. I like places where there are lots of different plants and trees.

58. I really like the work of looking after animals.

59. Sometimes it is not safe to be home by yourself.

60. I would like to get up very early just to see the sun rise.

61. Blizzards are frightening.

62. I worry if my parents are not at home when I expect hem to be.

63. I really enjoy nature.

64. There are times when I like things to be very quiet.

Thank you for taking time to respond to this survey.
Appendix B: Pre-Trip Activity Lesson Plan
Pre-Trip Activity for students preparing
to attend the New Jersey School of Conservation

Objectives:
- After viewing and discussing a set of cards with color words mismatched with their ink colors, students will state orally at least one explanation for why one might not immediately notice the mismatch of color words and ink colors.
- Given an unknown object in a bag, students will discriminate by naming three characteristics of that object after feeling it with a bare hand that could not be discriminated using a sock covered hand.
- Students will state orally how preconceived expectations can prevent one from experiencing events fully or can prevent one from noticing details that may be important.

Materials:
- Power Point slide show of color dots
- Socks- enough for each student to have one
- Opaque bags with spruce cones inside- enough for each student to have one

Procedures:
I am from the New Jersey School of Conservation and am here to give you a preview of some of the types of thinking and activities you will be doing on your trip to the NJSOC.

First, I am going to show you a series of slides and I want you to think about what you see.
Show cards in quick succession.
You may have noticed something about the cards that you didn’t expect. I am going to show the same cards again, this time a little slower. Look at each card carefully. Show cards again quickly, but slower than before.
Did you notice anything unusual this time? I am going to show the cards a third time, this time slowly so you can get a good look at each. Show the cards this time allowing about one second each.
Describe what you noticed about the cards. Engage students in conversation about the cards. They should have noticed by the end that the words do not match the color they are shown in. Have students talk about why they think that most people didn’t notice this at first.

Our minds expect for things to appear in a predictable way, and when they do not, sometimes we don’t recognize the difference.
This is an example of how we can insulate ourselves from new experiences without even realizing it.
The first time through the color words, you may not have noticed that the color words did not match the colors they are shown in. When we aren’t looking for something to be different from the usual, many times we overlook them even when they are in plain sight.
This natural tendency of our minds acts as a filter or even a barrier to fully experiencing our environment.

Now we are going to do another activity that will help illustrate the impact of this mental filtering.
Pass out one sock to each student. Have students put the sock over one hand.
Pass out bags with natural objects in them. Instruct students to not look inside the bags.

Using your sock covered hand, and without looking in the bag, reach into the bag you have been given and take a few seconds to explore the objects inside.
What can you tell about the item? Do you have a clear idea of what it is?
Now use your uncovered hand to feel what is in the bag. Think about what you notice now that you may not have before. Have you changed your guess about what it is?

Now take the item out of the bag to check your guesses.
Have students share their observations about the difference between using the sock covered hand and uncovered hand to explore something new.
Also have them discuss the important details that were missed by using the covered hand.

This activity creates a concrete way to see how our mental filters of perception can keep us from fully experiencing new things.

Soon you will be going to the New Jersey School of Conservation for a three day trip. During your stay there you will have the opportunity to experience many things in the natural environment that you may or may not be familiar with. Take the opportunity to fully experience these things. Try not to allow your mind to ignore the details; take them in and even take time to focus on them. You will be surprised at what you notice by consciously experiencing your surroundings.

This lesson plan is based on activities from Reconnecting With Nature by Michael J. Cohen.
Appendix C: Post-trip activity Lesson Plan
Post-Trip Activity for students after visiting
the New Jersey School of Conservation

Objectives:

• Students will identify by naming at least three ways humans are connected to the environment and rely on it for survival.
• Students will state in discussion at least three ways students can be actively involved in conservation of the environment.
• Students will state orally how the NJSOC trip and this activity have changed their perceptions and attitudes about the environment.

Materials:

• Locate an area outdoors on the school grounds that students may visit during this lesson. The area should have a variety of green plants and should be accessible enough that students may sit down and be able to touch the plants.

Procedures:

Take students outside to a natural area on the school grounds.
Have students sit down and get comfortable.
Have students share what they know about the air and what happens as we breathe. Fill in blanks so that students know that when we breathe in our bodies take the oxygen from the air and that when we exhale we breathe out carbon dioxide. This process is called respiration.

Where does the supply of oxygen in the air come from? Why is it that it doesn’t run out? Add information to student responses so that students see that plants are a major source of oxygen in the air. They take in CO₂ and they produce O₂ which is released into the air.

So how are these two processes linked? Guide students to recognize that the green plants around them produce oxygen, which is the part of air that sustains our life. This process is ongoing and replaces the O₂ we use in respiration.

You are sitting next to a green plant that right now is photosynthesizing and producing oxygen which you need in order to survive.
As you breathe, reach out and touch a part of the plant. Consciously notice how the air feels as you inhale and exhale normally.
Now consider how we all depend on the oxygen that plants help replace in our air. As you think about this, consciously take your hand away from the plant and at the same time, consciously stop breathing.
Notice how unnatural it feels to not breathe. Now place your hand back on the plant and when you do, you may breathe normally again. Notice your new awareness of how we are connected to the plants.
Repeat the process of breathing while touching the plant and then taking your hand away and not breathing.
Consider what respiration means to you now.
Point out to students that this activity emphasizes our connection to green plants. Have them discuss other ways we are connected to our environment or rely on it.

Have them share experiences that have made them aware of that connection. They may have learned or experienced something at NJSOC that brought out this idea.

Lead this conversation into a discussion of how the students can be involved in preserving that connection with nature and the environment. Some ideas include: turning off lights, etc. to save energy; recycling paper, cans, etc. at school and at home; not damaging plants or injuring wildlife; sharing their concern about the environment with others.

*How have this activity and your experience at NJSOC affected how you feel about the environment?*

*Will these experiences change how you act in relation to the environment? How? Why?*

Note: In the event of inclement weather this lesson may be taught indoors using live potted plants or cuttings from live plants.

This lesson plan is based on activities from *Reconnecting With Nature* by Michael J. Cohen.
Appendix D: Lesson Plans for NJSOC session
Archery

Background

Archery, which is at least 20,000 years old, is the oldest sport known to humankind. It was developed by early humans to secure food as well as for protection. The mythology of ancient Greece includes outstanding archery accomplishments by such famed characters as Apollo, Diana, Hercules, and Eros (Cupid). While England had Robin Hood, the ancient cultures of Japan and China also had legendary archery heroes. The American Indian's archery equipment was very crude; they therefore had to rely on stalking very close to their prey to be effective. It was in England that Archery was first organized into a sport in the 17th century and can now be found worldwide. Archery skills continue to be used by some aboriginal tribes in Australia, Africa, and South America. In 1972 archery became an Olympic sport.

In keeping with fundamental principals of learning, immediate participation and immediate success are important factors for effective group instruction. These two factors are generally easily accomplished during the archery session. Therefore with as little lecture as possible, get the students shooting. However, **you must insist that the safety procedures be adhered to at all times**. Also be ready to give individualized attention to those needing it.

**Setting up the archery range:** (prior to student’s arrival is preferred)

The shooting line should initially be set 10 yards from the targets. This distance provides a positive experience for the students because their arrows are hitting the target more often. Being on target also protects the arrows. **All archers must shoot from the same distance.** Archers who are waiting to shoot should remain 5 yards behind the shooting line. With two archers shooting at each of three targets, get out six bows and bow stands plus six arrows per archer. The arrows for each archer should be identical, since this simplifies retrieval. Place ground quivers/bow stands right next to the wooden shooting line. The ground is soft here and is easily punctured with the quiver. Please use the bow stringers to string the wooden bows. This prevents the limbs (top & bottom parts of the bow) from twisting and therefore being damaged. To use the bow stringer, first place the plastic cup end onto the bottom of the bow (the end with the rubber band holding the string in place). Then hook the opposite loop end, (with rubber fins) over the top of the bow behind the bowstring. Now while pulling the bow handle upward with one hand use the other hand to slide the bowstring into place. Once the string is well seated in the notches, release the bow gently until the string is taut, and then simply remove the bow stringer. At the end of class do the reverse to unstring the bows. The string must remain on the bow at all times; simply slide the string along the upper limb toward the grip.

**Determining Eye Dominance**

First, determine who is left and right eye dominant. A person should shoot lefty if they are left eye dominant, and right-eyed people shoot right. Eye dominance is easy to determine. Have students face you with arms extended and palms toward you. Overlap the two hands and thumbs to form a small opening between the hands (see graphic below). With both eyes open have students aim at your forehead through this opening. As you peer back at them individually, through their hands, you will see their dominant eye. If the right eye remains in the opening, they are right eye dominant (right eye does the aiming) and therefore when shooting, should pull the string with the right hand, and tilt the top of the bow to the right, slightly. If the left eye remains in the opening, they are left eye dominant, and should pull the string with the left hand, and tilt the top of the bow to the left, slightly. Occasionally there will be a student with non-dominance; this student should shoot from the side that seems most natural to them.

**With your arms held out straight**

**Hold your hands this way to form a small viewing hole**
Safety Policies:

Remember a bow is like a gun. A nocked arrow is like a loaded gun. A bow drawn with arrow nocked is like a loaded gun cocked and ready to shoot. Be as careful and thoughtful with a bow and arrow as you would a gun and ammunition.

1. Wait for the signal before nocking an arrow.
2. Remain behind the shooting line until the signal is given to retrieve arrows. When arrows are retrieved, all bows must remain on the stands or on the ground.
3. Never draw the bow (even without an arrow) while someone is in front of it.
4. When holding a bow, always face down range.
5. Never “dry fire” a bow, i.e. draw and release the fully drawn string. Without an arrow.

Shooting Instructions:

Instructor should demonstrate how to; use arm guards, hold a bow, grasp bowstring with fingertip grip, nock arrow, stand, draw, aim, release, and retrieve arrows. Finger tabs may also be demonstrated, however most beginners have difficulty using them at first. If the class is scheduled for a long period of time maybe consider introducing finger tabs as their fingers get sore from repetitive shooting.

1. Arm guards should be worn on the inside of the forearm that holds the bow with narrow end closest to the wrist. The stance involves standing at a right angle to the target, with shoulder that is holding the bow closest to the target. Weight should be evenly distributed on both feet, while feet are spread shoulder width apart.

2. Hold the bow in a relaxed “handshake” position (in hand opposite of your eye dominance). Place bow in the “V” formed by the thumb and fingers. Elbow and wrist should be “locked”. If shooters have a problem with “string slap”, (string hitting the forearm holding the bow) have the archer flex their elbow a little bit. Since your bow is tilted slightly, place the arrow on the upper shelf (same side as the hand holding the bow). Nock the arrow by placing it on the string in such a way that allows the odd colored feather or “index feather” to point away from the bow. This position prevents the arrow’s flight path from being altered due to the index feather contacting the bow. Also it is important for the arrow to be nocked at right angles to the bowstring and thereby parallel to the ground. This right angle is easily achieved by nocking the arrow just below the brass nocking point that is on the bowstring.

3. The draw begins with the string grip. This fingertip grip should use the three middle fingers, similar to the “Boy Scout salute”. The string should rest in the crease formed at the joint nearest the fingertips. Grasp the bowstring with one finger above and two fingers below the arrow. During the draw phase, it is important to emphasize that the arrow should not be over-drawn. The point should remain 1-2 inches in front of the bow. All arrows must remain pointing down range, at the targets, at all times. During the draw phase your “string” elbow should remain in a straight line with the arrow and horizontal.

4. The release should be limited to the fingertips. Everything else should remain still. Try not to move the bow or your arms at all. Keep aiming at the target even after releasing the arrow. This will help to limit unwanted body movements that may affect the arrow’s flight.

The goal in archery or any shooting sport is consistency. If your arrows are grouped, then you are doing very well. During your first set of arrows (6) you should aim all of them at the same spot. Even though
your arrows are not going where you want them, be consistent with your aiming for the first round. Then after this round you will know better how to adjust for your particular style and this particular bow. For instance, if after your first round of arrows when you were aiming at the gold center, you find that all your arrows are high and to the right of the bullseye, you should then aim low and to the left of center. On your second round using the same equipment, changing your aiming point should find the arrows much nearer the gold.

After shooting the last arrow, put the bow down; wait until all bows are set down. Then at instructor’s command, retrieve arrows. When removing arrows from the target, please place one hand on the target with the arrow between the thumb and fingers at the base of the thumb. With other hand grasp the arrow close to the target and pull straight out. This prevents broken arrows and also preserves the target face.

Only when everyone has returned behind the shooting line with arrows, can bows be picked up. Then repeat the procedure described above. Continue with a rotation helping those who need it most.

Scoring: Gold = 5, Red = 4, Blue = 3 Black = 2, and White = 1. (See diagram below). Olympic scoring begins with 10 points for the inner bullseye, 9 pts for the outer gold ring, 8 for inner red ring, 7 for outer red, etc.

The objective of this class is to teach basic Archery skills. We hope the students will continue the safe shooting routine advocated at SOC. Students may also come away with the realization that hunting with a bow is very difficult. Since virtually all early cultures (at least 20,000 years old) relied on the bow and arrow for hunting game, this could give them a better understanding of the struggles of these cultures. Most visiting students have never had the opportunity to try archery, and once they do have the experience, they find it fun. Therefore this activity encompasses development of new skills, safety awareness, and provides insights into former cultures all while being enjoyable.

Following each class please return all bows and arrows to the Archery shed. It would be very unwise to leave these items accessible and unsupervised for even a short period of time. Please do not leave weapons and ammunition available for students when an adult is not available to oversee the range. Please cover the targets at the end of the session.
Additional Important Information:

Please unstring the wooden (obviously high quality) bows using the bow stringers. This protects the bows from damage. Do not take the string off the bow; simply let it slip toward the grip. You may however leave the fiberglass (lower quality) bows strung.
Retire any arrows that are cracked! Leave them on the work bench inside the archery shed.
Replace bowstrings when a strand breaks.
Return all equipment to the shed after the class, and lock the shed.
Cover targets.
Return Archery shed key to Kittatinny Hall following the last session.
If any equipment needs servicing, please inform the SOC staff.

For further information:
Action Socialization Experiences

Action Socialization Experiences (ASEs) are among the most popular of all sessions at the New Jersey School of Conservation (SOC). Almost without exception, each student coming to SOC to learn about the environment has an opportunity to participate in ASEs.

