Curricular Connections in the Classroom:

A Study of Environmental Education in San Pedro, Belize and Northampton, Massachusetts

“A child’s world is fresh and new and beautiful, full of wonder and excitement. What is the value of preserving and strengthening this sense of awe and wonder, this recognition of something beyond the boundaries of human existence? Is the exploration of the natural world just a pleasant way to pass the golden hours of childhood or is there something deeper? I am sure there is something much deeper, something lasting, and significant…” Those who contemplate the beauty of the earth find reserves of strength that will endure as long as life lasts. There is symbolic as well as actual beauty in the migration of the birds, the ebb and flow of the tides, the folded bud ready for the spring. There is something infinitely healing in the repeated refrains of nature.”

-Rachel Carson

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ABSTRACT

This qualitative study focuses on the direct interactions that children have with their environment through existing and proposed curriculum. Previous research on environmental education in Northampton, Massachusetts set the base for this project. Interviews with local school teachers, two local classrooms, the Coral Reef Ed-Ventures program through the Environmental Science and Policy Program at Smith College, and a variety of source material were used to better understand and develop suggestions for curricular connections to further environmental education in the classroom. Goals included creating more direct connections between local students and their environment and creating a direct connection between the existing Coral Reef Ed-Ventures summer camp program and a group of local students in Northampton. Both of these goals would promote deeper and more direct connections of students to their environment, thus instilling a greater sense of sustainability and stewardship. Working directly with a 5th grade class at Jackson Street School helped to meet the first goal for this project, while working with a group of 4th and 5th grade students at the Campus School helped to meet both the first and second goal of this project.

INTRODUCTION

In this project I use the term “environmental education” to refer to formal and non-formal education contributing to understanding of the environment and our human inter-relationship with it (Côté & Reynolds, 2006). The decision to work on a project that involved environmental education at the elementary level and curriculum development came from a number of places. In my time here at Smith I have been interested in education on various levels. I have taken a number of education courses
knowing that teaching is something that will be woven throughout my life. Last summer I also found myself going to Belize to work on the Coral Reef Ed-Ventures Program that is run through the Environmental Science and Policy Program. This program works directly with Professors Allen Curran of the Geology Department, Paulette Peckol of the Biology Department, and Susan Etheredge of the Education Department. Coral Reef Ed-Ventures is a summer camp that is run for kids aged 7 through 11 on the island of San Pedro, Belize. A majority of the lessons and activities were taught while incorporating direct interaction with the environment. While teaching with this approach, I was amazed at how quickly the students caught on to the concepts we were covering. Their care and interest in the material was also clear in their excitement. They were learning about the world that they interact with on a daily basis and in a manner that would lead them to a lasting knowledge of concepts and stewardship of the land.

With this experience in mind I came to find great interest in the statements found among the reading of this seminar that dealt with the increasingly infrequent interactions the children in our society are having with the environment. David Orr (2002) suggests that our age has witnessed greatly diminished and compromised possibilities for satisfying interaction between young people and nature. Additionally, Pyle (1993) addresses this general problem as “the extinction of experience”:

“Simply stated, the loss of neighborhood species endangers our experience of nature...Direct, personal contact with living things affects us in vital ways that vicarious experience can never replace. I believe that one of the greatest causes of the ecological crisis is the state of personal alienation from nature in which many people live. We lack a widespread sense of intimacy with the living world. The extinction of experience...implies a cycle of disaffection that can have disastrous consequences. As cities and metastasizing suburbs forsake their natural diversity, and their citizens grow more removed from personal contact with nature, awareness and appreciation retreat...So it goes...the extinction of experience sucking the life from the land, the intimacy from our connections.”
This lack of intimacy with the natural world has many consequences, especially when speaking of children. Kellert (2002) states that the time between the age of 6 and 12, better known as middle childhood, is a time when an individual child develops humanistic, symbolic, aesthetic, and knowledge components of the scientific value most rapidly. It is at this age that they become more comfortable with other creatures and natural settings. So why then is our society not more focused on creating further opportunities for fostering children’s growing comfort with the natural world?

In reading previous seminar reports from this class, I was motivated to make an attempt at connecting with local elementary schools in Northampton. Both Kostick (2005) and Jonelis (2004) examined environmental and sustainable education in Northampton and found that what the teachers needed most was support. Above all, Jonelis (2004) recommends that there needs to be a change in the state support through frameworks and testing, but that takes time. What can be done on a more short term basis? She also suggested that universities and colleges take a more aggressive role in pursuing sustainability education opportunities. Using this project as an opportunity for exploring this possibility, I could better understand what exactly the teachers need.

