ABSTRACT

EVALUATION OF ENVIRONMENTAL EDUCATION AT NORTHBAY ENVIRONMENTAL EDUCATION CENTER, NORTH EAST, MARYLAND

by Vera Lucia Figueiredo

A six-month internship was undertaken with the NorthBay Environmental Education Center in North East Maryland between August 2007 and February 2008. The purpose of this internship was to work as a Graduate Educator to provide knowledge about environmental responsibility and character development to sixth grade students from a number of Maryland’s school districts. This internship also attempted to understand if using the Investigating and Evaluating Environmental Issues and Actions (IEEIA) curriculum, in an outdoor setting, can increase students’ awareness and determination to resolve social and environmental issues within their school and community.
EVALUATION OF ENVIRONMENTAL EDUCATION AT NORTHBAY
ENVIRONMENTAL EDUCATION CENTER, NORTH EAST, MARYLAND

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I. Introduction

A. Environmental Justice and Education

My interest in environmental justice and education compelled me to fulfill my requirements for the Masters degree in Environmental Sciences by taking a six month internship at NorthBay Environmental Education Center in North East, Maryland. Environmental justice is defined as the impartial treatment and involvement of people regardless of race, ethnicity, socioeconomic status, immigration status, education, gender or income in relation to development, implementation, and enforcement of environmental laws, regulations, and policies. Individuals with a low income of any ethnic group are more susceptible to environmental injustice. Citizens residing in underprivileged communities are typically at a higher risk of being exposed to environmental hazards on a daily basis (Claudio, 2007).

Residents of Baltimore, Maryland are faced with a number of environmentally related health problems due to the lack of services and knowledge. Between 1996 and 2002 over 100,000,000 gallons of raw sewage were discharged into city streets and local waterways, including tributaries of the Chesapeake Bay. These materials contaminated Baltimore waters with pollutants degrading the water quality by killing aquatic life and threatening public health (Seneca, 2002). According to US Census data 21.5% of Baltimore residents currently live in poverty (U.S Census, 2008). This means that environmental hazards are not their primary concern; they are more concerned with their daily expenditures. As an individual who grew up in a similar situation, I can understand how environmental issues can take a back seat to daily survival. My family immigrated to the United States and spent a majority of their time trying to keep a roof over our heads and putting food on the table. The environment was never a topic of conversation and any questions relating to where our trash went or about the dark clouds of smog in our neighborhood were said to be unimportant and nonsense. Being able to understand how environmental issues related to our daily lives and how its destruction was reducing our health may have empowered us to make changes.
Knowledge is the key to solving injustice. In 2000 John Erickson, founder of the Erickson Foundation and Erickson Retirement Communities, partnered with the Maryland Department of Natural Resources and a number of dedicated individuals to start planning the construction of an environmental education center for students in Maryland at a high risk of suffering the affects of environmental injustices. It is the belief of individuals dedicated to underprivileged students that the responsibility of an environmental educator is to teach about the crucial linkage between social and environmental issues.

The California State Education and Environmental Roundtable conducted studies demonstrating that strong environmental education programs can improve standardized test scores within the disciplines of reading, writing, mathematics, science, and social studies. The studies also demonstrated a decrease in behavioral problems, which improves classroom management. Overall, the research showed that incorporating environmental education into the curriculum increases a student’s engagement and enthusiasm for learning as well as pride and ownership for their work (Lieberman, 1998). These environmental education programs have a positive effect but some students still do not grasp environmental concepts due to the social concerns previously discussed. Environmental education must evolve to incorporate different cultures, economy, politics, local history and an individual’s perspective of environmental value so as to increase each student’s environmental awareness.

The purpose of environmental education is to instill skills that allow responsible decisions and actions towards the improvement of environmental quality. This is also a method of increasing awareness about our interactions with natural ecosystems. Each individual’s social identity affects the way they view the environment. The structure of environmental education emphasizes the scientific method but often excludes the sociocultural aspect. Environmental education has tended to focus more on pristine wilderness and the need for humans to be its protectors, than it has on how race, class, history, land ownership, and land management affects local ecological systems as well as an individual’s point of view (Cole, 2007). Therefore, I am excited about the opportunity to work with an organization that has been dedicated to helping students realize that their
actions can have a lasting affect, empowering them to help solve both the environmental and social problems they may encounter on a daily basis.

**B. NorthBay**
NorthBay Environmental Education Center is located on the Elk Neck Peninsula within the 2,188 acres of the Elk Neck State Park (Figures 1 and 2). The 97 acres of land that comprises NorthBay belongs to the Maryland Department of Natural Resources; while the facilities were constructed by the Erickson Construction Company (Figure 3).

![Figure 1. Elk Neck Peninsula. From www.activerain.com, 2008.](image-url)
Figure 2. Elk Neck State Park. From Tele Atlas, 2008.

Figure 3. The 97 acres of NorthBay EE Center. From Tele Atlas, 2008.
Opened in 2005, NorthBay was targeted toward Baltimore City students; but it soon evolved to incorporate more Maryland school districts. The concept for NorthBay is to provide a safe haven for sixth grade students to learn how their decisions affect their future and the environment. A number of these students face social problems such as absentee parents, lack of food, gangs, violence, and addictions. Environmental problems such as litter, air quality, and water quality also affect their daily lives. Although both have an equally negative effect on their well-being, it is difficult to focus on the environment when social concerns are dominant.

As a NorthBay educator I strived to provide students with an understanding of the relationship between the environmental and social problems in their lives. Educators make every effort to empower students to return to their communities and take action towards a positive and healthier future. NorthBay is about being able to change a student’s action towards events that occur in their daily life. As an educator, I was responsible for providing an avenue to help students respond to their individual situation in a proactive manner.
II. Educators

A. Role
The educators are an important part of the NorthBay curriculum. NorthBay educators are required to have, or be in the process of earning, a degree superior to a High School Diploma. Those who already have a degree are encouraged to continue their education in conjunction with teaching at NorthBay. Educators are not required to have a degree in environmental science, but must have an affinity for environmental stewardship. As an educator I was responsible for teaching sixth grade students environmental and character education.

