A Trip to the Wetlands

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INTRODUCTION

In our society citizens need to be aware of their surroundings and all its aspects. A well-informed citizen is better prepared to make choices in life that will allow him/her to lead a productive and healthy life. The environment and its conservation is a vital part of the quality of life that we all strive for. This unit will use Texas wetlands as an illustrative example of an environment that affects everyone.

This unit will teach about the environmental effects of the developmental changes in the wetlands in Texas and how these changes will affect daily life. Additionally, in support of the development of informed citizenship, the unit will place a great emphasis on reading, writing and mathematics. With these goals in mind I see endless opportunity to make this project grow. Part of this unit will include writing activities in Spanish so that the students can grow in their language development as well as have fun doing the activities. The mathematical aspects of this activity will satisfy the criteria used by the Houston School District and its Project CLEAR, a guideline used in the district to teach the Texas Essential Knowledge and Skills, which is an integral part of our elementary school curriculum. These activities and projects will stimulate the students to do some critical thinking of their own while they also have fun learning.

The ultimate goal is to help the students become critical thinkers and lifelong learners, thus becoming adults who will be making informed decisions about their environment.

When this curriculum unit is properly implemented, it will encourage students to be inquisitive and willing to learn for the pleasure of learning. Learning should not seem like a chore and a burden, but something that is worthwhile. The value, here, too, is that while enjoying learning, they will be becoming informed citizens whose decisions will affect their quality of life.

BACKGROUND

I work as a Bilingual third grade teacher, in an inner city school whose demographics consists of a high percentage of students that are mainly Hispanic and African Americans considered “at risk” because of their low socioeconomic status and limited English proficiency. My personal philosophy is that all children come to this world with the same intelligence and potential; however, because of their birth circumstances these students have a disadvantage when they start their education. Good teachers can reduce this disadvantage. Furthermore, I feel that teachers need to be prepared to teach the students the skills necessary to overcome disadvantages.

Teachers need to provide these students with the tools necessary to help them become well-informed critical thinkers, with an education equal to that of the middle class or their more affluent counterparts.

To better understand the difference between urban and suburban students, I read a book about poverty written by a local educator that informs us about this problem. The book is entitled *A Framework for Understanding Poverty*, written by Ruby Payne. The book helps one to better understand urban, "at risk" students.

She begins by examining people in poverty. She classifies people in poverty into two groups, generational and situational. "Generational poverty is defined as being in poverty for two generations or longer. Situational poverty is a shorter time and is caused by circumstance"(10). Needless to say, both have a negative impact on student progress. To better understand students, Payne gives the definition of poverty as "the extent to which an individual does without resources." She defines these resources as financial, emotional, mental, spiritual, physical, support systems, relationships, and knowledge of hidden rules and lack of language skills. Payne believes that each of these resources play an important role in the success of students (16-17). Through the use of scenarios, Payne illustrates how the lack of said resources affect the emotional and physical well being of people in poverty.

Next she describes the effect of poverty among children and how it relates to the learning environment. She believes that students of poverty lack the language skills needed in order to succeed. To illustrate, Payne reflects on the work of Montano-Harmon and describes the five registers of language. The five registers are frozen, formal, consultative, casual, and intimate (42). She states that disadvantaged students are unable to communicate effectively because of their lack of exposure and use of frozen, formal, and consultative registers. She maintains that children of poverty remain in the intimate and casual registries, which do not lend themselves to success for learning. Another variable, which affects disadvantaged students, is their lack of knowledge of the hidden rules of middle and upper classes. Since hidden rules affect how children's capabilities are perceived, it is vital that these children learn these rules in order to succeed.

Payne concludes by discussing strategies for improvement of student achievement among disadvantaged students. She believes that educators can enhance student learning by providing a support system, role models, and opportunities to learn. In the classroom, the teacher should use graphic organizers, establish goal setting, teach conceptual frameworks as part of the content, use a kinesthetic approach to learning, use rubrics for assessment, teach the structure of language, and teach students how to make questions. Finally she states that it is the educator's responsibility to teach the differences and skills that allow the individual student to make choices on their own.

Through the understanding of people in poverty, the effects it has on the way students interact in the school environment, and the ways to improve achievement among disadvantaged students, educators will become more willing to make necessary changes in order to provide these students with an environment conducive to meaningful learning.