These low element activities were originally implemented by former SOC faculty member Dr. James Merritt, as a means of developing small group cohesiveness and cooperation among the participants. Each ASE station offers a unique problem for the group to collectively solve. Although Dr. Merritt did not invent the notion of learning through problem solving, he did modify the experience to fit the particular needs of SOC. During the 1990-1991 academic year, SOC had nearly 9,000 participants enrolled in both public and private schools from the greater New Jersey region. This population pressure requires modifying the program from more traditional models.

"None of us is as strong as all of us. Never doubt that a small group of thoughtful, committed people can change the world. Indeed, it's the only thing that ever has." - Margaret Mead

During the course of solving these problems, the groups tend to realize that cooperation, communication, and consideration for others are essential concepts that are central to the ASE session. In addition, the more the group recognizes and utilizes the available resources, the greater the efficiency and level of success.

The specific objectives of ASEs are to provide each student (within the context of a group) with the opportunity to:

1. Be confronted with physically and mentally challenging problems.
2. Communicate their creative contributions to the solution.
3. Achieve a balance between leading and following.
4. Consider the abilities and limitations of the group.
5. Provide positive feedback during the debrief sessions.
6. Responsibly protect group members from harm or injury.

Creativity is the final component to being successful in the ASEs. There are many ways of successfully completing the problems. Please allow the group to approach and solve the problem in their own way (unless their solution is unsafe). Since the resources available in each individual group varies widely, the best solution for group "A" is not necessarily the best solution for group "B". Another important point to realize is that during the progression of the ASEs, the groups should evolve into a more efficient working group. Therefore it is important to note that comparing groups is totally inappropriate.

Procedures

The typical ASE program is run in the following manner: After the arrival of the school group, several (one adult for each ASE station) teachers from the school meet with a SOC staff person. During this mandatory “ASE MEETING”, the basic philosophy of ASEs is reviewed, program policies are communicated, stations and props are assigned to each facilitator, and then questions are answered. All participating adults must be present for the entire ASE Meeting each and every time they visit SOC.
Art in Nature

Session Description
Art is a visual expression of a person’s thoughts, ideas, or words. It is often inspired by a certain sight or particular experience where a person has dealt with life’s elements and situations, including those that have been funny, thrilling, and inspiring, as well as painful or unacceptable. It is a combination of freedom of self-expression with the disciplined techniques required for precise visualization of such expression.

This lesson begins with conducting several sensory-awareness activities. They are designed to intensify students’ recognition of their surroundings for features like: shapes and sizes, colors, shadows, textures, distance perspectives, as well as objects/scenes that they find beautiful, interesting, strange, or ugly.

In the field, students are guided on an outdoor hike, which culminates in fine art expression. During the hike attention is given to natural elements on the SOC campus within Stokes State forest. At appropriate sites, students may make natural element arrangements; do a sketch of the site; and utilize mediums like charcoal, craypas, or watercolors.

Objectives
Students will become more sensitive to and aware of their surroundings, including people and all other life forms in it, especially in the selected sketching and painting site(s).

Students will express what they have observed using various art media.

Students will be able to look at their site and imagine its appearance in 2050. They could possible describe it verbally and/or pictorially, after a potential environmental problem situation, and its effect on the site, has been posed.

Materials
SOC supplies for the class include:
- quality paper in a variety of sizes:
- paintbrushes of all sizes
- natural “paintbrushes” (rocks, twigs, branches)
- Cray pas
- pencils & colored pencils
- packets of laminated art work samples showing period styles of the past two centuries of art movements
- scrap paper for sketching, mixing colors, etc.
- water color paint sets
- charcoal sponges
- large plastic container of water
- plastic water cups for students
- easels (legal size clipboards)

Procedures - section 1
The following sensory-awareness activities, taken from SOC’s Perceptual Awareness lesson plan could be incorporated into the introduction section of the Art in Nature lesson. (If students are also scheduled for the Perceptual Awareness class, confirm which of the following activities are not being used during Perceptual Awareness.)

Solve the Mystery – Natural objects of various shapes and textures are in cloth bags. The students will feel one object, or each object, and then guess what it is. They describe the way it feels, verbally or in writing. They can also draw the mystery object as accurately as they can just by handling it.

Make Friends with a Tree – Use the technique from Acclimatization (Van Matre, 1972) entitled: “Find Your Friend in the Forest.” Pair up the students and blindfold one of the pair. The blindfolded student is spun around to be disoriented, and is then led to a tree which s/he must investigate thoroughly. Feel the tree’s skin. Is it smooth or rough? Is there anything growing on it? How wide is the tree at your head height? At your knee level? After a full investigation, the student is led back to the starting point. Spin the student once more, take off their blindfold, and have him/her go out to find their tree. Observations can be recorded in their journals. Have them switch partners and do it again.

One of a Kind – Distribute one particular type of leaf or a rock to each person. Tell them they must familiarize themselves with their item so that they can pick it out of a pile of similar ones. Give them time to become acquainted with their item, and then compile all of them together, with some additional ones mixed in. Each student must find his or her rock or leaf.
Improving Focusing Ability – Use cardboard sighting tubes (empty toilet paper roles) or the following handmade device, to telescope in on one object: fold a piece of 8½ X 11 paper into quarters. Snip one corner off with a semi circular cutting pattern. After you open the paper, it could function as a “telescope.”

Hold handmade tool close to your eye and see the full panorama view. Slowly move paper away from eye to observe details. Then pull it back. Do it several times. Compare what you see in the distance (skyline, blanket forest growth, sun, birds in flight) with immediate sightings (around your feet, by the nearest rock, tree, plant, or person). Which do you like best? Ask them to explain their partiality. Select a favorite distance, then sketch and paint the sight.

Cloud Gazing – Take students to an open view area, such as the Corral. Ask them to lie down on the grass, if possible. Suggest that they consider the shapes of the cloud patterns and what they bring to mind - animals, people, objects, and events. Have students consider the variety of colors, shapes, and shadows, in a “white” cloud.

Camouflage – Take the students into the area where you have set up the “Unnatural Trail,” before class began. Have them form a single file line and instruct them to walk down the trail in silence until they reach the end. (Space them so that they are at least four feet apart.) They are to stay on the trail, take a mental count of how many objects, not native to a forest area, can be seen. They are not to point to objects or give any hint of discovery if they see them. When they reach the end of the trail, they are to tell how many objects they have seen. When every student has done this, select one student at a time to slowly walk through the area, pick up one object, and show the site where it was found.

Photography / Awareness Walk – Select a set of laminated photographs of SOC buildings and sites, either the set for the Sequoia side of the lake or for the Wapalanne side of the lake. Give each student a photo. Take the group on a quiet walk through the site area. Ask them to observe their surroundings as they walk. Have them stop the group when they sight the object(s) in their photo. (Answer Key map included in the photograph set.)

Procedures - section 2
1. Schools of Painting – Show students the copies of renowned artists’ versions of natural scenes stored in SOC’s Art in Nature supply crates. They are broken down into time periods and styles of painting. Discuss styles and ask students to express their reactions to them. Emphasize that they must be able to give an explanation of their reactions.

2. Select a sketch site.

If students choose to paint a close-up view or a still life, visualization of these can be enhanced by using several techniques including:
- overlapping shapes in the scene;
- choosing to make shapes either sharp or fuzzy;
- lightening or darkening selected areas;
- using only one medium such as charcoal or a selected piece of pastel chalk;
- using only one water color.

If students want to try painting a larger, open landscape scene, they need to notice:
- the size of objects;
- the brightness of color based on the objects’ closeness, or dimness of colors because of their distance from the observer;
- the objects’ distance: if objects are close, they must be lower in the sketch, and if they are distant, they must be positioned in a higher area of the paper;
- that distant objects “meet” as they recede in space;
- that warm colors like red, orange and yellow cause a scene to seem like it is moving forward;
that cool colors, especially green and blue, cause the scene to seem like it is receding;
- that an illusion of distance can be created by using two figures in the scene, one large
and the other, small;
- that the nearness of an object is emphasized by making it dark, and its distance, by
making it light;
- how rough sketches or silhouettes foster a sense of distance, while great detail brings
the viewer closer to the scene.

3. Sketching considerations to be discussed with students:

Help students prepare for sketching by suggesting the following procedure, or actually doing a small scale
version of it while they look on, if possible. An alternate possibility would be to show examples of art work
given to SOC by previous visiting teachers and students at SOC.
- notice the three zones of landscape: foreground, middle ground, and background;
- select one, two or all three of them for painting;
- sketch major site(s) in the scene;
- add important shapes;
- add fine details.

When drawing animals, including people, focus on and sketch in the following order:
- shoulder to hip area first;
- legs, arms, neck, and head;
- and lastly, feet and hands.

4. After sketching the desired scene, students can practice the following watercolor exercises, as needed,
before they paint:

a. Brush strokes and their effects – elements to consider:
- flat bristle brushes are good for large wash areas, e.g. water;
- a wet brush will cause paint to have a more pulpy effect;
- pointy brushes are useful for thin light strokes;

b. Potential brush strokes and arm movement – have students practice the following brush strokes and
notice their visual effects:
- hold a paint brush in hand and move: just the hand/ full arm/ waist to arm to hand, with
a quick movement change of direction (up, across, and down);
- fling paint, which gives a spattered look on paper, similar to the splash of a bird
landing in water;
- grip firmly for a solid shape or gently for a flowing effect;
- Use slow speed for defined lines, or fast strokes for a wispy effect.
- Give direct brush strokes on paper with a toothbrush, or create the spatter effect by
running a fingertip nail across brush bristles.
- Dip a dry brush lightly into paint and use for: adding texture to a wet surface;
separating color lines for tree bark; painting filament plants such as grass; giving brush
strokes useful for showing animal fur.
- Alternate thin strokes with thick strokes.

c. Practicing with color: Please remind students to rinse brush off before dipping it into a new color. On their
scrap paper "palettes," have students paint one small circle in red. While still wet, quickly add more red and
watch color darken. Make a new red paint circle and add blue. Watch color turn $\Rightarrow$ purple. Make four new red
circles, continue this process, and add one color to each circle: add orange $\Rightarrow$ burnt orange; add yellow $\Rightarrow$ rusty
orange; add brown $\Rightarrow$ earthy brown; add black $\Rightarrow$ burgundy. Have students try this process with any other color
they are interested in. Ask them to label favored combinations, so that they can formulate more of it when
painting their picture.

d. Painting on a surface area that has been wet with water causes a flow of color. Painting on dry paper gives a
more defined image. Have students try practicing two possible approaches: wet half of a piece of scrap paper
and paint a simple colored shape, such as a yellow circle for the sun. On the other dry half, do a similar sun shape and compare the effect.

e. Seven varying techniques and their possible effects on watercolor art work:

1. **Sharp edge movement**– Run a bent paper clip or pointy rock over selected area(s) of the paper. Paint and create, for example, tree trunk lines or grooves on branches. The porous, scratched line area will absorb more color. Such scratch marks generally produce finer lines and increase texture effect. For a larger textured-area effect, a rough rock could be stroked in one direction, or strokes could even be crisscrossed, and paint could be applied over it. Avoid such strokes in water areas, where a smooth surface is more useful for achieving a mirror-like reflection of nearby objects.

2. **Wet-into wet painting**– Saturate paper with clean water using a large brush or sponge. Brush, spatter or flip paint on. It makes colors fuse, mix, and unique patterns result. Paper can be crumpled in the wetting stage and then painted. It gives a weblike effect. This technique is good for soft texture areas, as well as areas with mixed colors. Use sponges to lift out a cloud shape. **Wash technique** – Give watercolor painting more substance by slanting paper slightly and painting horizontal strokes. Overlap the strokes and work downwards. Squeeze out brush tip to pick up the remaining droplets of paint on the lowest section of that color area.

3. **Graduated wash technique**– Start with a dark wash and add clean water and try working downward. Last strokes are pure water. Do the reverse starting with a light color. -Useful for showing changes in light such as sunrise, sunset, moonrise, and moonset. It is also a good technique for showing surface.

4. **Silhouette shapes**– For practice, have students sketch their initials with significant space between an inner and outer line for each letter. Start with a dark wash outside the immediate edge of the letter and add water periodically. Lightest area should meet the outer border of the paper. A similar process could be applied to actual student sketches, or to natural samples such as leaves and rocks, that students have laid on their sketch paper.

5. **Line effect in art work**– Alternate a dark color with a light color either in curved or straight lines based on site or object.

6. **Resistant wax background**– Crayon coloring can be used when utilizing this technique for painting appropriate site areas. For example, when painting waves caused by air currents on Lake Wapalanne, a light gray or white crayon can be used to draw ripple lines, circles, and/or irregular blotches on selected sections of the lake area. After doing that, a paintbrush can be dragged across the entire lake area. Watercolor will only penetrate the un-crayoned areas of the lake, causing the desired light/dark wave effect.

5. **The mix technique**– Crayons, pastels, charcoal, etc. can all be utilized on the same work. Mixing such media causes a new surface texture that reflects light and dark in a different manner. It is also a way of creating new shades of colors for blending, subduing, or highlighting effects. Watercolors are also good in such a procedure, both under or over the other mediums.

7. Use fingers, pine cones and needles, tree bark, etc. as painting instruments.

**Summary**

Have students gather together. Ask them to share thoughts about their experience of both the forest and artistic expression of it in their paintings. Honesty is encouraged. If they found the activity boring, have them explain why. If they enjoyed it, ask for details. Suggest that they consider the future of their painted scenes or sketches if, for example, a business company managed to dispose of a dangerous waste that might seep into Lake Wapalanne. Have them describe its effect on the plants and animals in their scene, and what a future painting might reflect. Older students might bring
this topic up earlier in the class and decide to paint an impressionist version of the lake, one reflecting such pollution damage to the site. Encourage students to enjoy the land, appreciate it, protect it, preserve it, and allow it to continue its natural processes. The activities may inspire them to be willing to help in maintaining its character for future artists to interpret.

Bibliography

Lesson Contributors
Session developed in 1996 by Annette Sambolin, Research Associate for The New Jersey School of Conservation.
Black Bear Ecology  
(Ursus americanus)

Session Description

This investigation of the Black Bear (Ursus americanus) concentrates on adaptations, ecological relationships, conservation and management, and the general life history traits of this species. Participants will have the opportunity to examine a black bear pelt and skull, to discuss the natural history of black bear in New Jersey, to learn about the research techniques that have been employed to study these large omnivores, and to look for bear signs while hiking around the forested SOC campus. In the field, students will observe evidence of bear activity, examine a live-trap used for capturing black bear, investigate several den sites, and cover the data that bear researchers record. The session will conclude with an examination of the issues surrounding the interface of black bears and humans, and the impact humans have on the availability of black bear habitat.