In my sixth month at NorthBay there were ten male educators and nine female educators. Each week we were assigned a maximum of eighteen students. The groups were separated by gender to decrease distractions and allow them to focus on class work. Female educators are responsible for teaching female students and male educators for male students.

B. Permanent vs. Graduate Educators
There are two categories of educators: permanent and graduate educators. Permanent educators are individuals who have been employed at NorthBay since its founding or have long-term educational experience, in a classroom or outdoor setting, other than NorthBay. Graduate Educators are individuals who have, or are currently working on, a degree and have little or no experience in education. All educators report to the same manager but their responsibilities differ (Figure 4).
As a Graduate Educator my primary responsibility was to teach. Along with six other Graduate Educators, I was also responsible for helping breed mice, feed and clean two box turtles, a snapping turtle, a painted turtle, a mud turtle, a king snake, an exotic frog, two bullfrogs, two corn snakes, and a toad inside a vivarium. Graduate educators are also expected to participate in land management activities, and off camp activities, called follow-on. For example, I participated in a follow-on program at Dr. Rayner Browne Elementary School where we assisted in planting an edible garden and in a stream clean-up at Colonel Richardson Middle School. Graduate Educators are also encouraged to help improve the curriculum by developing lessons, such as the lesson I wrote on bird migration (Appendix A).

Permanent educators spend a majority of their time teaching, but they also have other responsibilities. Some of their current responsibilities are:

- Developing lesson plans that are relevant to the NorthBay curriculum
- Mentoring Graduate Educators
- Developing follow-on programs, such as Earth Day events, invasive species removal, rain and butterfly gardens, and other school yard habitats
- Developing follow-on assemblies for 6th and 7th grade students who have been to NorthBay
- Creating and implementing a native tree nursery at NorthBay
- Administering pre and post surveys to Baltimore City students
- Survey data entry and analysis
- Gang intervention
- Assist schools with becoming Green School Certified
III. Curriculum

A. STEM and Middle State Association
In the early 1970s there was a great concern that students, teachers, and professionals in the United States were not knowledgeable in the areas of science, technology, engineering, and mathematics (STEM). STEM was developed as a nationwide program to provide the United States with scientists and engineers who will help continue the country’s economic growth. It is also intended to develop a technologically skilled workforce, and scientifically literate citizens who are capable of making intelligent decisions (Peterson, 2007). The National Assessment of Educational Progress has been assessing the academic progress of elementary and secondary students since 1969. Both public and non-public school students in grades 4, 8, and 12 are assessed on their STEM knowledge. These academic assessments show that there has been improvement in each of these disciplines. However, a large portion of students still fall short of being proficient in these areas (Kuenzi, 2006). NorthBay has incorporated each of the STEM disciplines into its curriculum.

In conjunction with the STEM program, the NorthBay curriculum follows the criteria set forth by the Middle State Association (MSA). In 1921 the MSA was put in place to manage early age through university education. The MSA standardize the academic practices of elementary school to high school students within New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia. The goal of the MSA is to advance, assist, and sustain the quality of education to standardize the qualifications required for admission into college (2004).

B. Investigating and Evaluating Environmental Issues and Actions (IEEIA)
In 1990 Harold R. Hungerford and his colleagues developed a curriculum for middle and secondary schools to promote environmentally responsible behavior. Investigating and Evaluating Environmental Issues and Actions (IEEIA) is an interdisciplinary curriculum that allows students to explore environmental issues within their school or community
and decide on recommendations for remediation (Hungerford, 1990). The IEEIA program emphasizes six components to environmental issue investigation:

1. **Environmental problem solving.** Being able to solve environmental problems starts with a basic knowledge of human interactions with the environment. In this step students begin to understand that human activities can influence the quality of the environment, which affects the quality of human life. This section also teaches students to identify the stakeholders involved with the issue. Students also gain the understanding that each stakeholder has their own point of view, making it difficult to resolve the problem (Hungerford, 1990).

2. **Issue investigation.** The issue investigation process is meant to develop skills needed for researching the problem using secondary sources. After students identify an environmental issue they develop a research question relevant to the problem. It is important to focus their study so that they stay on track and are not discouraged by the extent of the problem. Once a research question is established, students are taught to identify reliable secondary resources concerning the issue (Hungerford, 1990).

3. **Data collection.** In this section students learn to use first-hand research tools to determine the response to their research question. Collecting and recording information using surveys, questionnaires, and opinionnaires is the primary focus of this section (Hungerford, 1990).

4. **Data interpretation.** Once the data is collected the information is evaluated. This section teaches students how to create and interpret tables and graphs. It also teaches students to draw conclusions and develop recommendations based on these conclusions (Hungerford, 1990).

5. **Investigating the environmental issue.** By this time, students have spent several weeks developing the skills needed to investigate an environmental
issue. Students are asked to decide on a local environmental issue, of their interest, to investigate using their newly learned skills (Hungerford, 1990).

6. Developing environmental action strategies. Finally, in this section students will learn the importance of getting involved in helping to solve environmental issues. Students begin to apply the skills they have gained into developing a plan of action to help resolve their chosen environmental issue (Hungerford, 1990).

A study was conducted to determine the effectiveness of the IEEIA training model as per the direction of the National Environmental Education Advisory Council. In the study 731 formal Kindergarten to 12th grade teachers, and participants in IEEIA training, took part in a survey about the incorporation of the model into their classroom. The survey’s purpose was to determine if there was a visible impact on the students. The survey results indicated that 59% of the teachers surveyed implemented IEEIA into their classrooms. The study also showed that the IEEIA approach was effective in helping student’s behavior, attitude, and skill development (Paul, 2002). Hungerford suggests eighteen weeks for this educational approach to be effective, but there have been alternatives to the approach. NorthBay has attempted to apply IEEIA in a five day outdoor education setting.
IV. NorthBay’s Adaptation of IEEIA

A week at NorthBay starts with the data collection. The background knowledge needed to start solving an environmental problem at NorthBay is expected to be covered at school before students arrive at NorthBay. Many weeks this expectation is not accomplished; therefore educators are prepared to begin the week with background information about environmental problems rather than with the, hands-on, data collection process.