These disadvantages become even more visible in children enrolled in bilingual programs where they are not only lacking in English language skills but also in a very limited American cultural environment. However, I believe that well-informed and skilled teachers can help these students overcome their disadvantages and thus prepare them to become critical thinkers and informed citizens.

This book has given me a deeper understanding of children in poverty. I, like Ruby Payne, believe that it is crucial for educators to have this knowledge in order to provide students with the tools necessary for success. Ruby Payne has done a fine job of providing the reader with her personal experiences and some case scenarios that reflect the image and cultural differences of children in poverty.

MAJOR POINTS RAISED

- Understanding the culture and value of poverty will lessen the anger and frustration that educators feel when dealing with students and parents.
- Students' resources should be analyzed in order to seek solutions to the situation of students in poverty. The attitudes the students and parents have are caused by their culture and personal beliefs.
- Educators have the opportunity to influence the students positively by being a role model.
- Students need to be taught the hidden rules of middle class and be given educational opportunities equal to those of the upper and middle classes to be able to succeed.
- Being in poverty is rarely about the lack of intelligence or ability.

IMPLICATIONS

All students have the right to learn and should be given the opportunity to do so. I believe that education should provide all students with an equal opportunity for success while encompassing and promoting diverse experiences, ideologies, and skills. I also believe that the education system should guarantee that all students would be successful regardless of socioeconomic status, ethnicity, or individual differences. Through the understanding of students in poverty, educators should be able to help students pursue their education in an environment that is free of physical danger, hostility, or apathy. Many of the students in my school do not have the opportunity to learn ways to protect the environment. As with many urban students, my students need the opportunity to interact with their own environment and explore more natural settings. Environmental issues are rarely discussed at home and students are largely unaware of environmental efforts.

WETLANDS' VALUE AS A TEACHING THEME

Wetlands is selected as a teaching theme because they are found nearly everywhere on Earth. Some students will have first-hand experience in wetlands (fishing, bird watching); a lot won't. In either case, the fact that wetlands are important, sometimes "invisible," and nearby makes them an ideal theme for my students. Furthermore, Houston can be considered a wetland environment and is the ideal for helping students to explore the world around them.

The EPA defines "wetlands" as lands where saturation with water is the dominant factor determining the nature of soil development and the types pf plant and animal communities living in the soils and on its surface (Cowardin, 1979). Wetlands vary widely because of regional and local differences in soils, topography, climate, hydrology, water chemistry, vegetation and other factors, including human disturbance. Indeed, wetlands are found from the tundra to the tropics and on every continent except Antarctica.

Wetlands are "in-between" areas that have something of both dry uplands and open water environments; they are *transition zones,* which is what makes them so interesting. Wetlands have both uplands and aquatic characteristics and thus, have richer flora and fauna in their environments (*Texas Coastal Wetland Guidebook*).

Some of the different types of wetlands include marshes (tidal and nontidal), swamps, and bogs. The students will also learn that we must protect our wetlands because they are a very important and valuable resource to our ecosystem and are home to many beautiful and rare species. They filter runoff and adjacent surface waters to protect many of our sources of drinking water; they are the source of many commercially and recreationally valuable species of fish, shellfish, and wildlife; and they retain floodwaters and protect shorelines from erosion (EPA, http://www.epa.gov/owow/wetlands/fun_val.pdf).

Wetlands provide a variety of ecological functions both to the natural ecosystems and to the man-made systems that are part of our everyday environment. The wetlands theme will require teaching many new vocabulary words that will enhance reading skills and satisfy requirements for this grade level, both in English and Spanish. This part will make an excellent tool for the use of dictionary skills which are integral part of a good reader and writer.

As a preparation for the unit, teachers need to have knowledge of what to present to the students. Part of this necessary prior knowledge will include the flora and fauna of the wetlands and also why it is so important to protect this very valuable resource.

WHY ARE WETLANDS SO IMPORTANT?