In Northampton, there is a clear division between the curriculum from that of the private schools and that of the public schools. Elementary public schools in Northampton include Bridge Street School, Jackson Street School, Ryan Road L.K. Finn Elementary School (Florence), and the Leeds Elementary School (Florence). Private schools include Clarke School for the Deaf, New Directions School, Northampton Developmental, Smith College Campus School, Fort Hill School, the Montessori School of Northampton, and Valley Christian School. The public schools are all under the Department of Education
and must follow the state frameworks and curriculum, whereas the private schools are all able to follow a more flexible curriculum for the possibility of more direct contact with the natural environment.

In thinking about this project I also wanted to create a connection between the Coral Reef Ed-Ventures program and a local group of students in Northampton. The program in Belize was first established because Smith faculty conducting research on the neighboring reef wanted to give back to the local community in some way. The camp was established and has grown in size over the past seven years. The Smith students and faculty who are involved in the Coral Reef Ed-Ventures program have created such an amazing experience for the children in Belize, but it would be even more incredible if there was some form of connection between this program and the Smith or Northampton communities. While in Belize, the children are often wondering what it is like where we come from; what better way would there be than for the students of each country to have contact of some sort? This would further their understanding and care for both their own environment as well as that of the environment of similar students with whom they would have contact.

Using Coral Ed-Ventures also as a model for the creation of some short lessons and activities would be a way in which this approach of incorporating direct interaction with the environment into curriculum could be carried over to local schools. In Belize, we use the local ecosystems, the coral reef and the mangrove habitat to study relationships of organisms, patterns in nature, and natural process. In Northampton, these processes could be taught using the local wetland or marsh habitat, while also encouraging new manners through which to explore and think about the environment.
From this background, I created two goals for this project. My first goal was to create better direct connections between Northampton students and their local environment and my second goal was to create a direct connection between the Coral Reef Ed-Ventures program/local children of San Pedro, Belize and a group of students from Northampton of similar age.

**METHODOLOGY**

The design of this project was based on the information that I was given by local school teachers as to how to better meet their needs in the development of better curriculum to incorporate environmental education. I first contacted elementary schools in Northampton, Massachusetts to see if any teachers would be willing to work with me, a Smith student on a project involving curriculum for my environmental science and policy seminar class. I received a response from the Smith College Campus School and also made contact with a kindergarten teacher, Sarah Records, and 5th grade teacher, Kathy Dewey at the Jackson Street School. From this point, I met with both teachers from the Jackson Street School to have an interview and discuss possibilities for developing a lesson. I also met with the director of the Campus School’s Wednesday afternoon program to determine the best group of students for the project I envisioned. We decided on a group of 4th and 5th grade students. At this point I worked on developing some lessons and activities for the Campus School, while also working with Mrs. Dewey to better incorporate a lesson into her curriculum. Throughout this process I came across a number of different resources on curriculum development and resources on teaching about the environment, and more specifically, wetlands, in the classroom. I referred to public and private school websites and the Massachusetts Department of
Education website to gain information on curriculum. Also throughout this process I had
conversations with a number of individuals working both in school systems or dealing
with school systems and their thoughts on environmental education in the classroom and
the lack of direct contact our students have with the environment today. In speaking with
these individuals I was sure to ask these five questions:

• How do you as an educator or parent of a student in the education system view environmental
  education?
• How important do you believe environmental education is for the age of your students?
• What most holds you back in this area of teaching?
• Is there a local habitat that you use to demonstrate natural process or concepts covered in class?
• What other resources would you need from the school or the greater community to carry out your
  desires in regards to environmental education?

RESULTS

In both speaking with teachers and reviewing the Massachusetts Department of
Education’s curriculum website I found a huge difference between the private school and
public school with which I was working closely. The Campus School (private) has a
number of units that focus specifically on our natural environment ranging from 1\textsuperscript{st}
through 6\textsuperscript{th} grade. These units include one on forests, ponds, wetlands, oceans, and the
Connecticut River. It is clear upon entering the Campus School that there is more of a
focus on hands-on learning where children are encouraged to explore concepts through a
number of different manners and materials.

In contrast, Jackson Street (public) must follow the state frameworks. Here,
larger connections and relationships between humans and their environment in the
curriculum are not encouraged in the public realm of frameworks until around 6\textsuperscript{th} grade.
For teachers, following a curriculum that is set in stone leaves very little room for
flexibility and the incorporation of more direct contact with the environment. In speaking
with two 5\textsuperscript{th} grade teachers about their desire for more environmental education and more
direct contact with the natural environment, both a lack of support and a lack of flexibility were their main complaints. In speaking with a kindergarten teacher, there was a similar frustration with the lack of flexibility. She wished that there would be more of an opportunity for teaching small lessons where the environment could be tied in, as oppose to only sticking with the emergent style of learning that her classroom follows.

In working with both of the schools I found that time was the main complicating factor. There is never enough time. Curriculum and testing were other complicating factors for working with Jackson Street School. Here, teachers must always have the Massachusetts Comprehensive Assessment System on their minds. Getting everything in before the testing date is the main deciding factor about the importance of teaching certain concepts and lessons. In 2003 science testing was slowly starting to get worked into the MCAS system for only 5th grade and higher (http://www.doe.mass.edu/mcas/). This further shows where science curriculum stands in importance to our state framework and curriculum creators. So much time is wasted on testing and preparation that could be used more proactively in fostering more intimate experiences with the natural environment.