A. Student Arrival

Students arrive on Monday between 11:00 am and 1:00 pm. The educators line up and cheer for the students as they exit the bus. Students are provided with a visual tour of NorthBay, separated, by groups of eight, into cabins, and presented with the NorthBay rules. Educators are responsible for unloading the luggage from each bus. The reason we cheer for students and unload their luggage is because we want them to feel appreciated. We want them to understand that this week is about them, and that educators are available to help them.

After lunch, educators are introduced, one by one, onto the stage. The purpose is to make educators look cool and establish them as realistic role models as opposed to the rappers and sports figures the students idolize. Once the educator line-up is complete, students are sent with their assigned educator. Students are assigned to the same educator through-out the week. Sixth grade students are not all willing to open up to people they do not know or trust. Having the same educator for the week can help build trust and facilitate the learning process.

Monday afternoon is dedicated to learning student’s names and personalities by playing games, talking, and journaling. My Monday afternoons begin with a short walk through the woods and ends at the soccer field. Once we reach the soccer field, I have students line up and do a fifty yard scream. This is a fun activity that gets students running and being silly with individuals who usually make them feel timid. This is followed by a name game which helps me start to learn their names and helps students from different
schools learn something about one another. I also take this time to discuss the theme of
the day and have them journal about what excites them, what they are afraid of, and what
they want to learn about at NorthBay. This allows me to determine their educational
level and what will interest them during the week. I also take half of a pillowcase and
have the students develop a contract flag. A contract flag includes a team name, which
students agree on, expectations developed by them, and consequences for failing to abide
by these expectations. Finally, I provide students with an overview of the week’s
schedule. Each educator does introductions differently, but we all manage to accomplish
the task and we all do it well.

B. Schedule for the Week

8:00 am – Educators prepare for their morning lesson
8:30 am – Breakfast
9:30 am – Morning Lesson
12:00 pm – Lunch. Educators prepare for their afternoon lesson
1:00 pm – Afternoon Lesson
3:30 pm – STUDENTS: Activity Time:
  ▪ Climbing wall
  ▪ Gift shop
  ▪ Zipline
  ▪ Kayaking/Canoeing
  ▪ Gym
  ▪ Game room
  ▪ Arts and Crafts

EDUCATORS: Lesson Preparation and project completion

6:00 pm – Dinner
7:00 pm – Students are with chaperones in the game room or gym
8:15 pm – NorthBay evening show, NorthBay Live, dedicated to character development
  and empowering students to take action.

Each lesson is approximately 2 ½ hours in length. On Monday morning each educator is
given teaching assignments for the week. Educators are expected to be able to teach all
of the following lessons: Bay Grass, Bluebirds, Built Environment, Clams, Deer, Food
101, Fungi, Fish, Ropes Course, Trees, Vultures, Wetlands, Small Mammals, and
Songbirds. There are templates available for each lesson but every educator has a
different interpretation of the lesson. After 3:30pm educators have time to review
journals, prepare for the next day’s lessons, and work on any projects assigned.
C. Daily Themes

Each day is centered on a theme related to the IEEIA model and personal character building. Educators are required to incorporate each theme into each lesson. The themes are as follows:

Monday

IEEIA:

Research Question
- Rules for a research question
  1. Must be in a question form
  2. Avoid yes/no answers
  3. Involve specific population/area
  4. Derived from and related to environmental issues
  5. Identify measurable variables
  6. Specify relationship between 2 variables
  7. Focus on significant issues for investigation
- Each lesson also has a research question that the students must develop themselves

Character:

Niche
- What is a niche?
- What is the niche of an organism?
- What is your niche at school, home, NorthBay?
- What do you expect your Niche will be in the future?

Identity
- Does niche and identity go hand in hand?
- What is your identity?

Tuesday

IEEIA:

Study Design
- Students develop a plan for data collection so as to answer the research question.

Character:

Invasive
- What is an invasive species?
- What are some invasive species in the environment at NorthBay?
- What are some invasive things in your life?
- How can you keep invasive things out of your life?

Degraded Condition
- What does it mean to have a degraded condition?
- What are some examples, in the environment, that can represent a degraded condition?
- What are some examples, in your home, neighborhood, community, etc, that can represent a degraded condition?
- How can you help to improve degraded conditions?

**Wednesday**

*IEEIA:*

**Data Collection**
- Students must develop an appropriate T-table for data collection
- Students must collect the data required to answer their research question

**Data Evaluation**
- Using the term “TAILS” students must develop a graph to represent that data they collect
  - **T** = Title
  - **A** = Axis
  - **I** = Intervals
  - **L** = Labels
  - **S** = Supporting Data

*Character:*

**Filter**
- What is a filter?
- What are some filters in the environment at NorthBay?
- Who are some people that act as filters in your life?
- Where can you find a good filter in your life?
- How and to whom can you be a filter?

**Thursday**

*IEEIA:*

**Conclusion/ Data Interpretation**
- Based on their T-table and graph students should be able to make some kind of conclusion that relates to the research question
- Done through a verbal dialog as well as having the students take a few minutes to write 4 to 6 sentences on what they are interpreting

*IEEIA/Character:*

**Action**
- This theme brings the week together
- Actions at home, school, community:
  - To what extent do our actions affect the environment?
  - To what extent do our actions affect our future?
  - What actions do you plan to take to improve the environment in your community?
  - What actions do you plan to take to help you to fulfill your future niche?
  - What invasive people do you currently have in your life? How will you stop them?
  - If you can not prevent invasives how will you respond to them?
Who are your filters?
How will you use your filters after you leave NorthBay?
If you don’t have a filter, how can you find one?
What are some degraded conditions in your community?
What are some actions you can take to help your community?

Actions at NorthBay:
What are some degraded conditions at NorthBay?
What are some actions we can take today to help upgrade a degraded condition at NorthBay?
Why is it important to take Action?