There are many different kinds of wetlands and they all perform ecological functions, and produce certain goods and services that are valuable to humans. The most important function wetlands perform on the Texas Gulf Coast are:

- *Water quality*: Wetlands are one of nature's most efficient water filters. Wetland plants and soils clean water before it goes into groundwater or into rivers.
- *Nurseries*: Coastal near-shore wetlands serve as important nurseries for fish, crab, and other shellfish. The total economic impact of commercial fishing at the wholesale level is more than $400 million annually, employing about 30,00 coastal residents who all depend on the wetlands! The total economic impact of saltwater sport fishing in Texas is almost $2 billion annually, employing about 25,000 coastal residents.
- *Wildlife habitat*: Our coastal plain wetlands are home to many different kinds of animals. Birds from all over North America use Texas coastal habitats during migration and many species spend the winter on the coast.
- *Flood buffers*: Wetlands reduce the severity of floods by acting as natural detention areas. Destruction of many wetlands has made downstream flooding much worse.
- *Erosion control*: Near-shore wetlands act as buffers to reduce shoreline erosion and stabilize banks.
- *Recreation*: In addition to fishing, hunting and bird watching are also economically important. Wildlife watching is the fastest growing segment of the tourist industry. In 1996, 3.8 million U.S. residents spent $1.2 billion watching wildlife in Texas.
- *Wetlands Protection*: It is illegal to drain or fill a wetland without a permit from the U.S. Army Corps of Engineers. The entire Texas coast is under the jurisdiction of the Corps' Galveston District Office. Before a permit can be granted the requestor must show that the project has considered all viable alternatives and minimized impacts as much as possible. Any wetland loss must be compensated for by constructing new wetlands or by restoring or enhancing existing wetlands. The Corps of Engineers considers all public comments before granting a permit.

MAJOR THREATS TO THE WETLANDS

Human activity has been the major threat to wetlands. Agriculture, industrial development, and urban and suburban sprawl have caused the greatest losses of freshwater wetlands. Agriculture is no longer expanding on the Gulf Coast, and very little of the current loss can be attributed to it. In fact, rice land agriculture because of the flooding that goes with it provides some additional wetland habitat not otherwise available. The biggest current source of loss for freshwater coastal wetlands is from urban sprawl. Land subsidence caused by the mining of oil, gas and groundwater has been the primary source of saltwater wetland loss. Subsidence causes the land surface to drop, which can then become flooded if the surface is already very near to sea level.

Subsidence-induced flooding has drowned many wetlands, especially in and around large coastal cities such as Houston.

Estuarine wetlands are dependent upon freshwater inflow from rivers. In some estuaries, such as Corpus Christi Bay, there is not enough freshwater to maintain maximum estuarine productivity. The Nueces River, which once flowed down through the marshes of the Nueces River Delta, has been diminished and rerouted and no longer provides much freshwater inflow to the deltaic wetlands.

HOW OUR WETLANDS CAME TO BE

To understand the present pattern of wetlands we must go back about 60 to 100 million years ago, when the edge of the continent was about where Dallas, Austin, and San Antonio are now. The entire region that would become Texas coastal plain was then at the bottom of the newly opening Gulf of Mexico. Since then, the Gulf has been continuously filling in with sediment carried by rivers. These layers of gravel, sand, silt and clay may be up to 40,000 feet thick, and have extended the edge of the continent some 250 miles into the gulf. This process of sediment deposition continues today as Texas rivers add their sediment loads (the portion that is not trapped in man-made reservoirs) to their bays directly to the gulf. The Texas mainland shore coastal plain, beaches, barrier islands and peninsulas, river deltas, and estuaries are all products of the processes of erosion and deposition of water borne (alluvial) sediments.

At the height of the Ice Age, about 1,800 years ago, sea level was 300 to 400 feet lower than it is today and the shoreline was at least 50 miles farther out in the gulf. During this period the coastal rivers cut deep valleys into the coastal sediments, which flooded and filled with sediment once the climate warmed and sea level rose as a result of melting glaciers. Most of our fringing salt marsh wetlands have formed in the bays and estuaries that resulted from the flooding and filling of these river valleys.

The information that was acquired through research and the seminar offered by the Houston Teachers Institute, this prior knowledge will be used to help the teacher develop a background rich in wetland awareness as well as the preservation of our natural resources.

LESSON PLANS AND ACTIVITIES

The following lesson plans and activities will teach the students the importance of water in our lives and that conservation of our natural water resources is of vital importance. The choices that we make determine the quality of life that we are preparing for our future.

Reading objectives will be implemented in our lessons throughout our unit as will other skills including geography, map skills, ecology, environmentalism, measurement, etc.

The basic goal of this unit is to familiarize students with environmental concerns, particularly the wetlands. Because my students live in an area that is a wetland environment, I believe it is particularly important for them to learn about the environment around them. I want to instill in my students the desire to learn about the environment and want to promote taking an active role in preserving the environment.

Activity One: The Role of Water in Our Lives

Objectives

1. The students will learn that most of our planets' surface is covered by water and will discuss the role water plays in our lives on a social, physical, and environmental level.