In working to reach my first goal of making stronger connections between students and their local environment, I worked closely with 5th grade teacher, Mrs. Dewey. In our first meeting, I first gave her a preliminary idea of what I was envisioning. Mrs. Dewey then gave me a detailed picture of the unit her class was working on. Earlier this year her students each received a stuffed teddy bear. The teddy bears then began to develop more into a unit. She told me they were at the point where the class was interested in building a Beartown Colony. With this information I took
another look at the lesson plan and changed the focus to fit the needs of the classroom at hand. I wanted to create an opportunity for the class to go outside, explore, and then discuss on site the implications of colonizing or settling a landscape. What natural resources would be used in the site? How would Beartown treat the environment? How could Beartown grow in a sustainable manner within the space? The class was also interested in what their bears would each be doing in Beartown. Some students had shown interest in having their bears be the farmers of the community. For the students to get a better handle on the land and issues with growing crops, I suggested we incorporate some soil analysis. I suggested using the school’s courtyard for this process; a habitat that was close-by and would not create any time complications. This lesson plan can be seen in Figure 1.

While still working to reach my first goal, I had a conversation with the 4th and 5th grade group teacher of the Wednesday afternoon program, Donna Rivers. In this conversation I came to find that a booklet of activities and short lessons incorporating interactions with the environment and talking about the environment would be helpful to all groups of the Wednesday afternoon program. I took activities that the program at the Campus School would find useful and incorporated times where direct contact with the environment could be fostered as well as fostering the discussion of ecological concepts and terminology in a fun manner. I was also aware of creating an array of lessons that incorporate visual, oral, and verbal styles of learning. In Belize I found that the students learned most from the activities where all styles of learning could be offered. Activities include active games, art projects, and even edible wetlands. This packet can be seen in Figure 2.
In working to reach my second goal of creating a connection between Northampton students and Coral Reef Ed-Venture students, I worked with this same teacher from the Campus School. My ideal for this connection would have been a concrete pen pal program. This ideal was complicated by a number of factors including the limited accessibility that the Belizean students have to the internet, the factor of time and travel to Belize only during the summer months, and the inability of keeping track of all students in both the Coral Ed program and Northampton. This ideal program can be seen in Figure 3. I imagined this program to begin an exchange of information between students who live in very different environments in the world. This connection could further their care for the environment as well as their interest in the health of an environment thousands of miles away. I found it interesting that a local habitat here in Northampton, the wetland habitat is similar to the mangrove habitat in Belize that also revolves around water and plants that are able to survive under completely water-logged conditions. After talking with Mrs. Rivers, the teacher of this group, I made a number of changes to my plan for the activity.
FIGURE 1

BEARTOWN in Need of a Home
Grade Level: 5th Grade, Room 203, Jackson Street School
Duration: 1 and 1/2 hours

Description:
Explore and analyze a habitat for Beartown

Goals:
1. To foster direct interaction with an outdoor habitat
2. To analyze the components of this habitat and explore ways in which the Beartown will affect these components.
3. To apply concepts learned in the classroom about colonizing and the economy to an activity about the environmental impact of Beartown on the courtyard habitat.

Objectives:
Students will create an Environmental Analysis Map of an environment they are most familiar with at school: the courtyard. Students will use organisms or objects in that environment to better analyze the relationship between human/bear and nature. The map will be a collection of information collected by the students. They will be divided into groups and then each group given a specific task for analysis of the environment. This map can be used to make further decisions about the location of Beartown and how to colonize in an environmentally friendly way.

Prerequisites:
Students must have a general understanding of colonizing and habitats.

Materials:
- Clipboards
- Paper
- Pencils/colored pencils/markers/crayons
- Scissors
- Glue
- Packets for each group to make their data collections about their specific component of the environment of the courtyard.

Procedures:
1. 1:30pm – 1:45pm:
   a. Explain to the students that because they are in a general search for a location for Beartown, they must first learn how to analyze locations for environmental impact to make a better decision. THEY WANT BEARTOWN TO LAST A LONG TIME RIGHT?
   b. Give definition for ecology: the study of relations and interactions between organisms and their environment, including other organisms. And sustain: to supply with necessities or nourishment; provide for.
   c. The first location they will analyze will be the school’s courtyard: the courtyard is filled with organisms and objects that must be better understood to know if this is a good location for Beartown. The environment must be taken into account if Beartown is going to colonize in a more environmentally friendly way than the explorers they have been recently learning about. It is awesome that they are already thinking about only using recycled materials to make Beartown, but doing this activity will help make even more
sustainable decisions. Each group will have a certain area of the courtyard to analyze. First each group will have to take a sample of the soil, and then they will have a separate component on which to take notes.

d. Divide the class into six groups of four students each. Give students their assigned groups and group leaders.

e. Pass out group environmental impact packets and group clipboards.

f. Review rules for outdoor behavior.