The daily themes are a great strategy to help cover materials necessary for MSA standardized examinations. There is a lot of information crammed into four days of teaching. With this much information, if a student remembers at least one thing, they are better off than when they started. Although educators have been extremely successful, there is little flexibility in developing and improving lessons when using the IEEIA curriculum and daily themes. For example, it would be great if educators were able to team up and play a massive predator prey game with their students. I do not believe there is a clear solution to this problem because schools bring their students to NorthBay with the expectation that materials on MSA standardized examinations will be covered.
V. Engaging Students

A. “Five E’s” Instructional Model
Roger Bybee, a member of the Biological Science Curriculum Study, developed the “Five E’s” instructional model. The “Five E’s” model allows students to interact with the world around them to better understand their existing scientific knowledge (Foster, 1999). The “Five E’s” are as follows:

1. **Engage.** This stage allows educators to determine the prior knowledge and misconceptions each student may have. It also includes activities that catch the student’s attention; encouraging them to ask questions and define problems (Foster, 1999). NorthBay educators engage their students by playing a relevant game before starting each lesson. Educators also use local environmental issues to catch student’s attention. For example, when we teach the deer lesson we play Oh! Deer. This game is similar to rock, paper, scissors. The students line up at an invisible line and each decides which resource they are going to represent (shelter, food, or water). One student is chosen to be the deer and faces the resources. Their goal is to get the resource they need to survive. If their required resource matches another student they run to get that resource. That resource then becomes a deer. Eventually there will be more deer than resources and the population will start to die.

2. **Explore.** The exploration stage provides students with the opportunity to, personally, direct their study. This encourages students to interact with each other and communicate to determine the details related to the problem (Foster, 1999). Students, at NorthBay, are encouraged to communicate with each other to direct their study. First, they develop a research question that is relevant to the lesson at hand. To facilitate the process we provide the students with the environmental issue. Educators help their students develop their first research question and we encourage them develop their own for the rest of the week. Once the students have a research question they develop a
study design. Like the research question, educators provide them with their first study design and help them work through the rest. We play more of a role in the study design due to limits in supplies used for data collection. Once the study design is set and a data table is created, the students are separated into groups to explore the environment and collect relevant data.

3. **Explain.** In this stage students take their knowledge from the exploration stage and begin to develop conclusions. Verbal communication with each other and the educator can encourage a better understanding of their experiential observations (Foster, 1999). NorthBay educators have students reformat their data tables into graphs to facilitate their understanding of the information. Educators encourage verbal discussions between students by asking questions that lead them to refer back to the graph for answers. This allows them to develop conclusions based on the evidence they have at hand.

4. **Extend.** In this stage students take the information they learned and make connections between their new and past experiences. This process often leads to further questions and further exploration of the world around them (Foster, 1999). The data students collect at NorthBay is intended to be distributed to teachers to further students’ knowledge when they return to the classroom. While at NorthBay, students are encouraged to take their knowledge and determine how they could take action to improve the quality of the environment, both at NorthBay and in their community.

5. **Evaluate.** The final stage of this model is to determine the depth of a student’s understanding and retention of concepts and science skills. This can include an assessment that provides tangible evidence that the student has made progress. This assessment can also be used as a guide to help the educator modify lessons to encourage the best retention of knowledge (Foster, 1999). A NorthBay educator’s evaluation focuses on short-term retention of knowledge. After discussing and interpreting data a written conclusion, based on guiding questions, is requested from each student to assess their
understanding. A survey is used for a number of Baltimore City schools to assess the long-term retention of concepts students learned at NorthBay (Appendix B).
VI. Classroom Management

Classroom management is an educator’s ability to successfully advance students’ knowledge despite disruptive behavior. It becomes difficult to be an effective educator when students are being uncooperative. It is common to become frustrated and powerless in the face of disruptive behavior. The natural reaction of an educator is to attempt to modify the student’s behavior. There are a number of discipline methods available to facilitate behavior modification. Educators may choose to establish rules with positive incentives for following them and penalties for breaking them. Other educators may not use incentives, but guide students in a direction that will help them succeed as a result of the student’s hard work (Tassell 2007). During our training, the Dean of Students, Corey Barnes, discussed a number of behavioral disruptions we could encounter and discipline methods that could function for each. We were given the freedom to put in place a discipline method we thought would work for our teaching style. We were also told that this would be an on-going process and we would probably have to use a number of methods to be most effective. It is important to be flexible and adjust our strategies because each circumstance is different and a discipline method may work for one group but not the next.

A. Levels of Confrontation

One of the discipline methods educators are strongly encouraged to use is the five levels of confrontation. This method worked extremely well for a majority of the school year. This is a structured alternative to yelling and arguing for a student’s attention. It is a great way to keep the student updated because they are introduced to each level at the beginning of the week. Every time they receive a warning they know exactly how many levels they have left before being dismissed from the classroom. The five levels are:

1. **Friendly non-verbal.** If a student is disrupting the class, for example having a side conversation, an educator will respond with a friendly non-verbal gesture. This is a signal meant to change the student’s behavior as soon as the problem occurs.
2. **Stern non-verbal.** A stern non-verbal is used if the student continues to disrupt the class after a friendly non-verbal. A stern non-verbal includes a firm, persuasive gesture, pointing of the finger or other non-verbal signals.

3. **Friendly verbal.** At this point the student has not responded to the non-verbal warning. The educator will ask, in a friendly manner, to stop disrupting the class. This is the opportunity to emphasize that their behavior is inappropriate and if it continues he/she will have to deal with the consequences.

4. **Stern verbal.** A stern verbal is the final warning. At this point the student is reminded that this is the last warning. Also, the educator emphasizes, clearly, what the next step is for the student.

5. **In school suspension (ISS).** If a student’s behavior warrants in school suspension, the Dean of Students, Corey Barnes, will be called to help the student understand how his/her behavior was inappropriate. Corey will work with students to help improve their behavior.

In my experience, as long as the classroom rules and consequences, including the levels of confrontation, are set forth on the first day, there will be very few disciplinary problems. There are always students who will try to push their educator as far as they can. Also, there is always a leader in the classroom. If that leader is being disruptive it will not be long before other students are doing the same. I found that if I talk to the disruptive student at the beginning of the week, and encourage her to be a positive leader for the group, the problem dwindles.

Discipline is necessary in the classroom, but if a student seems unmotivated, bored or frustrated with the lesson, there is typically another source to the problem. The student may not understand the materials, educators may not be effective at communicating the information, or the student may have difficulty with math, reading, or writing skills.
NorthBay educators are taught to handle disruptive behavior by maintaining constant communication with students to better understand the source of disruption.