2. Students will read *Water and My World: Mystery of the Muddled Marsh*.

3. Students will compose a short, descriptive essay explaining the role water plays in their lives as well as in the world around them.

4. The students will practice note-taking skills using material provided by the lecture.

Lecture

Almost all of the Earth's water is saltwater. Only a small amount of water that doesn't have salt is called freshwater. Freshwater is the only water that we can drink. Ponds, streams and wetlands or marshes have freshwater. All plants, animals and other creatures on Earth depend on having clean water. Without it there would be no life on our planet. We use water in our homes. It is important to have water for growing crops and raising farm animals. It is often used for transportation and to produce electricity. Many factories use water for making products. The students will also learn where the freshwater comes from. We will read that water can come from rivers, underground by using wells, and from the wetlands or marshes. Marshes and other wetlands are important because they help make our water cleaner. They filter out some harmful chemicals and other materials. Wetlands act as giant sponges. They hold water that might cause flooding. The wetlands are rich in resources to help wildlife to live because they provide plenty of food and water and places to make nests or other homes. Harmful chemicals that soak into the soil with the rainwater can pollute ground water. However, the wise use of these chemicals that help our crops grow is very important, but if extra or unwanted chemicals run off into our wetlands it could be harmful to wildlife and eventually harmful humans also. The

Wetlands have a very important role in preserving our water; they play a very important role in cleaning our water supply.

The plants and wildlife that live in the marshes serve as filters for the polluted water creating cleaner water for human use. The students will learn the importance of wetland conservation and the many things that can be accomplished if we use our knowledge to make choices that help keep our water clean.

Assessment

Compose a short, one-page essay explaining how water is important to your life and what you think water does for the world around you. How are you affected by water and what would happen if water was not available to you?

Activity Two: Field Trip to the Zoo

Objectives

1. The students will become familiar with the various habitats in which animals live as well as the dangers animals face with the destruction of these habitats.

2. The students will learn the importance of animal preservation efforts.

3. The students will learn about the jobs the zoologists, veterinarians, and others have at the Houston Zoo.

Lesson

During a trip to the zoo the students will get an overview of the different environments for our wildlife and how to preserve them. Many zoos have educational opportunities about the environment, which include animal habitats and the species that are endangered, and how we can help to protect them.

The Houston Zoo in cooperation with our school district (HISD) present a two day excursion into the different aspects of the various habitats in the world, which include wetlands and marshes and have activities that that encourage the students to participate in the conservation of our natural resources. The program stresses the importance of being responsible citizens that actively participate in these efforts.

The Houston Zoo program provides teachers with individual packets for each participant. These packets include a variety of activities that include reading, mathematics and science as well as social studies. The activities provide a variety of activities related to our objective. The teacher can contribute to enhance learning with personal experience and prior knowledge on the subject. By encouraging the students to

do additional research using a variety of resources, such as reading books on the subject and the use of the Internet, the teacher can accomplish a great deal towards achieving the goals expected from the students.

Activity Three: La Mujer Que Brillaba Aun Mas Que el Sol

Objectives

1. Reading objectives will be met by reading, *La Mujer Que Brillaba Aun Mas Que el Sol*, a Zapotec legend that tells a tale of what happens when people do not take care of their environment.

2. The students will discuss the things they notice about their environment. What do the trees look like and what they think the world would look like if there were no people.

3. The students will create a poster explaining things people can do to help save the environment.

4. The students will present the poster to the class and will discuss.

Activity Four: Rachel Carson and Silent Spring

Objectives

1. Bilingual Objective: Reading, listening, speaking, and writing the English language. Teacher reading and discussion of *Silent Spring* by Rachel Carson, who is the activist responsible for the modern day environmental issues, the banning of Dichloro Diphenyl Trichloroethane (DDT) and other pollutants that harm our resources. She is the founder of Arbor Day celebrations.

2. Guided discussion will focus on the importance of preserving our environment. The teacher will present different ways and resources that will involve the children in actively pursuing the preservation of our Wetlands.