2. 1:45pm – 2:15pm: Groups analyze a section of the courtyard

3. All groups will first do a soil profile with their Soil Test Kit.

a. They will then have four questions to answer, one per group member.

i. Point out what components of their section must be left alone, draw them into the map.

ii. What organisms live in this area of the section? Imagine that you are the organisms that live in the habitat: earthworm, squirrel, chipmunk, butterfly, bird, etc. What do you hear? What do you smell? What do you see? What frightens you? What do you eat? How do you grow? How would Beartown in this habitat affect these organisms?

iii. How much of this space could be used for Beartown? What parts of Beartown can you see being in this section?

iv. What things in this section could be used for Beartown?

1. For example: Bushes for berries for food

4. 2:15pm-2:45pm: Group leaders prepare the Environmental Analysis Map

5. 2:45pm-3:00pm/ End of day: Show class final map and hand out the Environmental Analysis Expert cards:

ENVIRONMENTAL ANALYSIS EXPERT

B E A R T O W N, U S A

Additional handouts for groups:

Testing the Soil:

1. Each group member takes one test tube.

Purple (Nitrogen)

1. Take a soil sample from 4” below the surface.
2. Fill a clean can with 1 part soil and 5 parts water.
3. Thoroughly shake or stir for one minute and then allow the mixture to settle for at least ten minutes.
4. Remove the cap from the tube and remove the purple capsule.
5. Fill the tube to the 4th line with water from the mixture.
6. Carefully open the capsule and pour the powder into the tube.
7. Cap the tube and shake thoroughly. Allow color to develop for ten minutes.
8. For best results hold white paper behind tube to compare the color with the Nitrogen color chart.
9. Record on chart.
Blue (Phosphorus)
10. Take a soil sample from 4” below the surface.
11. Fill a clean can with 1 part soil and 5 parts water.
12. Thoroughly shake or stir for one minute and then allow the mixture to settle for at least ten minutes.
13. Remove the cap from the tube and remove the blue capsule.
14. Fill the tube to the 4th line with water from the mixture.
15. Carefully open the capsule and pour the powder into the tube.
16. Cap the tube and shake thoroughly. Allow color to develop for ten minutes.
17. For best results hold white paper behind tube to compare the color with the Phosphorus color chart.
18. Record on chart.

Orange (Potash)
19. Take a soil sample from 4” below the surface.
20. Fill a clean can with 1 part soil and 5 parts water.
21. Thoroughly shake or stir for one minute and then allow the mixture to settle for at least ten minutes.
22. Remove the cap from the tube and remove the orange capsule.
23. Fill the tube to the 4th line with water from the mixture.
24. Carefully open the capsule and pour the powder into the tube.
25. Cap the tube and shake thoroughly. Allow color to develop for ten minutes.
26. For best results hold white paper behind tube to compare the color with the Potash color chart.
27. Record on chart.

Green (pH/ Acidity)
1. Take a soil sample from 4” below the surface.
2. Remove cap from green tube and remove the green capsule.
3. Fill tube with soil to the first line.
4. Carefully open the green capsule and pour powder into the tube.
5. Add water to the fourth line.
6. Cap tube and shake.
7. Allow soil to settle and color to develop for about a minute.
8. Compare color of the solution to the pH color chart.
9. Record on chart.

Soil Profile of Group #:

pH/ Green:

Nitrogen/ Purple:

Phosphorus/ Blue:

Potash/ Orange:

Results of soil tests:
Vegetables:
Beans 6.0-7.5 pH
Cabbage 6.0-7.5 pH
Carrot 5.5-7.0 pH
Lettuce 6.0-7.0 pH
Onion 6.0-7.0 pH
Potato 4.5-6.0 pH
Tomato 5.5-7.5 pH

Which vegetables would grow in your area? ________________________________
______________________________________________________________________

Questions for each group to answer together:

Names: _________________________________________________________________
Group number: __________

1. Draw all components of the section that must be left alone and draw onto the map. This includes…trees, bushes, flowers, and protection for the courtyard animals.

2. What things in this section could be used for Beartown? For example: berries on the bushes for food

3. What organisms live in this area of the courtyard? Imagine that you are the (earthworms, birds, ants, etc.). What would you see? What would you eat? What protects you? How would Beartown affect these organisms?