**B. 7%-38%-55% Rule**

There are three forms of face-to-face communication: verbal, vocal, and visual. Albert Mehrabian focused his studies on the inconsistence of human communication and is known for the “7%-38%-55% rule.” When studying communication, in relation to feelings and attitudes, Mehrabian found that 7% of our communication is verbal, 38% is tone of voice and 55% is body language or non-verbal communication (Mehrabian, 1980). NorthBay educators must be able to read a student’s non-verbals (eye rolls, attitude of frustration or boredom, or an expression of not caring) because this may be the way they are expressing their lack of understanding.

I believe because I was the student who rolled my eyes and was constantly frustrated, being able to read a student’s non-verbals comes easy for me. I have encountered students who have difficulty understanding the materials and express their frustration by sucking their teeth, rolling their eyes, throwing a hood over their face, or complaining about having to do the work. To encourage students to seek the help they need, I announce that there are no dumb questions and that my purpose, as an educator, is to help them with their work. Students who have difficulty writing at their grade level have tried to hide their journal because they do not want this publicized. To reduce this stress, I have started reading their journals as they complete their assignments. This way I can focus on the students having the most difficulty without embarrassing them in front of their peers. I have also tried to change my style of teaching so that it suits a broad audience; this increases the chances that students will be able to understand the material. Each group is different and each student has a unique situation. It is up to me to remain flexible and creative to facilitate the learning process for all of them.
VII. Evaluating NorthBay’s Educational Program

During the 2006/2007 school year surveys were created by NorthBay educators and administered to students when they arrived, directly before departing, and three months after their visit to NorthBay (Appendix B). The surveys assessed the short-term and long-term impacts of the NorthBay educational program on 445 students from Bohemia Manor, Calverton Middle School, and New Song Academy (Powell, 2007). I did not play a role in creating and administering the surveys.

Paired t-tests were utilized to determine the significance of change between the pre-experience, post-experience, and the three-month follow-up survey. Based on the data collected there was significant improvement in the character and environmental responsibility of the students between the pre and post-experience indexes ($p \leq .01$). The three-month follow-up survey represents only those students who were surveyed both at NorthBay and during follow-up (Figure 5). The results suggest that the NorthBay education program is successful at teaching students that the decisions they make today can affect their future. It also suggests that students continue to express an interest in learning how to help the environment and their community. Although the NorthBay education program is successful how long, past the three month follow-up, will students retain this knowledge and sense of responsibility?
<table>
<thead>
<tr>
<th>Index</th>
<th>Pre-experience</th>
<th>Post-experience</th>
<th>%</th>
<th>p</th>
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</thead>
<tbody>
<tr>
<td>Character development and leadership</td>
<td>75.1</td>
<td>79.1</td>
<td>+ 4.4%***</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Environmental responsibility</td>
<td>71.0</td>
<td>74.9</td>
<td>+ 4.0%***</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>School culture and academic performance</td>
<td>82.7</td>
<td>83.0</td>
<td>+ 0.0%</td>
<td>0.425</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Index</th>
<th>Pre-experience</th>
<th>Follow-up</th>
<th>Change</th>
<th>p</th>
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</thead>
<tbody>
<tr>
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<td>76.9</td>
<td>+ 1.6%*</td>
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</tr>
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<td>71.4</td>
<td>- 0.0%</td>
<td>0.75</td>
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<tr>
<td>School culture and academic performance</td>
<td>82.8</td>
<td>80.1</td>
<td>- 3.0%***</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

*** Statistically significant change (p ≤ .01)
* Statistically significant change (p ≤ .05)

Figure 5. Mean Comparison of Index Scores. From Powell, 2007.
VIII. Follow-on Programs

The surveys demonstrate that the week at NorthBay creates a positive influence on students’ character development, environmental responsibility, and academic performance, but these are short-lived results. For NorthBay to be successful, at empowering students to take action towards a positive and healthy future, one week is not enough. To continue NorthBay’s educational program, follow-on programs were established. The purpose of follow-on is to send educators to school districts, which request their presence, and facilitate community and environmental projects. The hope is that NorthBay continues to empower students to positively change their own communities. Some of the current follow-on programs are as follows:

1. **2b Clubs.** A 2b club is an idea developed by NorthBay educators. The title refers to Toobie, the main character in the NorthBay produced movie, shown during the evening show at NorthBay. In the movie Toobie chooses the right path for himself which empowers students to do the same for themselves. 2b Clubs are intended to address the social and environmental issues students face within their schools, and communities. These clubs empower students to take action and make their schools, and communities a better place to live, both social and environmentally, with the help of a NorthBay educator.

2. **Green Schools.** The Maryland Association for Environmental and Outdoor Education (MAEOE) sponsors a Maryland Green School Awards Program. This program recognizes primary and secondary schools, both public and private, for their efforts in promoting an environmentally friendly setting. To become a Green School the curriculum must provide students with knowledge about environmental issues. It should also encourage students to take action to improve the quality of the environment. Another requirement is that the school be a model for best management practices (BMP). One example of best management practices would be reducing the amount of solid waste being transported to landfills. This can be accomplished through a recycling program and a reduction in materials being used. Habitat restoration, such as
planting rain gardens or butterfly gardens using native plants, is also an example of best management practices. Finally, schools are required to partner with the community to develop projects that will produce a healthier environment (MAEOE Green Schools, 2008). NorthBay’s goal is to help 15 new schools become Green Schools by April of 2009.

3. **Schoolyard Habitat Restoration.** These projects are intended to provide native habitat for wildlife such as insects, birds, and amphibians. Schoolyard habitats provide a buffer which helps water quality by reducing pollution and sedimentation in waterways. These restoration projects can be incorporated into the school curriculum in a manner that students can ask and answer questions by interacting with the environment and understanding, first hand, how it is beneficial. The restoration projects are also an opportunity for the local community to become involved with solutions to local environmental problems (MAEOE Schoolyard Habitat, 2008). NorthBay has been and continues to be involved in a number of schoolyard habitat projects such as rain gardens, invasive species removal, creek clean-up, butterfly gardens, and wetland restorations.
IX. Recommendations

A. Education Department

Management
NorthBay’s education department has been able to apply an education model typically used in the classroom but the success of any department is measured by how it is managed. I believe that educators do well keeping themselves on task but it is the responsibility of the managers to plan, organize, and lead the team. It is my opinion that an emphasis on developing management skills could improve the overall success of the department and reduce the stress of the managers and educators.