Activity Five: Create a Watershed

Objectives

1. Use a large tub, deep wagon or wading pool to create a model watershed by placing two large mounds (hills) of dirt on either side of a gully (potential stream). The first of three activities listed below will be conducted in this model.

a. *Create a stream system*. Pour water down one of the hills to show how a stream system is formed. Discuss where the water comes from and where it goes – some into the ground, some into the stream, and some into the air.

b. *Illustrate how sediment can be a nonpoint source pollutant*. Place a sheet of white paper in the bottom of the gully. Pour water down one of the hills and observe the runoff of topsoil that makes its way to the stream (easily seen on the white paper). Discuss how the sediment (soil) can become a pollutant, harming stream life and eventually filling up the stream with soil. This happens naturally, over a long period of time, but how do human activities speed up the process?

c. *Illustrate how nonpoint source activities on the land affect the stream*. Dig a small hole in one of the hills and pour in ½ cup of motor oil. Cover the hole. This simulates a leaking underground storage tank or sewer system. With a watering can, "rain" on the contaminated area and observe the oil that makes its way to the stream system traveling underground. Discuss how nonpoint source pollution occurs and surface water is polluted from human activities on the land.

Activity Six: Pollution Clean-Up

Objectives

Illustrate how difficult it is to clean up pollution.

Lesson

1. Put a tablespoon of oil into a bowl of water and observe.
2. Try to remove it with various tools, such as a spoon, pencil, leaf, paper, or eyedropper.
3. Discuss how difficult it is to clean up pollution once it occurs.

Activity Seven: Plants for Oxygen Production

Objectives

Illustrate how water plants produce oxygen.

Lesson

1. Place a tube over a water plant.
2. Observe oxygen bubbles being produced when the tube is in strong light.
3. Discuss the importance of water plants in the stream system.

Activity Eight: Natural Recycling

Objectives

Illustrate how important water is in natural recycling

Lesson

1. Place some dead vegetation (grass, vegetable peelings, or leaves) in a nylon stocking.
2. Next, place some dead vegetation in a mesh bag.
3. Place some vegetation in a plastic bag.
4. Weigh the three bags.
5. Place the bags in water for a period of about two weeks.
6. After removing the bags and allowing them to dry weigh the bags once more and observe their appearance.
7. Discuss the role water plays in natural recycling.

Activity Nine: Phosphates

Objectives

Illustrate how phosphates impact water supplies

Lesson

1. Collect five gallons-size bags or jars of creek water.
2. Leave bag #1 as it is.
3. In bag #2, place ⅛ teaspoon of powered detergent (check the label to be sure it contains phosphates).
4. In bag #3, place ¼ teaspoon of detergent.
5. Put ⅜ teaspoon of detergent in bag #4 and 1.2-teaspoon of detergent in bag #5.
6. Discuss phosphates' impact on the water and the danger of too much plant growth in a stream. Remember that plants use carbon dioxide in the day and oxygen at night, so they would be competing with other living things for oxygen. (If nothing happens when the detergent is added, the creek where you got the water may be "dead" or the detergent may be too strong.)

Activity Ten: Watersheds

Objectives

Illustrate how water moves through a watershed.

Supplies

Simulated watershed containers made of different surfaces (sod, wood, linoleum, etc.) for comparing runoff.

Lesson

1. Observe water traveling over a variety of surfaces such as wood, linoleum, and sod.
2. Measure the amount of water poured compared to the amount collected after runoff.
3. Time how long it takes water to run over one substance compared to another.
4. Discuss how urbanization, agriculture and many human activities affect the water that travels through the watershed.

Activity Eleven: Filtration

Objectives

Create a natural system of filtration

Lesson

1. With a hot nail, punch a hole in the bottom of a clear plastic cup.
2. Create a natural filter by filling the bottom of the cup with small rocks, pebbles, gravel and sand.
3. Pour dirty water into the cup and observe the difference in the water that comes out through the hole.
4. Discuss how land naturally filters the water as it makes its way to streams, aquifers and other water supplies.

Activity Twelve: Oxygen

Objectives

Illustrate how plants give off oxygen for use by people and animals.

Lesson

1. Form a solution of several drops of bromothymol blue indicator and limewater (calcium carbonate).
2. Using a straw, breathe into the solution and observe how carbon dioxide turns the solution green.
3. Place a plant into another sample of the solution and observe that if oxygen is given off, no change occurs in the color of the water. (WET Instruction Handbook)

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http://www.nwf.org/
National Wildlife Federation

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The Nature Conservatory

http://www.sciquest.com
SciQuest – E-Solutions for Science

http://www.epa.gov/safewater/kids/wsb/index.html
Water Sourcebooks

http://www.whatduck.org/
The Wetland Habitat Alliance of Texas