4. What parts of Beartown can you see being in this section?

Environmental Analysis Map for each group to diagram their space on:
FIGURE 2
Packet for Wednesday Afternoon Program at the Campus School

Prior to using any of these mini lessons or activities here is some general information for understanding to use as a base for discovering the many wonders of some of the local wetlands around Northampton:

Water is one of our most important resources. We need water for drinking, cooking, cleaning, growing crops, and keeping our pets and livestock in good health. We make use of water by transporting our goods on oceans, lakes and rivers, and by raising fish in ponds. We also use water for fun - swimming, water skiing, fishing, etc. Wetlands are places that are completely covered with water at times. Swamps, marshes, ponds, edges of creeks and rivers are all wetlands. This habitat can be found many places in and around Northampton and the Pioneer Valley. Many creatures find their food in wetlands, including birds (ducks, mallards, and pelicans), animals (raccoons, deer, and moose), insects, and fish. Wetlands help protect our homes from flooding. They lower floodwaters by holding rain and melting snow. On the sea coasts wetlands catch the fury of the hurricanes. Wetlands also help filter pollutants. They provide habitat for wildlife, lend support for fisheries, and are sanctuaries for rare and endangered species. Many wetlands are now a place where people can watch birds, fish, and learn about the animals and plants. These are called "wildlife refugees." These wetlands are preserved to make sure that endangered species find their home and food there. Unfortunately, many wetlands are being drained of all their water. People then plant crops on them or build roads, airports, factories, or houses. As a result, animals and fish lose their homes and humans loose the ability to learn from these amazing ecosystems.


These activities do not all have to be done in relation to the wetland habitat, rather they were merely designed this way due to the prevalence of this habitat in and around Northampton in hopes that a field trip or walk would be possible.

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### Giving voice to the natural world

**Grade Level:** 1-5

**Duration:** 30 minute lesson

**Description:**
Taking a closer look at objects that cannot speak for themselves and normally not given a second thought by forming questions.

**Goals:**
1. To think more thoroughly about the natural objects around us.
2. To consider these objects in a different manner thus taking them into consideration more often when thinking about the effects that humans have on the natural world.

**Objectives:**
To find objects and then form questions that may or may not have definite answers to stimulate discussion and thought.

**Prerequisites:**
Class must have established rules for an outdoor walk

**Procedures:**
1. Take class outdoors and divide into groups of four or five.
2. Have groups collect some natural objects they find of interest.
3. Have each group brainstorm questions about the object. To include everyone in this process the items can be passed around in the small circles and each student can examine the object as they come up with another question.
4. Once they have run out of questions for the object they can move on to their next object of interest. If at this point, any one group is having difficulty example questions can be given such as these for a cattail:

- How does this cattail feel?
- How does this cattail get its energy to grow?
- How does this cattail survive when it grows in the water?
- How does this cattail look under water?
- How old is this cattail?
- How much would this cattail cost?
- How many times has this cattail been touched by humans or animals?
- How many seeds does this cattail have?
- Are there others exactly like this cattail?
- What color is the inside of this cattail?
- How many organisms have lived on this cattail?
- Does this cattail only live in wetlands?
- Could you eat this cattail?
- Does this cattail smell?
- Where did the cattail get its name?
- How long has the cattail existed on earth?
- How tall would this cattail grow?
- What would happen if this cattail was put in a different environment to live?
- Could you use this cattail to paint with?

5. Once each group is finished with their objects, the whole group can reconvene to discuss.
6. Each group can discuss what questions interested them the most and how their perception of the object changed as they had to keep coming up with questions.
7. Have small groups reconvene and decide on one question for which they will find the answer.
8. Walk back inside and remind them to try to find out the answer for the next day when they will be shared at the beginning of school.

**Assessment:**
The formulation of questions about each object and the act of finding the answer to the chosen question will prove successful assessment of this activity.
Prerequisites:
Class rules established for an outdoor walk.

Materials:
- Small bags for the collection of outdoor objects

 Procedures:
1. Explain activity to students
2. Go on the outdoor walk to collect objects. The walk would preferably be close to the a wetland habitat, but a wooded habitat would work as well, as long as there is a good supply of natural objects for the students to collect.
3. Have students pair up and collect about ten objects for 10-15 minutes. Objects can be anything from sticks, marsh grass, dead beetle, plastic bottle,
4. Reconvene and find a nice clearing to continue with the activity.
5. Have each pair brainstorm some ways in which they will categorize their objects. Examples would include lining them up by color: lightest to darkest, size: biggest to smallest, nature: most artificial to most natural, location: closest to farthest from the path, etc.
6. Have each pair set their objects up and take turns guessing the pattern. As certain patterns are created, the explanation of anthropogenic objects being objects that were left from humans’ presence might come up.
7. Walk back indoors for final discussion.
8. Discuss how many different ways there were to categorize the objects. Do we as humans tend to categorize nature in this way? Why do you think that is helpful or harmful to our environment?

Assessment:
Students will create various categorical line-ups for their objects.

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Lessons with a Hint of Art and Local Ecology

Sight: A closer look

Grade Level: 2 - 5
Duration: 20 minutes

Description:
Explore an object from the local wetland/outdoor habitat through visual techniques

Goals:
1. To gain greater appreciation for the visual and tactile qualities of objects from the local wetland/outdoor habitat.
2. To gain better understanding of the structure and function of these objects.
3. To strengthen personal connections with the objects.