I appreciated the liberty provided to the educators because it allowed for personal projects that can benefit both the educator and NorthBay. However, one of the problems with such liberty is that managers do not always follow-up to check the progress of each project. This conveys the impression that management may have forgotten about the project and are too busy to follow-up. If an individual is not supported, appreciated, and actively supervised their excitement soon dwindles and the project may not reach its completion. I suggest that the managers create a list of all the projects currently occurring within the department. This allows managers to set reasonable deadlines to expedite the completion of projects. It also allows managers to stay organized and keep track of what is currently occurring. Some educators may be tied down to multiple projects at a given time while others, with similar education and experience, may be without projects, having a list can help spread out the projects and avoid overworking individuals.

Green Center
As facilitators for the green school program, NorthBay must lead by example. To become a green school or center through MAEOE, two of the following requirements must be met: environmental education must be incorporated into the curriculum, green design and operation of buildings and grounds, and have partnerships with school and community organizations (MAEOE Green Schools, 2008). NorthBay currently meets a
large portion of these requirements, but as leaders, the entire facility should be as green as possible. Students are more inclined to participate in the green school process, if they can see the benefits of “being green”. I suggest that some of the following actions be taken to help lead by example:

1. **Motion detector light switches.** NorthBay can conserve energy by installing motion detector light switches. A motion detector light switch would turn on and remain on for 30 minutes. Replacing normal light switches with motion detectors can prevent lights being left on for hours at a time. It can also be beneficial to install these switches in storage closets. It is possible to install these switches in all of the buildings, but there are concerns that the lights would not remain on for long periods of time in some buildings, thus installing them in only certain locations is also a viable option. There have been times when bathroom lights have been left on by students, even when not being occupied. This is both a conservation method and convenient for the person. If your hands are full, you do not have to worry about the lights because they take care of themselves.

2. **Solar panels.** Installing solar panels on the roof of the Dining Hall could serve two purposes. First, NorthBay would be utilizing a renewable resource, and secondly the water used to wash dishes could be heated by the panels, rather than petroleum. As a long-term plan, installing solar panels on each cabin could benefit the overall cost to heat the water in each building; although NorthBay would still be on the grid because it is impossible to capture enough sun energy, in the winter, to heat water.

3. **Composting toilets.** There are approximately 300 students at NorthBay each week, all of which use the toilet. Installing composting toilets in each of the NorthBay cabins could significantly reduce the amount of waste entering the septic system. This type of installation can also reduce the amount of water used on a daily basis.
Curriculum
NorthBay educators have a number of lessons they depend on each week. The curriculum includes the lessons referred to earlier in this manuscript. Although each lesson covers the materials required by MSA standardized examinations some are inconvenient for use in the winter. For example, although the clam lesson is a great contributor to the students’ understanding of water quality and filters, this may not be a suitable lesson for the winter. During the summer, early fall, and late spring students get into the water to search for clams. In the winter this lesson is done off the side of the dock. Although educators manage to get this task done, it can become a nuisance for both the educator and the students. First, there is a limited amount of space on the dock; therefore it is difficult to have more than two classes, of 18 or fewer students, clamming at the same time. Second, the more students there are on the dock the better the chance of fights or falling into the freezing water. Also, continuous digging in the same area increases the degradation of the habitat. For example, the post hole diggers are a harsh mechanism that can crack the shells of clams and may affect NorthBay’s clam population.

I suggest that a curriculum be adapted for each season. Part of teaching in an outdoor setting is being able to read the comfort level of each student. If students are uncomfortable, for example excessive cold or heat, they will not focus on learning the materials. There are currently lessons appropriate for all seasons, but it may be beneficial for the education team to come together and brainstorm ideas for each season. Also, the development of new lessons can allow educators to use the NorthBay property more efficiently. This reduces the number of classes working on the same lesson and prevents stepping on each others toes for equipment and space. It can also reduce the continuous use of the same habitats, which may help reduce some of the negative impacts that is, currently, occurring.

Action Projects
A two and a half hour block of time is set aside, every Thursday, for each class to come up with an action project at NorthBay. These environmental projects can include trash pickup on the beach or anywhere on site, invasive species removal, making signs for
energy conservation, helping with the staff garden, repairing bird boxes, transporting recycled materials, etc.

I suggest that educators join their classes together to accomplish a few large projects rather than tackling a small project each week. Small projects are as important as large projects and all educators, as individuals, are able to successfully empower their students to take action, both at NorthBay and in their communities, but not all students learn in the same manner. It becomes difficult for some students to picture the positive outcome when they are the only group working on any given project. If students can actually participate in a comprehensive project with a number of groups working together, they may be better able to visualize such a project in their own neighborhood.

**B. Interdepartmental**

**Environmental Knowledge**
All NorthBay employees play a vital role in making sure that each group feels welcome and comfortable. Each individual is hired because they are proficient at accomplishing certain jobs. It would be impossible to have each week run smoothly if one department was absent. Although every employee is skilled, in a particular field, I suggest that every NorthBay staff member have some environmental training.

For example, salamanders and frogs have recently started to lay eggs in puddles of water, along one of the trails. If the maintenance team were taught that these are indicator species and why it is important to let these eggs develop, they may consider walking on the trail or at least driving around the puddles. Another example could be training the dining staff about where our solid waste goes after it leaves NorthBay in a garbage truck. Giving them the understanding that landfills are becoming full at a rapid pace may encourage them to reconsider using paper plates and cups.