Objectives

1. Students will describe black bear natural history and ecology in New Jersey.
2. Students will locate and identify signs of black bear in the forest during a hike and relate the signs to specific survival behaviors.
3. Students will develop observational/inquiry skills by generating questions about black bear ecology.
4. Students will compare, contrast and evaluate black bear conservation and management possibilities.

Background Information

See Black Bear Fact Sheet and Black Bear Instructor Sheet

• Materials
  In the classroom
  Bear hide and skull, bear track replica and tracking box, photographs of bear and bear signs, Star Ledger’s Back Bear Poster.
  Outdoors
  Styrofoam bear, stuffed toy bear, culver live-trap, and (optional) researcher’s backpack and tool box.

• Prior to Class
  Place the stuffed toy bear in the hollow log den if weather permits.

• Procedure
  1. Begin the session by asking students what they know about black bear. They can provide information that they may have read or seen on TV, or they can just make an observation based on the pelt and skull on the table in front of them. Use the Black Bear Fact Sheet to elaborate on the information the students provide.
  2. Ask the students where they would obtain information if asked to write a report on black bears (books, websites, and magazine articles)? Ask the students if they know how this information is obtained (through scientific research by biologists, mammalogists, ecologists, etc). How do researchers locate bears? What signs do they look for and where?
  3. Help the students to compile a list of bear signs (see the Black Bear Fact Sheet for more information):
    • Den/nest: (use photographs provided) point out possible den sites, their structures, and seasonal use. Explain the difference between hibernation and torpor (including the metabolic changes which occur).
    • Bent twigs, turned over logs and stones: Showing students a bear skull and examining the teeth while making reference to their function (small front teeth for nipping off vegetation, canines for
ripping flesh, and flattened molars for grinding food) ask students to list types of food eaten by bears. Bears are omnivores. Their jaws are powerful but unable to crush large bones.

- **Scat**: make reference to information researchers might be able to obtain from analyzing bear scat (diet; seasonal changes in diet, health).
- **Bear trees**: claw marks are made anywhere from 4 to 8 feet high on trees or telephone poles.
- **Tracks**: are used to indicate the direction of travel and assist researchers in locating the bears.

4. Invite students to the tracking box and press the black bear paw replica into the sand. Explain that bears are plantigrade walkers (that is they walk on the soles of their feet), their hind foot often steps in the track of their front foot, and they use trails traveled by other bears (often stepping in the exact spot a previous bear has stepped in). The flatness of their tracks may resemble human tracks (humans are also plantigrades).

5. At this point, explain to the students that they will be going on a hike to look for signs of black bear in the area. While hiking around Lake Wapalanne test their knowledge of bear signs by asking them to list the signs. Provide leading questions to assist students in locating the black bear signs for themselves.

6. Stop at the following black bear signs and discuss bear tree (telephone pole in front of Long House) Examine the claw and bite marks. What is the significance of this behavior? (visual and olfactory signals to other bear).

7. Next, stop at the culvert trap (across from the spill way). Once researchers suspect a bear is frequenting a given area, a trap can be baited with food and set in that area. Upon capture a radio collar will be placed on the bear so that it may be followed. Have students take turns entering the culver trap to experience what a bear experiences when it is caught. Ask the students what kind of information the researcher would collect from the captured bear (weight, length, blood sample, fur sample, tooth extraction, etc.).

8. Lead the students to an area where they can search for the kinds of food a bear would eat (nuts, berries, ants, skunk cabbage, etc.). Give the students about ten minutes to collect food and then review the findings with them. Point out how difficult food finding can be and discuss why bears raid garbage cans (lots of food in a small area).

9. Lead the students to the hollow tree/den with toy stuffed bear inside (hollow tree near the climbing wall). Encourage them to think about the surrounding habitat and what factors might influence den site (availability of food, water and shelter). This is also a good time to talk about the logistics of black bear reproduction since birth takes place in the den (see fact sheet for details).

10. **If time permits**, have the students record bear's coloration, weight, take body measurements, collect hair, simulate taking blood samples, sex bear, roughly predict it's age and simulated tooth extraction. Instructor should use the Instructor's Black Bear Handling Report Sheet and the Black Bear Fact Sheet to make reference to biological and ecological facts (adaptive coloration, gestation period, litter size, sexual dimorphism, home range, average weight, behavior, and population distribution) and to explain the significance of the data being collected.

**Summary**

Engage students in a discussion aimed at addressing New Jersey's human/bear conflict, encouraging them to share their feelings and suggest possible solutions to the conflict while applying information learned during the session to back up their ideas. Is it possible for bears and humans to co-exist? Do human activities have an impact on New Jersey’s black bear population? Are black bears an endangered species? Should we help to insure that black bear remain in New Jersey?

**Classroom Extension**

Have students design a housing development plan aimed at maintaining a sustainable black bear population while minimizing human/bear conflict.

**Bibliography**


Additional Teacher Resources


• Scholastic, New York, N.Y.; Bears: An Interactive Animal Kit (1998) (Includes a poster and cassette).


• Websites: www.state.nj.us/dep/fgw/bearinfo www.NewJerseySierra.org

Climbing Wall

Background Information

The act of quitting is generally a destructive pattern to habitually employ. If you hold back or quit when conditions are less than favorable, you may prevent yourself from reaching your full potential. Only by electing to participate in challenging endeavors can one break from this negative cycle. These challenges may be issues related to school, sports, personal or family relationships or any other area that requires effort to function at your highest level. Since we are all unique it is important to realize that we have our own individual limits for what we can achieve in certain areas.

Dr. Kurt Hahn, founder of Outward Bound, believed that few individuals truly live up to their full potential. Hahn believed that through structured programming people can further their self-esteem and then transfer that new found confidence into their everyday lives.

Mihaly Csikszentmihalyi (1975) developed the idea for the role of flow in a person’s life. Flow Theory describes those times at work or play when people experience feelings of enjoyment, concentration, and deep involvement. This theory suggests that any experience will be positive when the participant perceives that the environment incorporates sufficient opportunities for challenge which parallels their own skills. When the challenge and the required skill (relative to participants’ abilities) are high, the participant expands his/her capability while learning new skills and increases his/her self-image.

The climbing wall attempts to provide participants the opportunity to push themselves, hopefully a little further than they expected. Both climbing surfaces have three levels of challenge. This allows those climbers who are highly motivated to be challenged by attempting the most difficult routes. Conversely, this arrangement also helps those students who are less able or who need to bolster their self-confidence by providing them with less (more realistic) challenging routes.

Objectives

In order to accomplish the goals of increased self-confidence and to experience flow, the program should cause a little trepidation in the participants in order to stimulate them. Too little stimulation or challenge causes boredom, yet too much results in anxiety. Neither of these feelings is desirable. At the School of Conservation the climbing wall provides the best opportunity for matching the challenge with the required skill, and therefore is the most effective session for building confidence. In the end, the School of Conservation hopes the students will realize that by continually striving to conserve our natural resources, they can make an important difference. We must not quit in our efforts to protect the environment!

“If one advances confidently in the direction of his (her) dreams, and endeavors to live the life which he (she) has imagined, he (she) will meet with a success unexpected in common hours”. Thoreau

The effect on participants after climbing the wall, far exceed simple fun. Significant and positive changes in many individuals have been reported to have occurred after climbing the wall at SOC. Additional research on challenge education through climbing also supports this belief. The educational objectives of the wall are primarily two fold:

1) **Individual growth and development.** This is attained by having new experiences and by overcoming stressful situations. These growth areas may include physical, and emotional (increased self-image) growth.

2) **Group interaction and support.** Encouragement from the group can provide the final ingredient which may induce the climber to give maximum effort. Maximum effort provides the best opportunity for individual growth as listed above.
The specific objectives of Climbing Wall are to provide each student (individually) with the opportunity to:

1. Experience a sense of individual accomplishment.
2. Set challenging, yet realistic individual goals.
3. Understand that they are responsible for the decisions they make.
4. Provide positive encouragement and feedback to group members.
5. Experience the sensation of rock climbing.

Session Introduction

During the introduction to the class (prior to even seeing the wall) the SOC instructor will spell out some basic information. Safety, group support, and maximum effort will be the general thrust. It is imperative to be thorough during the introduction, since this sets the tone of the class and also forms the basis for the students' expectations. Shortening the introductory period seems to only slow the process later. It takes more time to continually review previous statements. Also when the students are fully apprised of the instructor's expectations they are better prepared to deal with the stress of climbing.

During this introduction we strive to form a verbal contract between the climbers (students) and the instructor prior to the activity. There are three statements that comprise the contract. Each student must agree to the contract before they are allowed to climb. The statements are; 1) If you want to climb, you must give a 100% effort. 2) When not climbing, each student must help all other students do their best by providing positive support. 3) No one comes down from the wall until the instructor says they can come down.

If any student does not agree to all three items on the contract, they should not put on a harness. By wearing the harness, the student is demonstrating that s/he agrees to all the terms of the contract. Many students prefer to watch one or more climbers before they commit themselves to climbing. This is understandable. We encourage students to gather as much pertinent data prior to acting as is possible. This allows them to make informed decisions.

The students are then taken to the wall site for discussion and demonstration of belaying, the harness and other equipment. It is explained that the ropes, carabiners and webbing we use are tested to several thousand pounds breaking strength. The analogy is often used that the rope could hold a passenger car with the group in the car! Although climbing a 20' wall may seem dangerous, by using good equipment and employing simple belaying techniques, the climbing wall is probably the safest activity in the Outdoor Pursuits area at SOC.

A student volunteer (preferably the same gender as the belayer) comes to the front of the group and the instructor assists in safely securing the harness. When complete the instructor should review for the remaining students the harness check that every climber will receive. This is accomplished by the instructor feeling for tightness the leg and waist sections. This check must be done on the students' side or hip area. The buckle is also checked to make certain it has been passed through the buckle three times. The student then threads the climbing rope up through the front portion of the harness for themselves. The final step is for the instructor to tie the reverse figure eight knot and back-up knots.

Once a student has committed to climbing, it is the facilitator's responsibility to maximize the benefit of the activity for each of the participants. Some students climb effortlessly to the top, while other students struggle to get halfway up. You may want to get the natural climbers to "risk" more by asking them to do additional challenges such as a "jumping jack" on top of the 2"x 6" platform. If any student rebels, remind them of the contract. They stated they would give 100% and they also knew they would not come down until the instructor said they could. Some students may attempt to get out of their contract by; (a) simply sitting in their harness, (b) having a temper tantrum, or (c) manipulating the belayer by crying. It can be a difficult judgment decision by the belayer to know how hard to push an individual student. Some crying
for example is an attempt to manipulate the belayer as stated above and other times is a sign that a student is at the end of his/her emotional endurance. If this is the case the student should be applauded for her/his effort and lowered to the ground. Remember, self-esteem is the primary objective of this session, and all decisions should be directed to this end.

The hand and foot holds are coded by degree of difficulty. Use of all holds is the least difficult route to the top. Using only the unmarked holds is more difficult, and using only the marked holds only is the most difficult most difficult challenge. Of course numerous variations exist which can serve to further challenge the climber. Students should state which level they will strive for. If a student is finding it easy going, the instructor should try to get them to attempt the next higher level of difficulty. The students will only get one chance to climb and they should make it their best effort.

No student should ever be coerced into climbing! **Challenge by choice** is the standard operating procedure when it comes to these types of adventure/challenge activities at SOC. If any student(s) elects not to climb, they must still support the others.

**Logistical Considerations**

It should be understood that not all students will have an opportunity to climb the wall while at SOC due to scheduling constraints. Sometimes misguided teachers/parents bring groups by the wall site as a way to appease the students that were not scheduled to climb. Please do not stop by unexpectedly with non-climbers. This seems to me to be similar to taking a child into a candy store and not making a purchase. It is generally better for them not to know what they are missing. All classes at SOC are valuable experiences, and no session should be promoted as “the most important”. All alternatives can also be fun and challenging. Maybe leaders could put the extra effort into making the class that is scheduled even better.

Visiting teachers and parents should help the students with adjusting the harnesses, and by providing positive support for the students. Teachers can become trained to assist at the climbing wall by participating in a training session prior to the group's arrival. This can help more students have a fulfilling experience at the wall.

During the cold winters it is probably best to have a back-up plan in the event that the temperature drops below 10 degrees Fahrenheit. Since only two students are climbing at a time, anything below this temperature it is just too difficult to maintain class interest for those waiting. The back-up class should also not be dependent on other weather or snow conditions. I would probably recommend Confidence Course or Group Initiatives as alternatives which replicate the excitement of the wall, but encourages more continuous activity from the entire group. These activities also help to keep the students warmer.

The first wall at SOC was constructed in 1977 by Dr. James Merritt. At that time very few climbing walls existed in the United States. The current wall was constructed in 1992 using a design which allows for two simultaneous climbers who are unable to see one another. This minimizes distractions and helps the climber to focus on the challenge at hand.

**Summation**

Following the activity, the wrap-up session should include- What difference does climbing the wall make in a person's life? Why do we have climbing at SOC? Students generally come up with a wide variety of answers, ranging from fun, to the need to work hard if we hope to solve our difficult environmental problems. Since students now choose the level of difficulty of their climb, appropriate goal setting may also be brought in to the debrief. Fulfilling your commitments or responsibilities is also frequently brought up. The question can then be asked, whose responsibility is it to conserve natural resources? Conserving natural resources is the responsibility of everyone who lives upon the earth. Protecting the earth’s resources will require a tremendous effort and commitment from a great many people.
When students elect not to participate, it is important to bring out the positive aspects from their non-participation during the debrief period. This is easily done by making the connection with peer pressure at school. It takes considerable courage to say "this is not for me". Ask the class, in what way does it take courage to say "no"? It can be difficult to stand up for your beliefs. Especially when the adults and peers want you to try something. Ascertain from the students what other instances might a similar situation occur? Things like smoking, drugs, alcohol use, etc. should arise.

The value of the climbing wall experience may be best summed up by the words of Oliver Wendell Holmes, "A mind that is stretched by a new experience can never go back to its old dimensions." Hopefully the climbers will remember the effort they gave as well as the feeling of accomplishment and satisfaction that came with it. Future obstacles and challenges are also achievable with concerted effort and fortitude.
Confidence Course

Background Information

It should come as no surprise that adolescents have to deal with several unique issues related to personal, interpersonal and social development. This age group places considerable emphasis on developing relationships, to fulfill a need to belong. Adolescents also spend much effort in developing a personal identity; an identity where they feel competent and comfortable. The confidence course can address these issues of personal and social development by fostering a sense of proficiency through personal testing.