Objectives:
Students will take a close look at objects from the local wetland/outdoor habitat and explore them through a variety of pencil and paper drawing activities.

Prerequisites:
None

Materials:
- Pencils
- Paper
• Objects from the local wetland habitat

Procedure:
1. Students will collect an object of interest from the local wetland or other habitat. Students can do this prior to class on their own time, or this step can be done by the teacher.
2. Students will each have pencil, paper, and their object in front of them as they are asked to go through the following activities:
   a. Looking at the object for one minute and then hiding the object out of sight and drawing the object from memory.
   b. Looking at the object while hiding their paper and pencil from sight as they draw the object. This can be done by putting their paper inside their desk as they draw.
   c. Closing their eyes and examining the texture of their object tactiley for one minute. Then drawing what the object felt like.
   d. Drawing the object in full detail with the ability to see the paper and the object together.
3. This can be repeated for as many objects as the students wish.
4. The drawings can then be displayed together to see the process of change as the student could become more familiar with the object.

Assessment:
Students will be able to describe their object with greater personal interest.

Adaptations

Grade Level: 2-5
Duration: 60 minutes

Description:
The creation of a creature with unique adaptations

Goals:
1. To gain an understanding of the concept of adaptations.
2. To gain an understanding of the role that humans play in adaptations of organisms.

Objectives:
Students will use natural adaptations covered and brainstormed as ideas in the creation of a new adapted creature never before discovered. Students will describe the creature noting their adaptations and subsequent uses.

Prerequisites:
A general understanding of organisms

Materials:
• The book Sharks by Nicola Davies
• Pens and pencils
• Markers/crayons/colored pencils
• Paper

Procedure:
1. Read Sharks by Nicola Davies
2. Explain the concept of adaptations: Adaptations enable living organisms to cope with environmental stresses and pressures. They can be differences in the anatomy or structure of the organism, differences in a process that happens inside the organism, or differences in a behavioral trait. Adaptations occur due to the changing of the organism over time.
3. These concepts can be explained by using the book Sharks to describe different adaptations.
4. Have the students brainstorm other adaptations they see in local organisms.
5. Have the students create their own creature with unique adaptations for living in a certain environment.
6. Have the students go around and explain the name of their creature and the adaptations the creature has that make it perfect for the environment it lives in.
7. Using the local wetland habitat would be perfect to get students started on thinking about an environment that is difficult for survival (little oxygen, lots of water, many predatory birds, etc.)

**Assessment:**
Students have successfully gained this concept if they can explain the adaptations of their creature.

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**Active Games with a Hint of Local Ecology**

These games will work great with any conversation about the local wetland habitat. Using activities such as these can inspire children to think about their natural environment in a number of different contexts outside the classroom. By exchanging ecological terms and organisms for traditional ones in common games, children can become more familiar with these terms while having fun.

**Green Algae, Green Algae, Send _______ Right Over**
(Variation of Red Rover, Red Rover, Send _______ Right Over)

*Outdoor/Indoor Activity*
- The group is divided into two.
- The two groups will stand facing each other at opposite sides of the playing field.
- Group members will hold hands tightly as they take turns calling one “chosen” member of the opposite team with the phrase, “Green Algae, Green Algae, Send Whitney right over!”
- The chosen player will attempt to break through the bond of the opposing group (Algal bloom). If the player breaks through, he/she can return to their team and if not, they must remain with the opposing team.
- Game continues until one group has “caught” all the players.

**Tadpole, Tadpole, Cross my Wetland**
(Variation of Fishy, Fishy, Cross my Ocean)

*Outdoor/Indoor Activity*
- Perfect for larger groups of any age
- Choose two players to be “newts” (or other predator of tadpoles).
- All other players will be “tadpoles”.
- With all the tadpoles lined up at one side of the playing field, the newts will call “Tadpole, Tadpole, Cross my Wetland”. The tadpoles will attempt to cross the wetland without getting eaten (tagged) by the newts.
- If tagged, the tadpoles will become “cattails” and must stand in the spot they were tagged. Now they must also try tagging the remaining tadpoles.
- The game ends when there are no remaining tadpoles.

**What time is it Great Blue Heron?**

*Perfect for groups of any age*

*Outdoor/Indoor Activity*
- Choose one or two players to be the Great Blue Heron. These players will stand at the far end of the playing field with their backs turned to the rest.
- All other players will be “tadpoles”.
- With all the tadpoles lined up at one side of the playing field, they will ask “Great Blue, Great Blue Heron, May we cross your wetland please?”
- Great Blue Heron will turn around and respond with an amount they can cross. For example:
  - You may take:
    - Five long cattails (five long steps)
    - Two tiny duckweeds (two tiny steps)
    - Six swirling damselflies (six swirling steps)
Occasionally, Great Blue Heron will jump around and yell “HERON DIVE” and all players must run back to the beginning without being tagged by Great Blue Heron.