**Maximum Capacity**
NorthBay educators are contracted to teach a maximum of eighteen students per week. For a classroom teacher this may seem like a small number but when an educator is leading a group of sixth grade boys or girls through the woods, in the bay, or on a boat more than eighteen students can turn into a mess. Recently the number of students has
ranged from 15 to 32 per educator. This has a negative affect of all parties involved. The educators have less time to center their attention on the needs of each individual student because they are focused on the group as a whole. The quality of education diminishes when students do not understand the materials because they are not getting the individual help required. The impact is not only on the educators and students; the rest of the NorthBay staff also suffers. For example, housekeeping is constantly running to get the facilities cleaned for the next group and maintenance spends a lot of time fixing damage caused by students. The quality of work and dedication to the job begins to diminish when the staff is over worked. I suggest a reduction in the number of students present at NorthBay each week. Building another site in Maryland may also be an option to reducing the number of students on one site as well as the environmental impact.
X. My Projects

A. Leadership in Energy and Environmental Design
The U.S Green Building Council established the Leadership in Energy and
Environmental Design (LEED) Green Buildings certification program. NorthBay is
currently working to become LEED certified so I was asked to help with this process.
Some of the prerequisites to become LEED certified are erosion and sedimentation
control, alternative forms of transportation, reducing site disturbance, best stormwater
management, heat island reduction, water use reduction, use of renewable energy,
reducing water use, and improving waste management. My role is to provide NorthBay
directors with ideas that can be accomplished for each of the prerequisites.

B. Solar Panels
When I started working at NorthBay the dining staff served the first and last meal of the
week on paper plates and cups. For an environmental center that emphasizes
environmental stewardship, this seemed contradictory. Each student has a Food 101
lesson that discusses where our waste goes once it leaves NorthBay. Having students
brainstorm ideas to reduce waste in landfills and then doing the exact opposite sets a bad
example. When the issue was brought up the excuse was that it did not matter because
they are heating the water to wash dishes. My solution to this problem was to build solar
panels on the roof of the Dining Hall to heat the water. My role in this project is to write
a proposal and cost analysis to get the project approved.

C. Toobie Club
Permanent educators have and continue to put effort into building partnerships with
school districts that have visited NorthBay. Toobie Clubs are starting to take-off in
Baltimore City schools. There is currently a male entity, from NorthBay, acting as a
facilitator for Toobie Clubs, but a female entity is necessary. I volunteered to take on this
role because I enjoy the time I spend with students from Baltimore City.
XI. Conclusions

As stated earlier, individuals with a low income are typically at a higher risk of being exposed to environmental hazards. A high percentage of Baltimore residents are living in poverty and have to deal with a number of environment-related health problems. It is my opinion that providing knowledge about these issues is the key to helping solve injustice. I agreed to intern at NorthBay because their primary purpose is to provide knowledge that may help at-risk students have a better chance in the future. As an educator I have done my best to help students understand the relationship between the environmental and social problems in their lives. I have made every effort to empower each student to take action towards a positive and healthier future. My hope is that some of that knowledge sticks with them and helps influence their decisions.

Even though educators are passionate about their jobs and we do our best to make a difference in student’s lives a week at NorthBay ends with short-term changes. Due to this, NorthBay educators started follow-on programs such as 2b Clubs, Green School Program, and Schoolyard Habitat Restoration. Follow-on programs allow educators to continue mentoring their students as well as empowering and building their knowledge base all through high school.

NorthBay is a young program that has quickly developed into something huge. This has been a challenging internship. It has actually been one of the more challenging experiences I have had in the field of environmental education. My time at NorthBay has been one learning experience after another and I have appreciated the challenge. I would like to continue as a NorthBay educator as long as students remain the primary concern and the educational program continues to evolve. An environmental education center is only as good as the curriculum established. The quantity of students exposed to an educational program does not matter if they are being exposed to outdated materials. NorthBay educators are dedicated to maintaining the educational and follow-on materials up to date.
I am concerned that the increase in students being exposed to this program may reduce an educator’s quality of work. It is difficult to maintain an eager attitude about teaching large classes, updating a curriculum, and continuing follow-on programs. In the end something is going to get left behind. The management team has continued to hire educators to reduce the student to educator ratio, but now the concern becomes the environmental impact. How many students can we allow to enter the wetlands, walk through the forested areas, or dig for clams before a lasting impact occurs in each ecosystem?
XII. References


Seneca, R. (2002). United States and Maryland Reach Agreement with Baltimore to Overhaul Sewer System, Stop Sewage Overflows. Retrieved: January 4, 2008 from Environmental Protection Agency Website: http://yosemite.epa.gov/opa/admpress.nsf/6427a6b75389555c585257359003f0230/f9ffe1e595b1f65f852570d60070fcf8!


XIII. Appendix A.

Bird Migration

Equipment:
- Peterson's First Guide to Birds
- Other Bird Field Guides (Examples)
  - Peterson Field Guides: Eastern Birds’ Nests
  - Peterson Field Guides: Eastern Birds
  - National Geographic Field Guide to Birds of North America
  - The Sibley Field Guide to Birds of Eastern North America
- iPods with Bird ID software (birdjam, The Eastern Stokes CD)
- Binoculars
- GPS units (Garmin, eTrex)
- ArcGIS
- Contour Feathers

Vocabulary:
- Migration
- Niche
- Diversity
- Species
- Abundance
- Rest stop
- Habitat
- Habitat Modification

Background:
- Biology:
  - Approximately 10,000 known species of birds in the world
    - 3,200 South America
    - 2,900 Asia
    - 2,000 North America (Panama, Caribbean and North)
      - 925 United States and Canada
    - 1,700 Australia
    - 1,000 Europe
    - 65 Antarctica
  - Distinguishing characteristics:
    - Warm-blooded vertebrates
    - Allows birds to maintain high levels of energy needed to fly
    - Feathers
      - Function:
        - Flight, thermoregulation, body protection, attraction of mates, species identification
      - Contour Feathers:
        - Body Feathers
          - Create outer shell covering body
          - Enclose down feathers underneath
        - Flight Feathers
          - Longer feathers of wings and tail
          - Each feather is different in length and shape for specific function
      - Down Feathers:
        - Smaller feathers, used for insulation
        - Located under contour feathers
  - Amniotes
- Hard-shelled eggs
- Semi-permeable
- Egg color and pattern:
  - Vary depending on need for camouflage
- Egg shape:
  - Depend on where bird nests
- Hollow bones
- Strong and hollow with inside supports
- Lightweight bones necessary for flight.

- Bird Migration:
  - Migratory birds use different areas of North America to stop along their path of migration from north to south.
  - Many birds travel the same paths each year and use landmarks to identify areas they stopped in previously.
  - As the human population expands and more natural habitats are replaced by developed areas, the migratory birds have a difficult time finding safe, inhabitable areas.