Dr. Kurt Hahn borrowed, and modified the idea of obstacle courses from the military to use in a manner that more sharply focused on increasing the participant’s level of self-confidence. While touring Belgium, Hahn visited a 16th century church and read an inscription that when translated said, “You have more in you than you know”. Hahn believed this deeply, and set out to develop a program that stressed self-reliance and thereby increased participants’ self-confidence. The international program Kurt Hahn founded is Outward Bound.

Since Dr. James Merritt built the first course in 1968, the New Jersey School of Conservation has used a confidence course in the Outdoor Pursuits area of their environmental education program. In the ensuing period thousands of students from grade three through doctoral candidates have been through confidence courses at the School. Most have found the course to be challenging, rewarding, and also fun.

Objectives

During the confidence course session we strive to have participants experience "flow" or an "optimal experience". Flow theory (as developed by Csikszentmihalyi 1975) describes those times, at work or leisure, when people experience feelings of enjoyment, concentration, and deep involvement. Flow theory suggests that any experience will be positive when the participant perceives that the environment incorporates sufficient opportunities for challenge which parallels their own skills. When the challenge and the required skill (relative to participants' abilities) are high, the participant expands his/her capability while learning new skills and increases his/her self-image. Too great a challenge can lead to anxiety, while too little results in boredom. While some anxiety may be good, too much can be detrimental.

Therefore the objective of Confidence Course is to encourage each student to put him/herself in an uncomfortable or challenging situation. Because only by trying new things, things you are not quite certain you can do, can anyone expect to bolster their level of confidence. As the challenge approaches the participants' ultimate ability, the better chance for the student to have a "flow or peak experience". Since everyone has their own perception of what is “challenging”, each student must be allowed to participate or not and also be free to choose which individual activities at the confidence course best fit their abilities.

The specific objectives of Confidence Course are to provide each student (individually) with the opportunity to:

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<td>1</td>
<td>Experience a sense of individual accomplishment by challenging their apparent limits.</td>
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<td>2</td>
<td>Set physically challenging, yet realistic individual goals.</td>
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<tr>
<td>3</td>
<td>Responsibly protect group members from harm or injury.</td>
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<td>4</td>
<td>Provide positive encouragement and feedback to group members.</td>
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<tr>
<td>5</td>
<td>Demonstrate consideration for the uniqueness of each group member.</td>
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Superficially, Confidence Course may seem identical to Group Initiatives. This is not accurate. Although some of the activities may be the same, the objectives and therefore the manner in which they are conducted differs. The primary thrust of the Confidence Course is on the individual pushing their comfort level. In contrast the objective of Group Initiatives is for the group to creatively solve problems as a team.

Logistical Considerations

Only those adults who have successfully completed training with the Outdoor Pursuits Specialist at the N.J. School of Conservation are authorized to utilize the confidence course activities. This training must occur without the distractions of school children present.

For maximum effectiveness, a second adult who can effectively spot and manage the group should accompany the leader. This is to allow dividing the group into two sub-groups (one adult managing each sub-group) at the confidence course site, which permits the students more opportunities to challenge themselves at the site. All adult leaders must be diligent in managing the risks to their students. Students can not be expected to consistently and effectively spot without adult supervision. Treat and protect each student as if he/she were your own child. Also the group size is best limited to 12 students, with two hours for the class. As the class size increases, or the length of time decreases, confidence building opportunities become more limited, and the benefits are compromised.

Activities that might be a part of Confidence Course are; Willow in the Wind, Levitation, Cargo Net, Beam, Toxic Waste, Trust Falls, Wild Woosey, and Cable Bridge. The Climbing Wall also serves to elevate self confidence levels, but is not considered a part of Confidence Course.

The Cable Bridge may also be incorporated into other planned activities outside of Confidence Course such as the science class - River Ramble. Facilitators should therefore be aware of the schedule of the group they are leading so as not to duplicate or lessen the impact of the experience. There is nothing worse than to be planning and emphasizing an activity, only to discover that the group did it earlier in their stay.

Since the students stay at SOC for such a short time, we want them all to benefit from the full range of unique experiences that are offered at the center. Therefore no field group should expect to participate in both Confidence Course and Climbing Wall. Their time may be put to better use by participating in the wide variety of opportunities that exist at SOC.

Introduction

The Introduction to the class may begin with a definition of confidence and then a discussion of how we gain and lose it. Confidence is gained by earning it through increasingly difficult tasks. We lose it primarily through "put downs" from others. Please remember that the students are best able to decide for themselves which activities in the confidence course session best suits them or adequately challenges their abilities.

As a facilitator a review of human and environmental hazards is required. Check each individual for potential hazards such as earrings, cameras, pencils, etc., and any other "human factors" which may lead to an accident. Prior to allowing anyone participate on any event the facilitator should take the time to check wires and connections and other "environmental hazards" such as ice where spotters need to be. Spread sand or wood chips to improve footing or seek alternative activities. It is negligent to be aware of a hazardous situation and conduct the activity without acting to improve the situation.

Other points that should be brought out during the introduction are safety through acting responsibly, and supporting each and every participant. No one can completely commit to doing their best, if they do not trust their group members. A verbal agreement may prove beneficial at this point. Ask the group members if there is anyone who can not spot effectively nor act responsibly. No one has yet admitted this. If a problem arises you can then return to the agreement for discussion.
The strategy we typically use at SOC involves beginning the session with the lowest risk activities and progressing to more difficult challenges. This progression allows the facilitator to witness the group's actions and establish a track record. The leader then has a better idea of the group's ability and is therefore in a better position to make the appropriate decision regarding which activities the group should attempt. Each SOC facilitator is expected to use good judgment when determining which activity the group is both willing and able to participate in. The determining factor is based on the group safety awareness that has been demonstrated during the initial and lower activities. The decisions should lean toward the conservative side!

Therefore, the “Willow in the Wind” activity is frequently done first. During this activity the facilitator instructs the class in safe spotting procedures. If a group demonstrates that it can function safely while standing on the ground, we can progress to an activity that is of greater height. When that has been successfully accomplished the group can move on to more challenging tasks. We want each group to experience every challenge we have to offer, yet the safety of the group must be our highest priority. We will also act in a proactive manner to minimize the chance for injury.

There are very few groups that can work through the sequence of activities and still have time for Trust Falls. Trust Falls are the most demanding exercises and therefore has the greatest potential for both growth and injury. We do not teach Trust Falls to visiting teachers, but we ourselves may elect to offer it to the group under our supervision. No one should be considered trained in this activity by mere observation. It is an activity that is rarely experienced due to the expanded confidence course possibilities that now exist at SOC.

Also extreme care must be taken if the facilitator decides to participate in any of the activities. Always consider; Can the group really catch you? If while participating you were injured, would the class be able to effectively react? Does the group know where to get help without walking around the lake three times? These are just some of the many questions you must ask yourself before volunteering to participate.

Please remember that participation in any of these activities is voluntary!

Possible Activities (sequence may be altered)

*Willow in the Wind*

The group stands shoulder to shoulder in a circle. They should stand in such a way that they have one foot forward and the other foot back. This position provides a stable foundation. One volunteer stands rigid in the middle of the circle with arms crossed over the chest. Remaining rigid the volunteer falls in any direction. The group should collectively catch them, and ease the person around or across the circle. It is important to be aware of and prevent hard shoving. Rotate the center person fairly quickly, because it can get boring to the group. If anyone hits the ground it tends to cause others not to participate. Find a location where a fall probably would not cause an injury. Please be aware that experience has shown that after a few children have successfully been passed around the circle, some of the children begin to lose interest. When this happens they often decide to make it more fun by shoving and other inappropriate actions.

*Levitation*

The group begins by forming two equal lines facing each other and kneeling. A volunteer lay at the feet of the group, between the lines. The group collectively lifts the volunteer gently and begins swaying or rocking the participants. The group then stands, and while continuing to rock the volunteer, they lift higher and higher until they are at the greatest height possible then slowly return to the ground. This is a very pleasant experience. The effect is maximized if the group remains silent during the entire activity. The entire process should take ~ 30 seconds/person. Find a location where a fall probably would not cause an injury. Due to the physical exertion required to do this activity, we normally would only offer it to a few,
light weight students, and then I would try to get volunteers from those that did not participate in the Willow in the wind activity described above. The appropriate area to do this activity is free from rocks and other hard objects with a soft litter layer.

Confidence Course Site

When utilizing this location please take care that all students off the ground are adequately spotted. This probably means at least four spotters/student. When facilitating this program it is good to allow the students to choose which two or three of the eleven elements they wish to try. They can then choose those elements which are appropriate to their abilities. When everyone has had an opportunity to complete these 2-3 elements, only have them pick additional elements if time allows. Since we are asking the students to push their limits, it is extremely advisable to have a responsible adult spotting each student off the ground, in addition to student spotters. Safety is the primary concern at this and all activities. The location of this activity is down the trail toward the cargo net site, and then turn left. activity along the ASE road. Check wires, connections and landing area prior to allowing students on. This activity often captivates the students to such an extent that they forget about their spotting obligations. Maintaining a suitable climate for student participation is the attending adult’s toughest job. Refer to the last page for a drawing of the Confidence Course.

Wild Woosey

Requires two participants working together. The goal is to progress as far as possible along two diverging cables. The pair should physically support each other on the cable. This support should be done by each person making a fist with the right hand and grabbing the other person’s fist with their left hand. This prevents broken fingers. At least two spotters should be on the outside of the wires with two more spotters placed in the middle. As the team moves down the wires, the spotters must also move with them. This activity utilizes the two adjacent tight wires at the Confidence Course that form an acute angle. A second Wild Woosey can be found up stream from the Heritage House (stone cabin) which is on the intermediate orienteering course. Check wires, connections and landing area prior to allowing students on the event.

Depending upon your route, two log bridges are on a rough trail between the Heritage House and the Cable Bridge. Some facilitators choose (if time allows) to lead the group over them and then return to the south shore of the Big Flatbrook stream using the Cable Bridge. When crossing these logs an adult should go half way across and find suitable footing to assist students if needed. Simply extend a hand for them to grab if they so desire. Before leading the group across the large log crossing the Big Flatbrook, determine if the streams water level is of appropriate depth.

Cable Bridge

This activity is located over the Flatbrook stream, behind of and up stream from the compost bins and archery range. It is preferred to have students facing down stream and crossing one (or two) at a time. Please discourage anyone from bouncing on the wire. If a student is reluctant, it sometimes helps if the facilitator accompanies them across. The facilitator can then steady the wire for the nervous student. Check wires and connections prior to allowing students on the event. Please be aware that high or low water levels can require the cancellation of this component of the program. The current is deemed too strong if the weakest person could not make his/her way to the bank without being swept away by the current in the event of a fall. The trend seems to be that kids “fall” in the water only on warm days. If this happens on a cold day, quickly evacuate the wet student to the nearest warm building and remove wet clothes, while preserving the victim’s dignity. Immersion hypothermia can occur very rapidly. Always check the master schedule prior to taking a group to the cable bridge; this can eliminate unwanted congestion at the site.
Cargo Net

This activity can be used as a "testing" activity to determine whether your group is ready, in regards to safety, for the confidence course (toxic waste). This is an elevated activity, yet the risk is only during the entering and exiting the net. Follow instructions as indicated on the Cargo Net sheet. Check wires, connections and landing area prior to allowing students on the event. This element is located on the right side of ASE road near Reverse log. The dismount is critical and requires a “palms up grip”.

Beam

This activity may also be used as a "test" activity for your group. Does the group need to be "tested" on both Cargo Net and Beam? Use your judgment. During this elevated activity every person off the ground is at risk of falling, therefore attentive spotting is essential. Follow instructions as indicated on the Beam sheet. Check wires and connections prior to allowing students on the event. This activity is located on the left side of the ASE road.

Summation

Following the activities and before the class is dismissed, a summary of the lessons learned should be led by the facilitator. A commonly asked question may be, Why does SOC have a confidence course? SOC is an environmental education center, What does a confidence course have to do with environmental education? Hopefully, the idea that a determined person, working alone can make significant contributions to society, and/or to the environment. Every day people make decisions that impact on the environment in small ways, such as turning off lights, and water spigots when they are not being used. These may seem like small items, however if you multiply the savings by the number of days in a lifetime, the impact is significant. Also many others are making the same sorts of environmental decisions. We need to have confidence that our environmental problems are surmountable. We need to have confidence that our neighbors are also working to improve our environment. We also need to have confidence that each one of us can teach others and help them understand that our actions make a difference. Without a summation, very few students will understand the environmental connection to confidence course. It will be demoted to merely a fun time, rather than an educational experience that was also enjoyable.
Eco Discovery
(Answer key in Faculty Annex)

Instructions:
1. **Choose one person who will be in charge of this form and who will record your answers to all questions.**
2. **Read ALL the questions on both sides of the paper before writing down any answers.**
3. **Keep the group together as much as possible.**
4. **Teachers or adult supervisors SHOULD NOT take charge of the groups. ECO DISCOVERY is to be done by the students without any help from adults, until the discovery activity is completed. Adults can review the answer key with students, if interested, AFTER sites on the discovery search have been reached, or data about the site found.**

1. What is the brand name of the milk you had during your meals? ______________________________
2. What are the colors of the lunch table seats in Big Timbers or Long House?_____________________
3. Who has the best vision in your group?___________________________________________________
4. What building is closest to the SOC mailbox?_____________________________________________
5. How many windows does the Trading Post building have? _________________________________
6. What color are the boat docks on Lake Wapalanne?________________________________________
7. How many canoes are stored near the dock closest to Big Timbers?__________________________
8. Who is the library named after? _________________________________________________________
9. How many people are in your group?____________________________________________________
10. What is the name of the building that the Infirmary is in?________________________________
11. What winter hiking equipment can you find mounted above the outside doorway entrance to Kittatinny Hall?____________________________________________________________________
12. How many floorboards are there in Rainbow Bridge?___________________________________
13. How many signs are there around the border of the Wildlife Management area? _____________
14. Approximately how tall are the trees on Piney Point?___________________________________
15. The trees on Piney Point are planted in a special way. How are they planted?_______________
16. What kind of pattern do the boards in the door of Seneca Lodge make?______________________
17. How many windows are in Lenape Lodge?_______________________________________________
18. What kind of material is the beach area made from?_______________________________________
19. Who is the tallest person in the group?_________________________________________________
20. Who is the shortest person in the group?_______________________________________________
21. What is the name of the family who owned the early American block cabin located near the corral?___________________________________________________________________________
22. When lined up shortest to tallest, who is in the middle?_______________________________
23. Make up a name for your group._______________________________________________________
24. How many have blue eyes?_________ brown eyes?_________ green eyes?_______________
25. What is the favorite food of the group?________________________________________________
26. How many flag poles are on the Wapalanne side of the lake?_______ Sequoia side of the lake?______
27. On Piney Point, logs form a circle. What is in the center of the circle?____________________
28. Make an X on the map in the spot where you think the lake is the deepest.______________________
29. Which is the most important building at the School of Conservation? ______________________
   Why?________________________________________________________________________________
30. How many pine trees are planted on the dam at the edge of Lake Wapalanne?__________
31. Lake Wapalanne was given the Indian name “Wapalanne” because it has the shape of a ___________________________ eagle ___________________________ beaver ___________________________ trout fish.
Early American Woodworking

Description:

This hands-on session takes place in the School of Conservation’s 150 year old Carriage House. After a discussion of the Colonial period, and a look at tree types and felling practices, students will use Colonial tools to complete a group or individual project.

Objectives:

1. Students will use Colonial tools to make a bootjack, a coat rack, or a candleholder.
2. Students will compare and contrast Colonial tools with corresponding Modern tools.
3. Students will compose a description of a Colonial woodworker based on their experiences using the Colonial tools.
4. Students will justify the value of trees and wood to both Colonial and Modern people.

Materials Needed:

Drawknives; shaving horses; lathe; chisel; augers; cross-cut saw; felling axe; fro; fro club; peavey; spud; wedge; mallet; several quarters of wood for froing; several sticks of wood for use w/ drawknives; Tree-Felling card; Early Workers of Wood cards; World of Wood card; For Every Need card; Modern Tool equivalents cards; Tool Evolution Notebook; Museum of Early American Tools notebook

Procedure:

1. Begin by demonstrating two colonial tools that have practical names: the drawknife and the shaving horse. Have students try to guess the names of the tools. What are the uses of these tools? How are they powered? How might a colonial person have used even the smallest shavings that fell from the wood?

2. Show students the lathe. What would this tool be used for? How is it powered? Inform them that a woodworker who used a lathe to make bowls, chair parts, and wheel hubs had a special name; he was called a turner. If there is time, play the Early Workers of Wood match game. Do they know anyone with a last name that describes an ancestor’s job? Choose two students to demonstrate the use of the drawknife and lathe.

3. Ask students what time period they think the tools are from. Introduce them to the colonial period and to woodworking by showing them items a colonial woodworker might have made (see laminated card “A World of Wooden Things”). What would he have needed to know in order to make these items? (What tools to use, how to use them, and what wood to use).

4. Using the laminated card titled “Things to Consider Before Felling a Tree,” show students a few trees in the forest, identify them, and discuss what uses they would have had for the colonial woodworker. For instance, the ash in front of the carriage house can be identified by its opposite branching and diamond-patterned bark. Since ash is a very hard wood (its cells grow densely) it was used to make the handles of tools such as hammers, and baseball bats. Behind the carriage house stands a large white oak, which can be identified by its acorns, wavy-lobed leaves, and white, flakey bark. Since white oak is very resistant to decay, it was often used for flooring and barrels. A woodworker who made barrels was called a Cooper, another last name we take from our history.

5. Finally, take students to the large white pine out in the forest. Bring the felling axe and cross-cut saw with you. What criteria would a woodworker use to choose a tree? (Type of wood, use of wood, size, straightness, number of branches and knots). What would he need to consider before cutting it? (Which way it was leaning, the wind, where heavy branches are). Show students the stump and describe how a tree can be forced to fall in a certain direction.
6. Take the cross-cut saw to the log fixed in the tackle prop. Point out what the tackle prop is made of: a forked branch. Allow students in pairs to use the cross-cut saw to cut a slice from the log.

7. Leaving the cross-cut saw at the tackle prop, move on to the peavey. Have students try to move the log lying on the ground with just their hands. Show them how the peavey can hook onto the log and then be used to move the log. Choose a student to use the peavey.

8. Next, demonstrate the use of the adze and/or spud and hammer to strip the bark from the log. An adze was sometimes also used to square the log, although a broadaxe was the tool of choice for this purpose. Show the laminated picture of squaring a log. Point out how and why the logs in Degroat Cabin have been squared.

9. Have students sit on the logs provided while you demonstrate the final tools: the froe and froe club and/or the wedge and mallet. Give each child a turn until you have sliced off a board appropriate for making a boot jack or coat rack.

10. At this point, allow students practice time with the tools. Station yourself or a parent at the cross-cut saw, and have another adult supervise the use of the froe. If time permits, students may make individual candleholders, or work in small groups to make boot jacks or coat racks. If there is little time, help students to finish one group project that they can take back to their classroom.

**Summary:**

Gather students together and have them show their finished projects. What kinds of qualities would a colonial woodworker have needed in order to produce these items? How do you think the woodworker valued the items he or she made? Can they name something in their house that is made of wood? Should they value this item? Why?

If there is time, hand out the pictures of modern tools and have the students tell you which colonial tool serves the same purpose. How do most modern tools differ from colonial tools? What do we use to power many modern tools? How does this affect our environment?

**Bibliography:**

Orienteering – The Fundamentals

ORIENTEERING RATIONALE:

The School of Conservation teaches basic orienteering skills to students because we believe this is an essential outdoor skill. According to Bjorn Kjellstrom, author and founder of Silva Compass Co., once these skills are acquired, students will be more "self-reliant and confident." At SOC we also believe this confidence leads to an increased comfort level while in natural areas. If students are more comfortable in natural areas, then they are more likely to visit them, and while there, they will more thoroughly enjoy these places. Increasing any one's enjoyment and interaction with the natural world will in turn hopefully foster an improved environmental ethic.

BACKGROUND INFORMATION:

We use and depend on map and compass skills nearly every day. When we travel (whether by automobile, bike, foot, etc.) from one place to another we choose which route we would like to use based on our priorities of aesthetics, time constraints, traffic conditions and many other factors. When providing directions to others, our brain automatically begins making mental maps which we rely on to describe the proposed route. Landmarks are often given to provide visual feedback for those following our directions. We also frequently rely on the four cardinal directions of North, South, East and West when giving directions.

Compasses work because there is a natural magnetic field surrounding the Earth that is caused by the liquid metal near the center of our planet. One end is near the North Pole and the other end is near the South Pole. The Chinese are credited with this discovery nearly 4500 years ago. Historians believe this magnetic field was first detected when someone placed a sliver of lodestone (type of magnetized rock) on a raft made of bark or wood and then set it in a pond. Under these circumstances the raft was able to turn until the lodestone was aligned with the magnetic field. Once aligned, the raft would cease to spin. The discoverer then tested the theory by traveling to different areas, at various times of day to determine if this phenomenon was constant. Since the magnetic field is a constant phenomenon, then angles from this constant, measured in degrees, can be determined. In short, the compass is a fancy protractor with a sensitized needle that provides all users with a common starting position or reference point. It wasn't until approximately 1100 AD that a written description of a magnetic compass the first documented in China. The literature from Europe documents the use of a compass at about 1200 AD.

The pioneer scout, trapper, and wilderness explorer relied heavily on the skill of path finding. A highly developed sense of observation and memory were required to place the natural signs of mountains and rivers, stars and vegetation into a familiar pattern that provided the landmarks needed to travel when both maps and compasses were very primitive.

Orienteering has evolved into a very popular sport around the world, but particularly in the Scandinavian countries (Denmark, Norway, Finland, and Sweden). Using the combination of a compass and a map the athletes are sent off in timed intervals, and then choose which route between controls or stations would be quickest. A straight line between two objects, although the shortest distance, may not be the most time efficient. Factors affecting the route chosen include distance, vegetation, waterways, cliffs or many other types of obstructions. Because people who orienteer are continually evaluating their position and making decisions while on the run, the sport of Orienteering is sometimes called the 'thinking man's or women's' sport.
PREPARATORY REMARKS / ACTIVITIES

Before the session, the instructor should check to make certain all equipment items are available and in working condition. All compasses should have strings long enough to be worn around the neck. Compasses should not have large (bigger than 1/4") air bubbles in the housing.

1. Review different uses of compasses: piloting ships and planes, military, sports including hiking, bird watching, fishing, etc.

2. Using the large demonstration compass to review the parts of the compass (see graphic):
   a) **Base Plate** - rectangular bottom.
   b) **Housing** - circular raised portion of the compass.
   c) **Magnetic Needle** - one half red, one half white inside of housing; **red end always points north** when the compass is held still and level. However, iron, steel or electrical devices (cameras) can affect the needle.
   d) **Direction of Travel Arrow** - etched on base where it says "read bearing here". Should always be pointing in the **same** direction as your 'nose and your toes'.
   e) **Orienting Arrow** - has "sergeant" stripes and is the arrow you align with the magnetic needle after setting a bearing. (Put **RED to BED**)

3. Have all students practice setting a bearing and then walking a triangle or square using their compasses. First have students mark their "home base" (starting point) with something from their pocket: a stick, rock, etc. To walk squares start with any bearing at all, find a landmark, walk "X" number of steps toward that landmark, stop. Add 90° and repeat, using equal distances for each side. After 4 sides students should have returned to their "home base". For triangles use 120° and three sides. To keep sides equal in length, have students walk heel to toe.

   **The following advanced skills should be cautiously presented to students only after they have practiced the skills listed above.**

4. A **back bearing** is a method of reviewing your choice of a landmark. From a control locate and advance to your first landmark. Now turn and aim the Direction of Travel Arrow at the original control. The landmark you are now near will be accurate if the white end of the magnetic arrow falls directly above the orienting arrow.

5. **Pacing** is a simple method of keeping track of or estimating distance traveled. To determine your pace walk several times along a 100 ft. tape. A pace is simply two steps. If you begin walking with the right foot leading, begin counting every time your left foot hits the ground. After averaging the number of paces it is a simple matter of dividing 100 ft. by the number of paces needed to cover that distance. The resulting number is the length of your pace. Now if you measure on your map that your destination is 1/4 mile away, with a pace equaling five feet, you now know that in approximately 264 paces you should be very near your goal. Factors that influence the length of your pace over uneven terrain are hills, thick brush, and other impediments to forward progress.

6. **SETTING A COMPASS FROM A MAP**

   To determine an unknown bearing use the following instructions:
   A. Refer to the laminated map supplied by SOC. Unlike many maps, the diagonal lines on this map align with **magnetic north** (not true north); this makes setting a compass bearing from this map very easy.
   B. On the map, identify or draw a line that connects your starting point with your destination point. Place your compass edge along this line of travel on the map, making sure that the
Direction-of-Travel Arrow on the compass is pointing from your starting point toward your destination point.

C. While holding the compass so that its position does not shift, turn the circular housing until the orienting arrow and housing lines are parallel to the magnetic north lines on the map. The number at the "read-bearing-here" mark on the compass is the bearing to follow. When doing this step it is important to remember that the Orienting Arrow on the compass should be pointing toward the magnetic north on the map.

D. The compass bearing is now read at the Direction of Travel Arrow.

Teaching this technique to the students may be too difficult, however they should realize that bearings are determined from using the compass in conjunction with the map, and are not always provided as they are in the SOC orienteering lessons. It can also be helpful to estimate the bearing by looking at the line you want to travel on the map and then make use of the cardinal directions and their number equivalents.

For example, if you wish to go to a place that is 60 degrees away from a starting point you would first draw a pencil line on the map from start to finish. Then using the magnetic north lines on the map as a guide, write the number equivalent of North (0 or 360 degrees) on the map, and then repeat with the number equivalent of East (90 degrees). Your compass bearing should fall in between these two extremes, with your destination (60 degrees) line being closer to East (90 degrees) than North (0 degrees).

Special Note for Orienteering Instructors meeting at the Infirmary or Big Timbers

If and only if you are conducting your class from the Big Timbers/Infirmary Area, you will proceed to Cabin #2 after the initial lesson and reviews. At Cabin #2 set the compass to 214 degrees. Following this bearing for ~ 900 feet should lead you across the stream (use stones as a bridge) and eventually to the trail intersection of Tinsley Trail (yellow blazes) and the Spring Brook Cabin Trail. Once you arrive there with the group turn left onto the Spring Brook Cabin Trail and follow it to the cabin. The cabin’s picnic table provides a good location to review the process for determining a bearing from a map as described in #6 above. Follow this process to determine the correct bearing for a hike back to camp from the cabin to the Trading Post circle. The bearing should be 338 degrees for a distance of ~.50 miles. Leaving from the outhouse keeps the hikers away from most of the wettest areas. Please take care moving through the rocky terrain.
BIBLIOGRAPHY


5. For information about Orienteering events in North Jersey /Southern Tier of New York region visit the Hudson Valley Orienteering Club at: www.geocities.com/Yosemite/8761/

6. For information about Orienteering events in southern New Jersey and Pennsylvania contact the Delaware Valley Orienteering Club at: www.dvoa.us.orienteering.org/

12/04 WMM
Ornithology: Bird Identification Trail

DESCRIPTION:
This activity can be used alone or in conjunction with the lesson “The Ways of Wild Birds”. The trail uses simulated wooden birds placed along a trail and is designed to give students practice locating and identifying common species of birds. The twelve stations that are part of the trail highlight a variety of birds and habitats. The trail is “teacher friendly” in that the accompanying teacher’s manual provides photographs and information about each bird along the trail.

OBJECTIVES:

• To give students experience using field guides and binoculars to identify birds.
• To expose students to the study of ornithology, and to bird watching as a recreational pastime.
• To provide students with an awareness of birds, and the role they play in the natural environment.
• To provide teachers with a ‘bird activity’ that is user friendly and can be used at any time during the year.

BACKGROUND INFORMATION:
Bird watching is an excellent tool to introduce students to the importance of wildlife. It is an activity that can easily be continued at home or at school and often continues as a life long hobby. Learning to identify birds is a good first step; however the lessons should not end there. The behavior of birds, the interaction of birds with their environment and the monitoring of birds as indicators species of the health of an environment are steps that should naturally progress over time. Even if this activity is being utilized alone, teachers should consult and include the scientific and conservation information contained in the “Ways of Wild Birds” lesson.

MATERIALS:
Pictures of a variety of birds
Bird field guides
Binoculars
Bird Trail Teacher’s Guide Book

STUDENT ORIENTATION / PROCEDURES:
Students will need two tools in order to fully utilize the bird trail; binoculars and a field guide. First it is important to talk about key terms/areas of the bird that are often used for identification. Use pictures of different birds to help students better understand these terms.

Key areas used in bird identification

- Eye Ring or Line
- Beak/Bill
- Crest
- Crown-top of head, feathers not high like a crest
- Throat
- Back
- Breast
- Wing Bars
- Side
- Tail Feathers
Have students investigate the field guides provided so that they understand the layout of the book. In order to acquaint students with the field guide you may want to ‘quiz’ them with questions such as:

- On what page can you find a purple finch?
  How did you determine this?
- If you see a very large bird in flight that you think may be a hawk, what would be your next step in using the field guide?
- If you see a bird that is bright red and orange, how could you narrow down what you think it may be?

Once students seem comfortable with the layout of the field guide it is important for them to practice using the binoculars. Using binoculars takes a bit of practice, which is why the wooden, non-moving birds on this trail provide a good start for beginning bird watchers. Students should practice finding, with their binoculars, an object in the distance and then practice focusing on objects that are a variety of distances away. For safety reasons, remind students not to walk while looking through the binoculars.

Once you are comfortable with the students understanding of the key vocabulary words, the layout of the field guide and the use of the binoculars you can move on to the trail which is located behind Cabin #2

**BIRD TRAIL:**

The ‘bird trail’ utilizes the Green Darner trail, which begins behind cabin #2. The ‘bird trail’ portion consists of twelve different stations; a numbered falcon that is mounted on a post marks the stations. The ‘bird trail’ makes a circle with the beginning markers on the right side of the trail. Once you reach the marsh there will be four markers that loop you back around and head you back to cabin #2, all the while following the Green Darner Trail markers.

Once you reach a station marker students should try to locate a life size, wooden model of a bird. All of the birds are mounted 50 –100 feet directly behind each marker, it is intended that the group stays near the markers and use their binoculars to locate the birds. Birds are mounted in their natural setting, meaning if they are ground birds they will be found on the ground, if the are song birds they are in the trees etc...

Once the birds are located students should use the field guides to come to a consensus as to what the bird is, here is where a discussion of identification features is key. Once the group comes to a consensus on what bird they have located the teacher’s manual will provide a photograph of the bird, its scientific and common name and additional scientific, social and conservation information about the bird. Some fun facts, trivia and jokes have been added as well. The birds in the teacher’s guide clearly correspond to the numbered markers on the trail.

It is important to keep in mind that the birds that have been included in the trail survey a wide range of habitats, a variety of species, and birds that students may come in contact with in their everyday lives. Developing an appreciation for and an understanding of this group of wildlife should be a primary focus.

**WRAP-UP:**

✓ Have students identify which birds were located in what type of habitat, and discuss how that habitat is important to that birds’ survival.
✓ Discuss food chains and food webs that include birds.
✓ Discuss the importance of a clean environment and how pollution may affect different birds.
✓ Discuss which birds were easiest and which were the most difficult to identify. How would bird identification change if the birds were moving?
✓ What other birds are common or familiar?

**FOLLOW-UP:**

Have students set up bird feeders at school. (Discuss Black Bear issues with feeders)
Begin a class ‘life-list’ of birds they have seen.
Discuss/Research different nesting boxes or houses and build some.
Learn to identify birds by their songs.
Sensory Awareness in Nature
A selection of activities

1. **Sounds** - Each student is secretly given the name of an animal, then blindfolded. By imitating the sound the animal makes, the group must line up from the smallest to the largest.

2. **A Listening Experience** - The teacher has various objects which the students can not see. The teacher shakes, scrapes, bangs, etc. each object. The students then try to guess what the object is, or describe the sound verbally or in writing. Try to mix types and familiarity of sounds.

3. **A Tactile Experience** - Objects of various shapes and textures are put into opaque bags. The students will feel one object, or each object, then guess what it is. They can also draw the object as accurately as they can just by handling it or describe the way it feels verbally or in writing.

4. **An Olfactory Experience** - The students are given various scents without seeing or touching the source of the odor. They are then asked to guess what it is or describe it orally or in writing.

5. **A Taste Experience** - The students are given various objects to taste, without seeing or touching them if possible. They are asked to guess the object or describe it orally or in writing. Be careful of food allergies and also of poisonous substances. Make sure you know what something is before you allow a student to taste it.

6. **Sense Chart or Sensory Hike** - You can have charts made up, or have the students make their own. Leave a blank column down the left side of the chart and across the top head five columns: see, hear, touch, smell, taste. In the left-hand column, record an object observed on the Sensory Hike. In the columns below each of the senses record sensory words which are descriptive of the object, such as a tree which looks tall and straight, sounds swishy in the breeze, has scaly bark and soft needles, smells like Christmas and tastes bitter. There will naturally be things you can not taste or smell, but use your imagination and observe through the other senses as best you can.

7. **Blindfolded Walk** - All students are blindfolded and led on a walk. During this walk they are to receive through their other four senses as much information as they can concerning their walk. They are then asked to list or describe as many sensations as they can remember from their walk.

8. **A Simple Poem** - The *cinquain* is a very simple poem encouraging the use of descriptive words, thus increasing the observational skills of the author.

   - **State the name of the object:** Snow
   - **Use two short descriptive words:** Cold, grey
   - **Use three words to describe further:** Swirling, whistling, cutting
   - **Use four words to describe how you feel about the object:** Exhilarated, calm, athletic, clean
   - **Repeat the first line (or use a synonym):** Snow (blanket)

9. **Drawing Through a Frame** - Using a coat hanger bent to form a circle, diamond, or a square as a frame, draw on paper what you see in this frame. You can also use sturdy cardboard for a frame.

10. **Microquadrat** - Using the frame from #9, set it down on the ground and study very closely the area contained within the frame. Note the characteristics of the vegetation, soil, temperature and any life which might happen to pass by. Look for patterns, shapes, colors, etc.

11. **Object Characteristic Hunt** - Assign to groups of students or let them decide upon what characteristic (i.e. scaly) they wish to find in nature. Then collect, actually or by sketching, objects which have these characteristics without destroying the environment and display their examples to other members of the entire group. The rest of the students will attempt to guess their characteristics. Examples can be found of many colors, shapes, textures, etc.
12. "A Day (An Hour) in the Life of My Object" - Have the students imagine that they are an object found in nature. Then through writing or role playing, describe or act out things which happen to them during a certain period of time. One good example is the day in the life of a stream.

13. Sensory Meditation Period - Students go on a solo hike or sit in one place for a period of time. During this time, they gather all the sensory experiences they can. On-the-spot or upon their return, they can put their experiences into prose, poetry, art, music or drama.

14. Photography is a great activity for visual perception if it is practical for your classes.

Stonewall Study: A Guide Sheet

Mending Wall

Something there is that doesn’t love a wall,
That sends the frozen-ground-swell under it,
And spills the upper boulders in the sun;
And makes gaps even two can pass abreast.
The work of hunters is another thing:
I have come after them and made repair
Where they have left not one stone on a stone,
But they would have the rabbit out of hiding,
To please the yelping dogs. The gaps I mean,
No one has seen them made or heard them made,
But at spring mending-time we find them there.
I let my neighbor know beyond the hill;
And on a day we meet to walk the line
And set the wall between us once again.
We keep the wall between us as we go,
To each the boulders that have fallen to each.
And some are loaves and some so nearly balls
We have to use a spell to make them balance:
“Stay where you are until our backs are turned!”
We wear our fingers rough with handling them.
Oh, just another kind of out-door game,
One on a side. It comes to little more:
There where it is we do not need the wall:
He is all pine and I am apple orchard.
My apple trees will never get across
And eat the cones under his pines, I tell him.
He only says, “Good fences make good neighbours.”
Spring is the mischief in me, and I wonder
If I could put a notion in his head:
“Why do they make good neighbours? Isn’t it
Where there are cows? But here there are no cows.
Before I built a wall I’d ask to know
What I was walling in or walling out,
And to whom I was like to give offense.
Something there is that doesn’t like a wall,
That wants it down.” I could say ‘Elves’ to him,
But it’s not elves exactly, and I’d rather
He said it for himself. I see him there
Bringing a stone grasped firmly by the top
In each hand, like an old-stone savage armed.
He moves in darkness as it seems to me,
Not of woods only and the shade of trees.
He will not go behind his father’s saying,
And he likes having thought of it so well
He says again, “Good fences make good neighbours.”

---Robert Frost

NOTE: This guide sheet was extracted from an article entitled, “Stone Walls: Just Another Kind of Outdoor Game,” written by Robert E. Rutkowski, Assistant Director, Lakeside Nature Center, Spring Valley, New York. The School of Conservation is grateful for permission to use this material.
I. THE WALL

A. What types of rocks comprise the wall?
   1. Mineral composition, hardness, color, etc.
   2. Study and describe the textures and patterns of the rocks in the wall. Do so in different light conditions.

B. Are these rocks native to the area? If not, where do they come from?

C. Are the rocks fitted at their natural fractures?
   1. Does the wall taper? SKETCH
   2. Does the wall tilt? If so, why?
   3. Has mortar been used?

D. Is there evidence of weathering?
   1. What forces are at work? How do you know?
   2. How is the nearby soil affected?
   3. Compare it with soil 10 feet from the wall.

E. Measurements
   1. Length ______________ Width ______________ Height ______________
   2. How much area is enclosed by the wall [L x W] ______________
   3. What is the weight of the average stone?
   4. How many cubic feet of rock is in the wall? [LxWxH] ______________
   5. How do these measurements compare with modern proportions?
   6. In which direction does the wall run?

F. Microclimate Investigation
   1. Record the temperature at the top
      Side A ______________ Side B ______________
      Ground level A ______________ Ground level B ______________
   2. Record the temperature within the cracks in the wall: ______________
   3. Record the temperature 5 feet from the wall: ______________
      10 feet from the wall: ______________
   4. In winter, measure the snow depth on different sides of the wall. Why would snow recede faster on one side? Or accumulate deeper on one side?
   5. Calculate the amount of shade the wall receives. Devise your own system of measurement.
      Top ______________ Side A ______________ Side B ______________
      Ground level A ______________ Ground level B ______________
   6. Are the above measurements constant for the length of the wall? Where are the differences? Why?

II. HISTORICAL IMPLICATIONS

A. Was the wall built in a hurry or slowly? How do you know?
   1. Is there a gate or other break?
   2. Is there any hardware?
B. Does the wall follow a road bed or stream? If so, where does the road or stream lead? Consult a map, if necessary.

C. Is any other kind of barricade present?

D. Compare the building materials and techniques with known structures.

E. Consult a topographic map. Relate it to the tilt, angle, direction, position, etc., of the wall.

F. Research the land use pattern for the area.

G. Did the wall keep something in or out? Why do you think so?

H. Do you think that "good fences make good neighbors?" Why or why not?

III. FLORA

A. What plants are growing on the wall?

B. What plants are growing in cracks of the wall? Are any damaging the wall?

C. What plants are growing within 5 feet of the wall?

Within 10 feet?

D. Are the same types of plants growing on each side of the wall? If not, indicate the differences.

E. Is there the same amount of vegetation on each side of the wall? If not, indicate the differences.

F. Sketch the wall and its area, scaling the dimensions. Sketch the flora in position on this map.

IV. FAUNA

A. What animals are present [i.e. those actually seen or heard]?

1. On and within the wall

2. Nearby-within 5 feet

3. Within 10 feet
B. What animal homes are evident?

1. On and within the wall

2. Nearby-within 5 feet

3. Within 10 feet

C. What tracks are present?

1. On and within the wall

2. Close by

D. What other evidence of animal life do you notice?

MATERIALS NEEDED:

- compass
- magnifying lens
- meter stick
- tape measure
- identification keys
- thermometer
- topo and road maps
- soil testing kit
- rock hardness kit
- vinegar
- paper and pencil
Stream Geoecology

Session Description

In this session, students take a scenic hike along the Big Flatbrook River. Several stops include hands-on demonstration, simulation, and investigation activities related to the concept of watersheds.

Objectives

1. In the classroom, after observing the watershed demonstration, students will state orally the definition of a watershed in their own words.

2. At the Big Flatbrook, given a poster of a watershed that shows how stream profile, human activity, and wildlife usage differ in upper, middle, and lower portions of the watershed, students will discriminate between the upper, middle, and lower watershed by describing the stream profile, human activity, and wildlife usage that occur in each portion of the watershed.

3. At the Big Flatbrook, given the definition of point and nonpoint source pollution, students will discriminate between point and nonpoint source pollution by naming who represented each type of pollution after participation in a simulation of pollution traveling through a watershed.

4. At the Big Flatbrook, given a net, pan, and biotic index, students will generate an evaluation of water quality in the Big Flatbrook River by sorting the organisms caught into groups according to tolerance level.

5. At the Big Flatbrook, given a tape measure, stick, and stopwatch, students will demonstrate, by solving for the stream’s velocity, the formula \( d = rt \).

6. At the Big Flatbrook, given the formula for carrying power and the stream’s current velocity, students will identify, by calculating, the stream’s carrying power.

7. At the Big Flatbrook, after role-playing sediment in a watershed, students will identify the upper, middle, and lower watershed as primarily erosional or depositional bodies by interpreting the position of each type of sediment at the end of the role-play.

8. At the Big Flatbrook, after role-playing the flow of water along a tree-lined stream bank, students will identify how a stream meanders and cuts a flood plain over time by interpreting the effects of the water on the stream bank in the role-play.

9. At the old home site next to the Big Flatbrook, students will generate strategies for altering human activity in order to protect watersheds by synthesizing concepts learned during the Stream Geo-ecology hike.

Materials Needed

Paper; marker; spray bottle; relief map; watershed map; drainage patterns card; Flatbrook watershed card; watershed diagram; rope watershed; pollution bottles; tape measure; calculator; 5 strainers; biotic index; collection pan; sediment cards

Procedure

1. Demonstrate the making of a watershed by folding a piece of paper in half, coloring 1/2 inch on either side of the fold with a washable marker, crumpling the paper up, and then uncrumpling it. Have a student spray water on the top of the fold and watch two separate watersheds (or drainage basins) form on either side of the mountain. Ask students to define the term watershed (the land area from which a body of water
receives its supply of water. A watershed is an open system. What are its inputs? (precipitation, snow melt, sediment). What are its outputs? (evaporation, stream flow, deposition).

2. Have students identify which watershed they live in using the DEP map and point out its major rivers as well as the larger body of water into which it empties. Next, point out the Big Flatbrook watershed to the students and compare and contrast it to the watershed in which they live. (e.g. both empty into the Atlantic Coastal basin).

3. Show students the types of drainage patterns a watershed can have. Briefly discuss how the slope of the land and the structure of the underlying rock help shape each pattern. Show students the smaller map of the Upper Delaware Watershed. Which pattern do they think it most resembles? The Ridge and Valley province is often classified as a trellis-shaped watershed, with major rivers in the valleys and smaller streams joining them at nearly right angles from the ridges. Point out how the shape of the watershed changes as you change your scale of examination by having students try to identify the drainage pattern of just one stream in the Upper Delaware Watershed.

4. Begin your hike along the Big Flatbrook watershed. At the top of the hill overlooking the Flatbrook river, take out the watershed diagram. What drainage pattern does this diagram exhibit? Inform the students that although the Upper Delaware watershed has a trellis-like pattern, the Flatbrook watershed (within it) is more dendritic. Dendritic drainage patterns are the most common and can be found anywhere. Use the pictures on the diagram and the information on the back to discuss with students the differences in stream profile, human activity, and wildlife usage at each level of the watershed. Have students observe the environment around them. What part of the watershed do they think they are in now? Why? In what part of the watershed do they normally live?

5. At the bottom of the hill, use the ropes to illustrate the dendritic watershed pattern again. Have one student stand in the lower watershed holding a clear jar half full of water from the Big Flatbrook. Hand out the different types of “pollution” to the students in the upper watershed. Have each student contribute his or her type of pollution to the jar. You may refer to the watershed diagram to elicit from students where these types of pollution might come from. Discuss the differences between point source pollution (pollutions discharged from an identifiable point such as a pipe, ditch, or sewer) and nonpoint source pollution (widespread overland runoff).

6. Walk to a pebbled beach or other area where the water can be accessed easily for the biotic index. Use the watershed diagram to discuss different animal uses of the watershed. Hand out nets to pairs of students and demonstrate collecting techniques for aquatic organisms. Allow ten to fifteen minutes for collecting and then use the chart provided to complete a biotic index of the stream. If the stream were identified as Class III, how would scientists go about deciphering where the pollution was coming from? (they would check each stream leading into the Big Flatbrook to see if the pollution was widely spread or confined to one area).

7. If time permits, continue walking until you reach a broad floodplain. Hand out a particle card to each student. Have each student find an example of his or her particle.

8. Determine the velocity of the water using the rope measure, a stick, and a stopwatch. Square this number to get the carrying power of the stream. Point out to students the importance of this calculation: the carrying power of the stream increases proportionately with its velocity. Thus, even though the carrying power for cobblestones is considerably higher than the carrying power for sand, the stream only needs to be going a little faster in order to transport them.

9. At the same spot, line students up shoulder to shoulder, perpendicular to the stream. Have them look on their card and determine the carrying power necessary to transport their sediment down stream. Narrate a brief seasonal story for the Flatbrook in which you call out different carrying powers and the students take two steps forward if their particle can move at that power. When you have finished, have students observe their positions and point out how sediment is sorted as it is transported from the upper to lower watershed.
At what point in the watershed is the stream primarily an erosional body? At what point is it primarily depositional? Refer back to the watershed diagram to help them visualize this.

10. Next, have students simulate the meandering of the river by lining up in two rows, shoulder to shoulder, facing each other, about three feet apart. Give a few students sticks to hold up as trees. Have a teacher demonstrate the movement of water down the channel. Have a few of the trees topple over and into the water from leaning and erosion. This time, when the teacher demonstrates the flow of the water, he or she should bump (erode) students in the bank into a curvy shape as he or she attempts to go around the toppled trees. Use the watershed diagram to point out how streams erode banks on the outsides of curves, and deposit sand on the insides, creating huge flood plains to hold back waters from the lower watershed in times of flood. Have students feel the sponginess of the soil in the floodplain and look for evidence of recent floods (debris backed up against the bases of trees).

11. Conclude your hike at the old building site. Have students contrast this part of the floodplain with the portion they have just left. Have them look for evidence of human activity. Was this a good place for a home? Why or why not?

Summary

Review the activities of the hike and the concepts learned at each. How could humans change their activities to better protect watersheds? Discuss current litigation.

Classroom Extensions

Have students research their own watersheds. They can go to www.state.nj.us/dep/watershedmgmt for maps and information.

Bibliography


Survival Lesson Plan

Materials: Survival pack containing many of the following items: Flint & steel for spark, large plastic bag, candy bar, compass, map, newspaper, hat, pocket knife, whistle, flashlight, insect repellent, water bottle, watch, metal can, reflecting device, first aid kit, bandana, steel wool, and a tarp.

Objective: For the participants to understand the four steps to deal with emergencies and to be able to prioritize the four needs for survival. Participants should realize that being resourceful and improvising will help any emergency response be more effective. Finally we want students to realize that when going on hikes with their families or friends certain precautions should be taken to deal with unexpected emergency situations.

Procedure: Have group form a circle. Explain that with the ever-increasing luxuries and conveniences at work and at home, many people are unprepared for their trips in the out of doors. Life threatening situations can happen at any time. Please do not feel compelled to conduct all the activities described in this lesson.

First Activity: Ask the class - What is the worst reaction you could have to an emergency? Answer - PANIC! It then follows that one of the most important things we can teach is a tool for avoiding panic. We do this by using the S.T.O.P. cards. Place the cards, in order, on the ground, then lead a discussion to help the class understand these four steps.

| S  | S = Slow down. This gives you some time. Time for the sense of panic to pass, and Time to... Think! How much time you need to slow down depends on your situation. For example, you can spare more time if you are lost than if your house is on fire. |
| T  | T = Think, about the factors affecting your situation, such as time of day, weather, injuries, etc. If lost study the map for landmarks. When did you last know where you were? Are your footprints visible? Can you hear sounds of traffic? You can often find your way back if you take time to think. If you can't determine your way back, stay where you are! |
| O  | O = Observe what things are available to you that may be useful (resources) to help with the situation. What do you have in your pockets or pack? What useful items can you find or make from the natural materials surrounding you? You are trying to make yourself as comfortable as possible and also as visible as possible to rescuers. |
| P  | P = Plan your actions. Your plan should consider how to best use your resources and your energy. If you have followed the STOP sequence your plan will be the best available to you and therefore you probably should stay with this plan. |

Gain control. Your mind is a tool, which when in control can be used constructively or destructively when panicking. The S.T.O.P. exercise is important because it helps reduce panic, which is critical in emergency situations. It has been said by survival experts that survival is 80% mental (keeping a positive mental attitude), 10% skill (knowledge), and 10% equipment (specialized resources).

Second Activity: Ask the students to name the four needs we have as humans (which are the same needs as all other animals). As they identify the needs, place the corresponding card on the ground in front of the group. Then ask the class to assign a time card to the appropriate need card. A general rule of thumb is, you can survive for approximately:

3 minutes without air,
3 hours without shelter (in average weather for N.J. ~ 50 degrees, realizing that clothing is shelter)
3 days without water, and
3 weeks without food.
This exercise is important because it identifies and prioritizes our needs, which is something that is essential in emergency situations.

**Third Activity:** Take the bandana from the daypack and have a student come up with one use for it. Then have the first student pass it to another student who gives a different use for it. Continue until all students have had a chance to participate. Having each student state their name prior to their idea of how they would use the bandana, helps teachers to learn their names. Each student must provide a unique use for the bandana. As it becomes more difficult, remind the group to remember the four needs, they can then pick one need and develop a use for the bandana to meet that need. Some uses for the bandana are; bundle nuts or berries, warm hat, shade hat, wipe sweat from brow, tie hair back, signaling, hot pot holder, trail marker, cover mouth and nose to filter smoke, help with shelter building, and many first aid uses- including arm sling, bandage, tourniquet, support wrap.

The important concept behind this activity is improvisation - Making the best use of your resources in emergency. This is an important skill when dealing with emergencies.

Further explain that maintaining and conserving your energy is an important concern.

Begin the hike away from camp. A few words of caution for the students; watch where you place your feet- ankle twists, loose rocks, and slippery logs. No one should go out of sight of the group.

**Fourth Activity:** Explain to the group that we will be in a simulated survival exercise for this class. Lay the contents (see materials above) of daypack on top of the tarp with the group surrounding the tarp. Have the group choose 8-10 items. The items they chose should represent those items the group feels are most important or most useful. If you want you might also ask the students to rate them from 1-5 with 1 being the most important item. The group should be able to give the reasons for the top 5 selections. Review with the class those items selected as well as those resources not selected. All items in the pack are useful in some way.

**Scenario:** Imagine our group was in a helicopter that crashed in the mountains of northern New Jersey. The pilots did not survive the crash. Your assignment is to keep everyone in your group alive. Before the helicopter explodes the group only has enough time to get themselves and the 8-10 items out of it.

The group can take as much time to discuss the items as you wish.

The following are some possible uses for the items in the survival pack. Items in RED are probably better choices than those items printed in BLUE for our students, although all are useful.

- Tarp - Shelter. Probably top choice
- Metal can - Boil water, cook food, collect or carry things
- First aid kit - Important to be prepared
- Hat - Extra clothing - hypothermia, cooler temp. at night
- Flashlight - signaling (three flashes)
- Flint & Steel/Lighter - a fire needs spark, air & fuel
- Whistle - signaling - 3 whistles for help
- Pocket knife - versatile, helpful with shelters, fire, and food
- Garbage bags - provides shelter, poncho
- Steel Wool - One of the few things to make fire from a spark
- Newspaper - Fuel for fire
- Reflecting device - Signaling, reflect sunlight
- Map & compass - Knowledge needed
- Bandana - versatile, signal, rope, trail marker
- Snack - Extra food - people need food
- Water bottle - people need water, can't boil in plastic
- Watch - Determine direction & time
Ask the group if this crash really did happen what would they do first? Check for injuries!

Optional Activity: Provide first aid to a person with a deep cut on an arm caused by the helicopter crash. Did the group pick the first aid kit? Does anyone know any first aid procedures? Have them talk you through what their actions would be. Correct procedure: Calm victim, sit them down. To stop bleeding apply clean dressing (in first aid kit or bandana). Apply pressure directly to the wound, and elevate the area. Also apply pressure to the pressure point to slow bleeding to the injured arm. Apply bandage and continue to calm victim.

The brachial artery and pressure point is located along the upper arm bone on the inside of the arm (arm pit side) midway between the elbow and the shoulder. To check for effectiveness of the pressure point, find normal pulse rate, then apply pressure to the pressure point and recheck pulse. If you are correct with your pressure point the pulse will be reduced.

Optional Activity: It is the month of __?____. The wind is picking up, temperature is dropping and dark clouds are gathering. What should your group begin to do? Build shelters. If they are building a tarp shelter they will need to work as one team, if you want them to build debris shelters then they could work in one, two or three groups. They may use any of the materials chosen in the beginning of the session.

For debris shelters the groups should not use any living plants, move buried rocks, or cause any harm to the environment.

* Leaders information: To be shared with students following their attempt to construct shelters.

<table>
<thead>
<tr>
<th>Size</th>
<th>Should be just big enough to shelter the builders. If too large your body heat which warms the shelter will be less effective.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sturdy</td>
<td>Able to stand up to wind, rain, and snow. Use a tree, log or rock as a foundation or structural support.</td>
</tr>
<tr>
<td>Wind</td>
<td>Door should open opposite the direction of wind and be as windproof as possible.</td>
</tr>
<tr>
<td>Rain/Snow</td>
<td>Waterproof. Sloping roof tends to shed water better.</td>
</tr>
<tr>
<td>Insulation</td>
<td>Must hold in the warm air. Dead tree leaves work great. Piled up to three feet thick.</td>
</tr>
</tbody>
</table>

Always consider whether the amount of energy you will save by being protected from the elements will be greater than the amount of energy needed to build the shelter.

* TAKE DOWN AND SCATTER ALL MATERIALS USED FOR SHELTER BUILDING!

Optional Activity: Clothing is your most basic form of shelter. Evaluate as a whole the groups clothing situation. Are they appropriately dressed for this session? Would they be comfortable if forced to remain outside for an extended period of time? Check footwear, rain gear, insulation materials, hats/hoods. Hats can conserve up to 70% of your total body heat output. Are the majority wearing sneakers, cotton jeans (skin tight), and cotton T-shirts or sweatshirts? Cotton is a very comfortable fabric which when wet is very slow to dry out. What dries your clothes when you’re wearing them? Your body heat of course. This robs you of vast amounts of energy. It is critical to remain dry, both from perspiration and from rain/snow. When you are wet, you lose energy up to 250 times faster than when you are dry.

Discuss Hypothermia. Hypothermia is a lowering of the core body temperature (98.6 F). The body is using more energy than it is producing. The body is unable to warm itself. Often occurs at temperatures well above freezing and is compounded by dampness and wind. Symptoms include shivering, slurred speech, lack of coordination, irritability, and mental confusion. First Aid for Hypothermia is to remove wet clothing and replace with dry clothing. Give warm sugared fluids to a conscious, alert victim. Move victim into a warm place.

Optional: Secretly assign one student with hypothermia. The group should identify the problem and verbally give effective first aid.
**Optional Activity:** Finding Direction. There are many ways to identify the basic directions north, south, east or west even without a compass. There are natural indicators such as:

**Note:** Covering all 5 items listed below may confuse your students, proceed cautiously!

- A) the growth rings on cut tree stumps tend to be widest on the south side.
- B) the color and texture of tree bark may reveal north and south. Northern exposure tends to be smoother with a more solid color due to punishment from the wind and rain/snow. The south side is often lighter and rougher as a result of more exposure to direct sunlight.
- C) tree branches tend to grow larger and thicker on the south side.
- D) spiders tend to weave their webs on the south side of trees or shrubs.
- E) moss grows best on the north side of trees, out of direct sunlight in moist, cooler conditions.

There also is a simple way of finding direction with an ordinary watch face. Point the hour hand at the sun. Then divide the angle (in half) formed by the hour hand and the 12 on your watch, this points to south.

Have the students try to use the above indicators to identify directions. Verify with a compass.

You should realize that remaining in one place is generally the best thing to do! Do not try to find your way out.

**Optional Activity:** Make a fire / Purify water. **BUILD FIRE ONLY IN AN AUTHORIZED FIRE CIRCLE AND WITH A FIRE PERMIT WHICH WILL ONLY BE ISSUED FOLLOWING A FIRE ORIENTATION** (schedule with SOC office) Ask the group - Why is building a fire important? A fire is important because; it gives warmth and light, acts as a signal, can purify water, dry clothing, and boasts morale.

Allow the group to do this at first. They should be organized. Collect wood and separate into three piles-tinder (toothpick size -smallest twigs & shavings), kindling (pencil size), and fuel wood (up to thumb size only). Don't begin fire until all wood has been collected. Allow _?_ matches, or flint/steel and steel wool.

Discuss water purification. Folklore contends that water running over rocks and small waterfalls is safe to drink-True/False? FALSE. Boiling water for 5 minutes is the safest method to kill germs and bacteria. Boiling will not remove chemical pollutants.

With fire burning strong, place water (from bottle) into the metal can and place in fire. You can add the needles from hemlock or pine trees to make a vitamin rich tea. Contains about 7 times more vitamin C than orange juice. There is also a poison hemlock, which is a flower. This is the hemlock that Socrates ingested.

*In an emergency situation, you should begin building the fire two to three hours before dark and gather two to three times as much wood as you think you need.*

To extinguish the fire, pour buckets of water over the fire area and stir the ashes with a stick. Continue this until you are safely able to place your hand on the fire site, and then in the ashes. If the ashes are cold the fire is completely extinguished.

**IS YOUR FIRE COMPLETELY OUT? THE FIRE RING SHOULD BE COLD!**

**Optional Activity.** Discussion - What do you do when lost? **S.T.O.P.** People will be looking for you. **STAY TOGETHER.** This will help to calm everyone and you will be easier to find. You can also use the resources of the group by sharing knowledge, skills and ideas. What do you have to signal with? Did the group choose a flashlight, reflector or whistle from the pack? These take no energy to use and can travel a long distance in good conditions. **Stay alert** to car horns, whistles and voices. When you hear something call out in a loud voice, whistle or signal in some other way.
In New Jersey, which is the most densely populated state in the country, you could also walk down hill until you find a stream or trail. Then walk down stream or in one direction on the trail. This will lead to a road in a short distance. Follow the road in one direction until you come to help.

In other areas of the United States, STAY WHERE YOU ARE. Search teams will be looking for you. You will be found sooner if you stay put. Make yourself obvious by building a fire, tie colorful bandana in a visible place or place makers in an open area such as a field. A grouping of three is a universal distress signal. Make three piles of rocks or three fires or blowing a whistle three times signals that you need help.

**Summary**

Review the lessons in the class such as STOP, Improvising, Human needs, etc.

Preventing survival/emergency situations is much easier than experiencing one. When traveling in the forests:

- Travel in groups of at least three.
- Let a responsible adult know where you are going and when you will return. Stick to this plan.
- Learn how to use a map and compass.
- Find out what the weather forecast is, but be prepared for the worst.
- Review first aid procedures.
- Know where to go to get help fast.

Lastly, discuss what should be in a daypack when going into the woods:

- 2- garbage bags -provides shelter
- water bottle – people need water
- flashlight – signaling (three flashes)
- extra sweater – cooler temp. at sunset
- map & compass - know how to use them

| 2- garbage bags -provides shelter | space blanket - shelter matches/lighter-make fire |
| water bottle – people need water | pocket knife- versatile, |
| flashlight – signaling (three flashes) | string – making shelters |
| extra sweater – cooler temp. at sunset | bandana- versatile |
| map & compass - know how to use them | extra food – people need food |

BE SURE TO INVENTORY ALL MATERIALS BEFORE & AFTER THE CLASS!
YOU ARE RESPONSIBLE FOR THE PROPS

For further information:

Rev.10/01WMM
**Web of Life**

**Session Description**

During this exciting simulation game, students learn about predator-prey relationships, the food pyramid, bioaccumulation, and the Four Laws of Ecology: 1) everything is connected to everything else, 2) everything goes somewhere, 3) nature knows best, and 4) there is no such thing as a free lunch.

**Objectives**

1. While role-playing herbivores, omnivores, and carnivores in a simulation game, students will strategize to meet their basic needs.
2. By analyzing the number of animals left alive at each level of the food pyramid when the game ends, students will infer the normal ratios of producer and consumer populations in real habitats.
3. By analyzing the amount of pesticide left at each level of the food pyramid at the end of the game, students will infer the causes of biomagnification.
4. Students will explain the four laws of ecology by supporting them with evidence from the game.

**Materials**

- shower rings—one per player
- food, water, etc. stations w/ markers
- 6 green life tags per herbivore
- 2 pink pesticide tags per herbivore
- 6 blue life tags per omnivore
- 4 red life tags per carnivore
- 4 flag life tags per man
- green armbands for herb. (optional)
- blue armbands for omnivores
- red armbands for carnivores
- flag armbands for man
- yellow armbands for the elements

**Procedure**

1. Begin the game by making sure the students understand the following terms: herbivore, omnivore, carnivore, food chain, and food web. For older students, you may also want to define producer, consumer, secondary consumer, and tertiary consumer.

2. Inform students of the rules. Refer to the posters as you tell the rules. If students have already been assigned a role (do this with larger groups as they enter the meeting place by randomly passing out armbands) encourage them to listen closely while you go over their specific goals. If students have not yet been assigned roles (do this with smaller groups by asking for volunteers beginning with the elements and moving down to the herbivores) tell them not to worry about memorizing all of the rules until they find out their role. It is helpful to have the students seated in groups according to their roles with a poster defining their goals close by.

**Rules:**

**Herbivores** will be let out first. They will wear green armbands (or nothing) and carry a shower ring with 8 green life tags, two of which have been tainted with pesticide. They must find each of the food, water, shelter, and space stations, mark their hand or wrist with the washable marker found at each station, and try not to get tagged for the rest of the game.

**Omnivores** will be let out 10 minutes after the herbivores. They will wear blue armbands and carry a shower ring with 6 blue life tags. They must find the water, shelter, and space stations and mark their hands accordingly. They must also find food, either by finding the food station and tagging at least one herbivore, or by tagging at least two herbivores. When an omnivore tags an herbivore, the herbivore must stop and hand over a life tag.
**Carnivores** will be let out 10 minutes after the omnivores. They will wear red arm bands and carry a shower ring with 4 red life tags. They must find the water, shelter, and space stations and mark their hands, but to eat, they must tag at least four omnivores or herbivores. When an omnivore or herbivore is tagged, it must hand over a life tag to the carnivore.

**Man** will be let out 10 minutes after the carnivores. Man does not have to find any stations. He may kill herbivore, omnivores, and carnivores by pointing to them when within twenty feet and saying “Hasta la vista.” An adult will go with Man to facilitate these killings. When an animal is “killed” it must hand over a life tag to man.

**The Elements** will be let out 10 minutes after man. They may collect as many life tags as they can by tagging anyone else in the game except other elements.

The game ends after the elements have played for 10-15 minutes, a 50-60 minute game in all.

3. Before students ask questions, add the following rules:

1. When you are tagged, you must hand over either a pesticide tag or your own color life tag.
2. When tagged by an element you must hand over your own color life tag.
3. You may not tag the same person twice in a row.
4. You may not tag anyone who is giving or receiving a life tag.
5. You may not tag anyone who has the same role as you.
6. If you lose all your life tags before the final whistle is blown, return to the starting point.
7. If you set foot on the road, the teacher there will take a life tag symbolizing that you have been hit by a car.
8. You may not go inside any buildings, or climb trees.
9. When the final whistle is blown, return to the starting point with your life tags.

4. Clearly describe the boundaries of the game to the students and teachers. At this point, all but one or two teachers (depending on how many students you have playing “man”) should be taken by the SOC staff to a point on the boundary to ensure that students do not get lost, and assist with injuries, disagreements, etc. It is essential that at least one adult be placed on the road in front of the statue. It is also helpful to place adults near (but not next to) the station markers so that they can bring them in at the end of the game and ensure that the markers remain there and stay capped. For a group size of 70, acceptable boundaries would include Long House Lawn, the wooded area behind Long House, in front of and behind Lenape to the Astronomy dome, the campfire circle, Piney Point, and along the lake edge in front of Lenape, across the beach and to the road.

5. Allow children a few minutes to ask questions and to study the posters describing their role. Then line up the herbivores and hand them their shower rings and life tags as they leave Long House. Continue to send out the players at the ten minute intervals described above.

**Summary**

1. When the students return, have them sit in groups according to their roles. In order to give students a chance to be appreciated for their skill in the game, ask all herbivores with 1 or more remaining lives to raise their hands, 2 or more, etc. Do this for each level of the pyramid. Allow the elements and man to show how many life tags they obtained.

2. If there is time, have each level of the pyramid record the total number of their own life tags which they have retained. List these numbers on the board in a pyramid arrangement next to the original numbers. Which group still remains the largest? Which the smallest? What would happen if we started with more carnivores than herbivores and omnivores? Would the game be any fun? What would happen if those numbers existed in a real forest? What can you predict about the populations of each level of animals in a real habitat?

3. Now have students raise their hands to indicate how many pesticide tags they have. In which group did the animals end up with the most pesticide? How is this possible? Inform students that the name for this
occurrence is biomagnification and that it did occur in the United States in the 1940's after the use of DDT, affecting the populations of many of our predatory birds.

4. Finally, show students the poster of the four laws of ecology, and have them explain each law and support it with an example from the game.

Classroom Extensions

If desired, data collected during the summation can be provided to the visiting teachers. Students can then graph the changes in population and pesticide magnification at each level of the food pyramid to reinforce inferences made during the summation.

NOTE: Adhere to the following ratios for determining number of carnivore, omnivores, etc.: for a group size of 47, 24 should be herbivores, 12 should be omnivores, 6 should be carnivores, 4 should be elements, and 1 should be man.
Appendix E: Teacher instructions for administration of CERI subscales
Children’s Environmental Response Inventory

Administration Instructions

*Note: all students must use a No.2 pencil when marking their responses*

Distribute test booklets, answer sheets, and pencils to each student.

Say: **Do not write in the booklet. You will only make marks on the answer sheet you have been given.**
Print your name on the appropriate blank on the answer sheet. (pause)
Print the color name of your academic team on the blank for subject. (pause)
Fill in the number of this class period on the blank for period. (pause)
Copy the code from the cover of your booklet on to the line marked date. (pause)

Say: **I am going to read the directions about what you are to do. Read the directions from the first page silently as I read them aloud.** (Read the directions from the cover of the booklet.)

Say: **Are there any questions about what you are to do?** (Answer any questions)

Say: **There are no right or wrong answers. Take your time and answer according to how you feel. Respond to all statements with only one answer. When you finish, close your booklet and I will collect it and your answer sheet.**

Say: **You may begin.**

Please do not interpret any of the statements for the students. Please avoid looking at the students answers during and after the test.

Please return all booklets and answer sheets to the envelope provided and give them to Nancy Harris. I will collect them from her. Thank you again for helping out with this research project.

*See reverse for cover of student booklet*
Please do not write on or in this booklet!

Form code: _______

Directions:
The statements in this booklet are about different things related to the environment and your daily life. Each one describes an opinion or a feeling about something. The way you answer will help in understanding how students think and feel about these topics. Read each sentence carefully. Then decide how much you agree or disagree with what it says. Then carefully mark the choice on the answer sheet that best indicates how strongly you agree or disagree with the statement. Only choose one response for each statement.

Response choices:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>disagree</td>
<td>disagree</td>
<td>don’t know</td>
<td>agree</td>
<td>agree</td>
</tr>
<tr>
<td>very much</td>
<td></td>
<td>don’t care</td>
<td></td>
<td>very much</td>
</tr>
</tbody>
</table>

Examples:

1) I like to go shopping.  
   [ A ] [ B ] [ C ] [ D ] [ E ]
   
2) Watching sports games on TV is boring.  
   [ A ] [ B ] [ C ] [ D ] [ E ]
   
3) Pizza is a healthy food.  
   [ A ] [ B ] [ C ] [ D ] [ E ]

In the first example, the person answering agrees very much that they like to go shopping.

In the second example, the person disagrees that watching sports games on TV is boring.

In the last example, the person indicated that they do not know or do not care if pizza is a healthy food.

In your answers, please only select don’t know/ don’t care (3) when you are absolutely sure that no other choice expresses how you feel.

Because these items all relate to opinions, there are no right or wrong answers. It is important that you answer truthfully according to how you feel about each statement.

This has nothing to do with your school grades. No one from your school will read your answers.
Appendix F: Informed Consent letters

(printed on Montclair State University letterhead)
Dear Parents,

During the fall semester of 2004 seventh grade students from Jefferson Township Middle School will attend the New Jersey School of Conservation (NJSOC) for three days and two nights. The staff at NJSOC is interested in learning how pre- and post-trip classroom activities influence changes in student attitudes toward the environment. This study is designed to help answer that question.

Lisa Cavern, a graduate researcher at NJSOC, will come to the Jefferson MS campus to conduct classroom activities related to the NJSOC experience with randomly selected classes. At most, classes will participate in one activity before the trip and one activity after the trip. Students will also complete a survey designed to measure their attitudes toward the environment both before and after the NJSOC trip.

All information collected will be kept confidential. Lisa Cavern will be the only person with access to the student surveys. Student surveys will be coded so that names will not be entered with responses. As soon as responses are coded and recorded, the original surveys will be destroyed. No student's name or individual responses will be reported in any way related to this study. Participation in this study is voluntary and students are free to withdraw from the study at any time without penalty.

We would be happy to share the report of the study with you when it is completed. If you have further questions about this study, you may contact Lisa Cavern, graduate student (cavernl1@mail.montclair.edu, 973-655-4209) or Nicholas Smith-Sebasto, research advisor (smithseban@mail.montclair.edu, 973-655-7614).

If you have any questions about your rights as a research participant, you may contact the IRB chair (Tamara Lucas, lucast@mail.montclair.edu, 973-655-7718) or the Director of Research and Sponsored Programs (Tim Kirby, kirbyt@mail.montclair.edu, 973-655-7534).

My signature below indicates I understand this information and agree to allow my child to participate in this study.

________________________
Child's name

________________________
Parent signature

________________________
Date
Student Consent Form

I agree to participate in a study to find out how students feel about the environment. I understand that I will complete a survey about the environment before and after my trip to the New Jersey School of Conservation (NJSOC). I may also participate in activities led by Lisa Cavern, a graduate researcher, before or after my school trip to NJSOC.

My answers on the survey will only be used for this study and will not be seen by anyone other than Lisa Cavern. No information about me as an individual will be reported as part of this study. As soon as this study is completed, the surveys will be destroyed. I understand that it is my choice to participate in this study and I have the right to stop participating at any time.

My signature below shows that I understand this information and agree to allow my child to participate in the study.

__________________________
Student name

__________________________
Student signature

__________________________
Parent signature

__________________________
Date