As the tadpoles make their way across the wetland, whoever reaches Great Blue Heron first is the winner.

**Conservation Musical Chairs**

*Perfect for those with a general or greater knowledge of wetland ecology*

**Indoor Activity**

- As in musical chairs, players will circle a set of chairs while music is running.
- In this version each player will be given a card with a wetland character they are acting as (cattails, boardwalk, water, great blue heron, dragonfly, lily pad, teacher, construction worker, company owner, local resident, etc.)
- Before each round either a wetland threat or a positive wetland occurrence will be stated aloud. Suggestions include:
  - The local wetlands have been contaminated by a pollution leak from a neighboring manufacturing company.
  - Protected land surrounding the local wetlands has been expanded to keep a closer eye on groundwater pollution.
  - A hurricane hits the local wetlands.
  - A new informational boardwalk has just been constructed through a portion of the local wetlands.
  - A new company is expanding with construction directly neighboring the local wetlands
  - Etc.
- When the music stops those players not in chairs have to explain how their character would be affected by the issue of the round.
- As each round ends a chair is taken away and the last one left sitting in the chair is the winner.

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**Anyone Hungry?**

**Edible Wetlands**

**Grade Level:** K-5  
**Duration:** 30 minutes

**Goals:**
1. To get excited for learning about the wetland habitat.
2. To gain a better understanding of wetland organisms.

**Objectives:**
To create a sweet snack with food that resembles organisms found in the wetland.

**Prerequisites:**
Prior to preparation, there must be knowledge of any food allergies among the students and a conversation about sanitary practices of food preparation.

**Materials:**
- Chocolate pudding- water/mud/ and dirt
- Gummy worms- small worms
- Swedish fish- small tadpoles that start their life in the wetland
- Pull N’ Peel twizzlers- tall grasses
- Toothpicks- cattail stalks
- Mini marshmallows- cattail heads
- Green fruit roll up- algae living on the surface of the water
- Pan for the creation of the wetland habitat
Procedures:
Students discuss the word "wetlands"; and life that depends on them. Students will think of different life forms that exist around wetlands. After identifying the life forms, students will build their own wetland out of edible materials. While consuming the treat/wetland habitat, the concept of energy transfer can be discussed if the group is old enough to have discussed the concept of energy.

Assessment:
The successful identification of what each edible component of the snack resembles in a wetland.

FIGURE 3

Cross-cultural connection: San Pedro, Belize-Northampton, MA, USA

Grade Levels: 2 - 5
Duration: 2 hours

Description:
Create a class pen pal connection

Goals:
1. To create a direct, tangible connection between two cultures and their environments.

Objectives:
Students will create a mural of an environment they are most familiar with at school: the courtyard. Students will use organisms or objects in that environment to better analyze the relationship between human and nature. The mural will be a collection of shape poems created by the students. They will each be given an organism from the habitat used often in their school, the courtyard. Each student will make a poem about the organism or object in that organism or object’s shape. This mural will be transported down to San Pedro summer 2007 so the Coral Reef Ed-Venture students can compare the way in which they interact with their environment to the way in which Northampton students interact with a very different environment.

Prerequisites:
Students must have a general understanding of poetry and habitats.

Materials:
- Clipboards
- Paper
- Pencils/colored pencils/markers/crayons
- Scissors
- Glue
- Cards with the image and name of an organism or object from the courtyard
  - Dragonfly, earthworm, frog, great blue heron, swamp sparrow, flowers, cattails, bulrush, duckweed, water lily, tall grasses, water, dirt.

Procedures:
6. Introduce the Coral Reef Ed-Venture program.
7. Find out how much the students know about reefs: What do you know about coral reefs? How can you imagine an ecosystem that is so far away and so different than what we see in our backyards can affect us? Or vice versa?
8. Read *The Sea, the Storm, and the Mangrove Tangle* by Lynne Cherry.
9. Explain that this is the type of environment that the children in Belize live near. Many of them have only experienced tropical environments and so in making a stronger connection, describing the natural environment here in Northampton would be beneficial. To do this, a mural and letter
will be sent down to Belize and during the summer, they will create a similar mural and letter for a class here in Northampton.

10. At this point, someone will be given the role of writing a class letter that will accompany the mural down to Belize. In writing this letter, the class can all contribute in brainstorming ways in which they interact with the natural environment. The weather and other current conditions can also be mentioned in the letter.

11. Have the students pick their organism from a hat before taking the outdoor marsh walk. Use an example such as the whale to explain shape poetry.

12. Review rules of outdoor field trips and remind them to think about their organism as they are exploring the wetland area. One possible way to do this would be to imagine that you are that organism. What do you hear? What do you smell? What do you see? What frightens you? What do you eat?

13. At this point, have the class remain silent as they take the wetland walk.

14. Each student will have their clipboard, paper and pencil to take notes on their organism.

15. After 20 minutes, take the class back inside.

16. Inside the students can make their shape poems and as they finish can help put together the mural, sign their names, and decorate.

17. Finally, take a class photo that will be sent with the mural and class letter to the group in San Pedro.

Assessment:
Students will finish their shape poem and attach to the mural as a contribution.

DISCUSSION

I discovered many things in carrying out some of these activities with the groups of students in Northampton. In the Beartown lesson, we had to make a number of changes on the spot to allow the students to more easily conduct the soil analysis. At the end of the soil analysis I felt that in our discussion, each of the students showed that they had at least taken something of importance from the lesson. There was a great discussion about the multitude of bees that we had encountered as we were exploring the courtyard. At first the class wanted to get rid of the bees nest and exterminate all of the bees from the space, but with some provoking questions, they began to reconsider this idea. Prior to exploring the outside space, they had merely been thinking about how they would have inhabited as humans, but bears are a bit different. I asked them what bears ate. They began to catch onto the idea that they could learn from the bees and potentially have the bees nest be a deciding factor about where to base the honey production for Beartown. I
would hope that some of what they took from the lesson will encourage them to reconsider what it means to take over a space, especially as a large group.

As the lesson was taking much longer than expected, I also had to carry the lesson into the next morning with only the elected group leaders. The group leaders and I created a large poster size Environmental Analysis Map of the courtyard habitat. In each group’s allotted space, we plotted all existing plant material and other existing elements that must stay if Beartown were to decide to settle in the courtyard. In each allotted space we also cut out shapes of the vegetables that could possibly grow in that soil. In this way, the map will stay in the classroom and will later be used to make decisions and plan where they will be building their houses and community buildings versus farming and protecting the land.

In conducting the lesson to begin an exchange of information between a group of Northampton students and Belize students, I changed a number of aspects. There was a group of about twenty students and I first described to them the Coral Reef Ed-Ventures program and pointed out where Belize is on a map. I followed this with a reading of The Sea, The Storm, and the Mangrove Tangle, by Lynne Cherry. This provoked much discussion about the habitat in Belize and I encourage the students to ask many questions. It was exciting to hear that a handful in the group had studied Belize the prior year in a geography assignment.

Following a short discussion, the class each took a 16x11 sheet of poster paper. On one side they were encouraged to write a letter including the following items:

- Their name, age, who they live with and if they have any pets.
- What animals and plants they see in their backyard and/or near school?
- How they spend their time outside in nature?
- Any questions they many have about the coral reef or mangrove habitat.
On the opposite side I asked them to draw their favorite local organism or habitat in a way that describes how they interact with this thing or place. I had to veer away from the shape poem idea with a mural because a handful of individuals in the group were a little hesitant to be doing the poetry and were quickly starting to omit negative energy about the activity. Several did end up writing stories about how they directly interact with the environment, but it was interesting to see that most had a very difficult time with imagining themselves in this way. Many immediately thought of their house pets, which is a stark contrast to the variety of responses and ways in which the students in Belize have approached similar activities in the past. I believe this to be a further sign of our societies decreasing interactions and intimacy with the environment.

In conclusion, we must focus our attention on educating the rising generations about the environment and foster greater interactions with the natural world. We must understand that these children are one of the many important keys that will lead our communities to more sustainable paths. There will always be complications with curriculum, testing, and time in the classroom, but to limit these obstacles, a serious reconstruction is in need. I believe that interactions with the environment should be of the utmost importance in the classroom. Through these interactions, crucial concepts and subject matter can be explored. Math skills can be gained through the observation and analysis of certain animal behaviors. Writing skills can be gained through the written exploration of experiences in nature via poetry and other forms. Even interpersonal skills can be gained through the practice of interviewing community members about service projects. Jacobson, McDuff, and Monroe (2006) provide a wide range of suggestions and examples of schools that have successfully incorporated environmental education and
more direct contact with the natural world into their school systems. This book should be required of every school to help foster the reconstruction of curriculum that is needed.

Working to change entire school systems and curriculum frameworks is a daunting task, but I believe that small steps can be taken. The knowledge, motivation, and energy that is housed at universities and colleges such as Smith should be used to give local teachers the support that they so desire. Work study positions could even be created for the purpose of being environmental support resources for each of the local schools in Northampton. The energy from this seminar alone could be used to create an Environment in the Classroom day where activities and discussion could be facilitated by students in the seminar. All of these ideas take time, but I believe that it takes one step at a time. The suggested experiences and connections from this project will hopefully foster more personal relationships with the local environment as well as provoking thought about how children of similar age and similar interests can interact with a very different environment across the globe.

LITERATURE CITED


http://www.doe.mass.edu/frameworks/current.html

http://www.doe.mass.edu/mcas/