- Bird Identification:

**Engagement:**

- **Migration Hop Scotch:**
  - **Materials:**
    - Pavement chalk or sand and a stick
  - **Procedure:**
    - Draw a large sized hopscotch course
      - The course can be drawn on the pavement with chalk or on the sand/dirt with a stick.
      - The hopscotch course should contain 10 squares.
    - Have students line up at the beginning of the course
      - Tell the students that they are birds starting their journey northward
    - Tell the students that each of the squares represents a habitat used as a rest stop.
    - Students are challenged to migrate northwards one at a time
      - They do not have to step on every square; however, they must not go outside the course.
    - All students should be successful in the first migration.
    - Next, tell students you are a developer
      - You will destroy 2 rest stop areas in order to build houses
        - Put an "X" on two of the squares.
    - Tell students to make the migration once again
      - Students can't step on the destroyed habitat.
    - If they do, they die
    - Destroy two more habitats and repeat until all students fail to migrate
      - Try to "X" off the squares in a way that not all are destroyed but are far enough apart that students cannot make the jump.
        - This will help with the debriefing.
          - Why did the birds die?
          - How does this game represent migration?
          - Why did the birds die even though some habitats remained at the end of the game?
The Web of Life/Food Chain:

- **Materials:**
  - Ball of yarn, list of organisms
- **Procedure:**
  - Write name of each organism from the list of connections on index cards
  - Have students sit in a circle
    - Each student takes a card from the pile
    - Each student holds up the name of the organism for everyone to see
  - Start with the primary producer and work your way through the trophic levels
    - The person with a plant card starts the game by tossing the ball of yarn to someone in the circle
  - Person who catches the ball tries to explain how the organism on their card interacts with the plant
  - Second person holds onto the string and tosses the ball to a third person
    - Third person explains how that organism interacts with the second person's organism
  - Game continues until everyone has had a turn to catch the yarn
  - Choose one organism in the game and remove it from the web
    - What happens when we remove this organism from the web?
    - Would other organisms be affected? Which and how?
  - You can also cut the yarn with a pair of scissors and use it as a discussion about habitat destruction
    - In the environment, what is equivalent to cutting the yarn?
      - What effect would this have on the ecosystem?

Research Question:

- To what extent is NorthBay used as a migratory rest stop?
- To what extent are birds diverse at NorthBay?
- To what extent are birds abundant at NorthBay?

Study Design:

- Students will use *Peterson's First Guide to Birds* to identify different bill, body, and tail shapes of birds
  - Students should be able to identify that each difference is suited to a specific niche.
- Students will use their ears and iPod to identify bird calls
- Students will use their eyes, binoculars, and Field Guides to identify Bird Species
- Students will program GPS units with the exact location of each bird found
  - This information will later be put into ArcGIS to determine a pattern over time
- Students will analyze their data by developing a graph of their own data as well as comparing their data to previous data of birds identified

Character Connection:

- Niche
- Diversity
XIV. Appendix B.

Instructions: Read each question carefully and respond as best you can. When you’re finished, place your completed sheet into the folder in the center of the table. Do not talk to your neighbors while filling out the survey.

1. What is the name of your school? __________________________

2. Are you female or male? Please circle one. Female Male

3. Write your initials here: ______________________

4. Write the month, day and year of your birthday: Month Day Year

Questions 5-14: To what extent do you agree or disagree with the following statements? Check the best answer.

5. The choices I make today can change my entire life.

6. Going to school is a waste of time for me.

7. I feel comfortable arguing for what I believe in.

8. My actions impact the environment.

9. I have people who support me when I need help.

10. My school is a dangerous place.

11. I can be a good leader.

12. I have the power to help protect the environment.

13. I enjoy school.

14. I can make a change in my community.

Questions 15-18. Please check the box that best describes your level of interest in each of the following activities.

15. Learning about new subjects in school

16. Learning how to protect the environment

17. Going to college

18. Working to make my community a better place
Questions 19-20. Please check the box that best describes your opinion about your teachers at school.

19. How many of your teachers really care about you?  
   - None of them
   - Less than half
   - About half
   - More than half
   - All of them

20. How many of your teachers believe that you can succeed?  
   - None of them
   - Less than half
   - About half
   - More than half
   - All of them

Questions 21-29. How often do you plan to do the following things?

21. I will talk to my family or friends outside of school about what I’ve learned.
   - Never
   - Hardly ever
   - Sometimes
   - Often (or usually)
   - Always

22. I will make up excuses when I do something wrong.
   - Never
   - Hardly ever
   - Sometimes
   - Often (or usually)
   - Always

23. I will work as a volunteer in my community.
   - Never
   - Hardly ever
   - Sometimes
   - Often (or usually)
   - Always

24. I will help my friends with their problems.
   - Never
   - Hardly ever
   - Sometimes
   - Often (or usually)
   - Always

25. I will research things that I am curious about.
   - Never
   - Hardly ever
   - Sometimes
   - Often (or usually)
   - Always

26. I will take responsibility for my mistakes.
   - Never
   - Hardly ever
   - Sometimes
   - Often (or usually)
   - Always

27. I will talk to my friends about making positive life choices.
   - Never
   - Hardly ever
   - Sometimes
   - Often (or usually)
   - Always

28. I will pay attention to the teacher in class.
   - Never
   - Hardly ever
   - Sometimes
   - Often (or usually)
   - Always

29. I will complete all of my schoolwork on time.
   - Never
   - Hardly ever
   - Sometimes
   - Often (or usually)
   - Always

30. Do you have someone who you consider to be a role model to you? Circle yes or no.  
   Yes    No
   If yes, who?  
   - A teacher
   - A brother or sister
   - A parent
   - A friend
   - A famous celebrity (actor, athlete, musician, etc.)
   - A pastor
   - Other (Please write in) 

31. If you had to rate your experience at NorthBay on a scale from 1 to 10, with 10 being the best and 1 being the worst, what number would you choose? Please circle your choice.

1  2  3  4  5  6  7  8  9  10
I hated it.  Neutral  I loved it.

32. In the spaces below, write what you felt were the best and worst things about your NorthBay experience.

Best things:

Worst things: