

How Do Organisms Survive Change in Natural and Man-made Habitats?

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Introduction

Henry M. Brader Elementary is an elementary school that services students from kindergarten to fifth grade. Programs include general educational classrooms, least restrictive educational classrooms, Realistic Educational Alternatives for Children with Disabilities (REACH) and Delaware Autistic Program (DAP). Our building teaches a diverse group of students of ethnicity, special needs, English language learners (ELL) and a variation of economic statuses. It is a Title One school with about 500+ students. Our school is made up of about 3% ELL, 35% low income and 21% special education students. This current school year class sizes will increase from the low 20s to the high 20s in each classroom. I will be teaching fourth grade in all subjects. The subject I will focus on at this time will be a science unit: Structures of life. The district provides the classroom with FOSS science kits and live animals to conduct understandings of animals and their environments.

Rationale

This school year I will be starting a new grade level of fourth grade. I have taught for 8 years, but in the lower levels. I have also mainly taught small class sizes of around 20 students. This current school year I will be teaching in a class size of at least 30 students. I will teach all subjects with Common Core Standards and curriculum maps from the district. The students will be exposed to a variety of science topics of Land and Water, Magnetism and Electricity, Sky Watchers and Structures of Life. I will focus this unit on enhancing Structures of Life. We will use the suggested curriculum from the district and the FOSS science kits. We will also use our local resources of the wetlands on our school property to observe plants and animals and borrow pond water to better understand survival for plants and animals in our classroom. The students will work in groups to read articles, present articles, experiment with animals/plants, and better understand how the environment affects survival. The students will be able to dissect an article to find the relevant information for the subject at hand. Then with that information, the students will observe life in natural habitats and in controlled classroom habitats. The students will

understand the different types of adaptations that occur for organisms to survive. They will understand the five basic needs all organisms need for survival. With the information learned they will care for and observe bess beetles, crayfish, frogs and toads.

Content objectives

This science unit will focus on, “How do organisms, both plants and animals, survive in changing environments?” with a focus on crayfish and toads and the plants found in their habitats. The students will understand that the structure and function of these living organisms dictates how organisms grow, behave and survive. The students will have access to a variety of articles to better understand their organisms and what makes them function. The students will then create habitats to best mimic their natural habitat. The students will make and record observations of classroom habitats and natural habitats in the local wetlands. The students will learn how organisms can be grouped based on similarities and differences in their structure and function. We will learn how the functions of a structure can be similar despite different appearances in the different organisms being observed. They will be exposed to an understanding of how different organisms use their similar structures to thrive in various environments. The students will gain knowledge of how all organisms have basic needs for survival and obtain energy to grow and thrive. The students will then interpret how organisms adapt in order to obtain their basic needs for survival. Does their growth and other features change with responses to internal and external cues that aid in an organism's survival? The students will gain a better understanding of how a change in an environment, such as a man-made classroom habitat, may cause an organism to change or acclimate, and possibly result in adaptations appearing in the subsequent generations.

My purpose

The purpose of this unit is to enhance the Life Structures unit that I teach in fourth grade. The students will work with bess beetles and crayfish that are mailed to us with our kits. We are given a teacher’s manual, a Foss Science Kit with materials and a small selection of readings. The purpose of why I choose to add to this unit is to give the Structures of Life unit more structure, observational experiences and research. The students need more exposure to “Close reading” where they focus on a reading piece and pull out the important details to be learned. They also need more research resources so I added technology reading pieces and articles they can read at their differential reading levels. In the original unit they will observe two organisms in a classroom environment. This enhanced unit I am creating will have them observe toads, as well, and take field trips to see them in their natural habitat. Here the students will be able to compare the two habitats and see what is different and alike and how that might affect the animal. I broke this unit into four basic needs for my students. The flow of the lessons would work to the teacher’s discretion. I plan to do more of the research in the beginning of the unit to give the students more background knowledge, but it will be continuous through the unit. The

observations will occur once the habitats are created and then we hope to take frequent visits to our wetlands school property to observe the natural habitats. The formative assessments, “Apply your knowledge,” sections will be completed during the unit to check for understanding while the unit is in progression. The final formative assessment will be bringing all the information together by using their observations notes, texts and all other science resources to complete the “apply understanding,” section of the activities.

Background Knowledge

Here are a few key terms to use and know for this unit. The five basic needs for all living organisms for survival are sunlight, water, food, air and habitat. Not all organisms need the same amounts and/or types of these five basic needs. Sun light is a crucial need for it's a source of energy as well as light and heat. Sunlight provides energy, and for plants it helps create food through the process of photosynthesis. Water is a habitat for some organisms, like our frogs in the wetlands area. It is used for hydration of all organisms; it's just that they all require different amounts in different ways. Plants need it to bring in nutrients through their roots and animals need it to help cell activity function properly. Air is needed for all organisms, but often in different ways. Air helps animals breathe with oxygen and it helps plants survive with carbon dioxide to support photosynthesis. The food organisms need are different types of nutrients for each type of organism. This is another source of energy organisms need to function, grow into healthy adults and reproduce. All these needs for survival are provided within the habitat. All organisms need habitats for survival and can only tolerate a certain amount of change. The habitat for organisms should be suited to the animals' basic needs. The habitat has certain temperatures, nutrients, air and water to meet the organisms' survival needs. For example a snake could not survive in a cold atmosphere due to being a cold blooded animal. In this unit we will discuss and experiment with the habitats to make sure our organisms will survive, but also try to create the best habitat the students can create to best simulate their organisms' natural habitat. This will also lead to the different kinds of adaptations of organisms that are needed for continued survival.

There are three types of adaptations. They are morphological, behavioral and physiological. The morphological adaptations are what the body needs to help survival in its habitat, like legs to run and find food or to escape a predator. The behavioral adaptation is your mannerisms for survival and/or protection like how a flock of geese fly in a V shape or bees live in family groups. The physiological adaptation is chemical in where you process something at a certain speed. For example, a snake has venom to kill its prey before eating it and to ward off its predators.

Another part of this unit is understanding the differences between toads and frogs. The students will be exposed to a variety of answers, but they should gain a basic understanding of these animals' differences. A toad has rough, dry skin with wider bodies

and they do not need to live near the water to survive. A frog has smooth, moist skin and must live near water to survive. This unit will also look into the basic characteristics of a living organism to better understand and explore their organisms. This will also help them to classify organisms. The concepts needed for understanding living organisms for this unit are that an organism needs and uses energy, it will grow, reproduce, respond to a stimulus, and it is made-up of cells. When discussing growth, it could be simple cellular growth or it could be the process of metamorphosis. For example, our toads will go through a complete metamorphosis of egg, embryo, different stages of tadpole, and finally reach adulthood. An organism can either have sexual or asexual reproduction for the basic need to pass its genes on to subsequent generations. We will not go into depth about the cells and how to understand them, but more to the knowledge that they are an essential building block of living things.

Here are some of the teaching techniques to be employed in this unit. Close reading is a skill where students are given an article to read over once for pure pleasure of reading and gaining knowledge. The second read could be in whole group, small group, partner reading or even individual reading. The second read is where you become more familiar with the reading piece and find the important facts within the reading. I will have the students high-light or note-take the important facts to be obtained. This can take more than two readings. Jigsaw reading is where the whole group will be given one larger article and it will be broken into sections for students to read. The other way is the students will be given multiple articles on the same topic for students to read. The students will read their section and note take. Then they will present their findings to the whole group to help better understand the article for themselves and their classmates. The videos are shown with a smartboard. The first round they will watch to completion. In the second showing, the video will be stopped periodically to check for comprehension and allow students to take notes. After the video is finished a brief discussion will occur to check for understanding by all students. Note taking is to be completed in their journal in a different section than their journal observations and it is of their understandings and explorations. Journal observations will be taken daily, and it is just for students to express what they see and hear, and to record how students notice things and make predictions. They will share in whole groups or with partners to express their findings and interpretations. The wetlands field trip is on our school campus where the students will walk and observe the different animals in their natural habitats. The students will be grouped in whole group, small group, partners and independent as needed with the lessons.

The Crayfish

Crayfish can naturally be found in any fresh water habitat. Most common locations of crayfish to be found in United States are in Louisiana, in the Mississippi Basin, and Kentucky. They can be found in other countries, as well. You will normally find crayfish

under a rock or disguised within its surroundings for protection. They prefer cool dark areas and not in direct sunlight. They are most active at night. Crayfish are Crustaceans and are closely related to lobsters with ten legs. Among the ten legs, the front two are large claws called Chellae. These claws are used for both protection and as a tool to catch their prey. They have an exoskeleton, meaning they have no bones and it will shed its skin when it out grows its exoskeleton. They can be different colors, like light shades of pink, yellow, brown, white or green. Some can be a dark brown. Crayfish begin as eggs in a cluster attached to the female. There can be 10 to hundreds of eggs in one cluster. The cluster is among the 5 pairs of legs called swimmerets. The swimmerets are feathery looking under the abdomen of the female. This area is called the bristles and the female's bristles have tiny black dots on them. The eggs are called instars. Once the crayfish have hatched, the babies will stay close to the female for protection and food. After the babies have shed about two times, they will be big enough to leave their mother to find food on their own. Crayfish can live up to about 2 years with proper living habitats. They normally grow to about 3-4 inches, but could grow bigger to about a foot. Crayfish eat both plants and animals. They prefer fresh foods such as worms, insects or the insect larva and eggs of other fish or toads. Although they prefer fresh food, they will eat deceased animals as long as it is not too dated.

The Bess Beetle

Bess Beetles can be found in many outdoor setting of darkness such as underground, in gardens, decaying logs, or wood piles. In United States they can be mostly found in Florida, over and across to Texas, and up the east coast states. They are needed in our ecosystem because they are scavengers and decomposers. Most Bess Beetles grow to about an inch and a half. They are black in color. Like all insects, they have 6 legs and three body parts (head, thorax and abdomen). These beetles will eat wood and decaying wood of oak, elm and other hard wood trees. They live in groups called colonies. Bess beetles go through a cycle called a metamorphosis. They begin as an egg. These eggs will stay in the tunnels of wood and be cared from by their parents. Once the egg hatches, it will become a larva. As a larva it looks like a worm and it eats preprocessed wood from their parents and grows. Once it has grown enough it will enter the pupa stage of resting. This process could take up to a year within a safe place within the tunnel, as well. Then the pupa changes into a hard shell as an adult Bess Beetle. Most adult Bess Beetles live to about a year to a year and a half.

The American Bullfrog

The American Bullfrog can be found in or around local swamps, ponds and lakes across the eastern and central United States. It is normally a light green/yellow color with a lighter underbelly. It has webbed hind legs from swimming. It can be about 3 and ½ inches to 8 inches long and up to one pound in weight. They are nocturnal organisms and

they feed on insects, worms, fish, crayfish and other smaller frogs. Its life cycle is called a metamorphosis. It starts as an egg. The eggs, left by the mother, can be found in underwater vegetation. The eggs can float at the top of the water and could be in a group of hundreds eggs. After about 21 days, eggs hatch into tadpoles. These tadpoles swim, have gills and eat the local vegetation. It will grow in the local water area and begin to change into a froglet. Becoming a froglet is where the tadpole begins to grow legs and slowly loses its tail. This is also when the lungs are developing. The frogs reach adulthood at about 3 months. They will then have fully functioning lungs and no longer have gills. They can live up to 9 years old, but this is rare due to its predators.

The American Toad

The American Toad is known to be found on the Eastern coast, but can be found in areas of Tennessee, Kentucky and Indiana. It could be found in grassy fields, near ponds, gardens or forest areas. It is a brown or dark green color with warts that look like spots. Although it can change colors slightly due to stress, temperature and humidity. It mainly eats insects. To protect itself from predators its many glands can produce a poisonous fluid. These toads can be about 2-4 inches in length. Their eggs are clustered together with thousands of eggs at once in a fresh water reign and could take up to 12 days to hatch. Once they hatch they will become tadpoles. The tadpoles are the larva stage of the metamorphosis. As tadpoles, they start with gills and as days go by they will produce legs. Then as time goes on they will grow into toads as their adult form. As adult toads they will no longer have gills, but lungs to breathe on land. It will continuously shed its skin during its lifetime. The toads are not known for living long, nor all making it through each stage, but they have been recorded to live to about 10 years old.

Activities

Students will have an essential question to guide each lesson. The lessons will be during a 25 minute science block. Some lessons will take several days to complete. Some lessons will be continuous through-out the unit. There are a variety of teaching techniques using nonfiction articles, computer lab visits, jigsaw reading, videos, note taking, journal observations, wetlands field trip and students being grouped with partners and/or small groups.

The research

The students will be given activities throughout the unit to assist with their research about their organisms. The research will not be done all at once, but instead throughout the lessons when needed. Each of the following will be used as part of the research

process providing different opportunities for learning and to research topics on organisms.

KWL - Students will fill out a graphic organizer answering questions concerning what they know about environment and its changes, what they need to know to better understand the conditions in the environment, and then we will revisit this L for what they have learned at the end of the unit.

The students will begin to learn about the basic needs of all organisms. The students will be given the question; what are the basic needs of all organisms for survival? Then I will take the students to the computer lab to visit this site: <http://eschooltoday.com/science/needs-of-living-organisms/five-things-living-things-need-to-survive.html> I will read the introduction. Then, the class will be split into five groups to read about their basic needs, take notes about what the needs are and why they are important for survival. The class will share their findings and create a poster of the five basic needs.¹

The students will determine the classifications of organisms. Students will watch a video and take notes about the different classifications of organisms. Then as a whole class, we will discuss the importance of classifying organisms to answer the question of why we classify organisms and how does it help us to better understand them?

The students will gain information on how organisms obtain energy. The students will be given the question, how do organisms obtain energy to grow? I will then take the students to the computer lab to visit this site: <http://eschooltoday.com/science/characteristics-of-living-organisms/characteristics-of-living-things.html> Then the students will listen as I read the introduction. Then the class will be split into five groups to read about how organisms obtain energy and how they grow. The class will share their findings and take notes in the science journals.²

The students will understand “animal’s natural habitat.” I will read aloud “The Magic School Bus, Hops Home”³ to better understand the basic needs of wetland animals and their habitats. Then the students will draw a natural habitat of a pond for their creatures and make sure to label the necessary elements of a natural habitat and why it is important.

Understanding the term “Aquaculture” - Students will be given an article entitled, “What is Aquaculture.”⁴ The class will be split into partners and given sections to read. Students will then come together to discuss the article and make plans for the care of our classroom organisms and figure out how we can make or habitats as close as possible to what is found in nature.

Close read on Crayfish - The students will be given different articles about crayfish and then come together to find common trends from all articles to answer the question, “What are the crayfish’s basics needs?”⁵

In a similar exercise, the students will be given different articles on toads and they will need to define, what are the toad’s basics needs? Then come together to find common trends from all articles to define the toad’s basics needs.

Students will compare the toads and frogs for the local wetland on school property to the classroom toads. The students will then read an article on the difference between frogs and toads to determine what we have in our local wetlands and what evidence do you know from the article to support your fact?⁶

The students will be given notes on what the three types of adaptations are and examples of organisms with these adaptations.

The observations

The students will observe habitats for all organisms. They are given the crayfish and bess beetles with the kits. The students are given plastic containers for their habitats. They then need to create a “natural” habitat with things in their natural environment outside the building. The toads are given to me by another co-worker. We will observe them both in our classroom habitats and outside in a pond on our campus.

The students will then create a habitat to cater to the crayfish’s basic needs in a classroom. They will be given small plastic containers with open tops and high walls. They will also be given fish food that crayfish eat. Then they will go outside to find natural resources to best simulate a crayfish’s habitat. In creating their habitat with a team of students, they will need to justify why they have done what they have done for the crayfish. Then the class will use these habitats for the different crayfish that are sent with the science FOSS kits.

Students will observe the Bess Beetles daily as their morning work. What has changed, what is needed and what could we do to make it better for the living organism?⁷

The students will then create a habitat to cater to the Bess Beetles’ basic needs in a classroom. They will be given small plastic containers with closed tops with holes for ventilation. Then they will go outside to find natural resources to best simulate a Bess Beetle’s habitat. They will also need to make sure to find food for their organism to eat. In creating their habitat with a team of students, they will need to justify why they have done what they have done for the Bess Beetle. Then the class will use these habitats for the different Bess Beetles that are sent with the science FOSS kits.

Students will observe the Bess Beetles daily as their morning work. What has changed, what is needed and what could we do to make it better for the living organism?

The students will then create a habitat to cater to the first tadpole's basic needs in a classroom. We will use a fish tank, distilled water and fish food for the tadpoles. Then the students will go outside to find things needed to add to the tank. In contributing to the habitat as a class, they will need to justify why they have done what they have done for the tadpoles and how it will either stay the same or be adjusted once the tadpoles become toads. The tadpoles will be donated from a local pond.

Students will take daily observation notes about how the tadpoles are surviving and what could we do to make it better. What has changed in the habitat or the tadpole?

Students will take a field trip to the wetlands on school property to observe toads/frogs in their natural habitat and how could we better accommodate in our classroom?

Students will compare the toads and frogs for the local wetland on school property to the classroom toads. The students will then read an article on the difference between frogs and toads to determine what we have in our local wetlands and what evidence do you know from the article to support your fact?

Apply your knowledge

Students will revisit the notes of classifying organisms to figure out what classification we can give the crayfish and toad. Do they follow the normal classification?

The students will listen to a story "The Magic School Bus Explore the world of animals."⁸ The reading will stop in the middle of the story and the students will have to make predictions of where the animals' habitat is and what evidence they have to know this is true.

After the students have completed the lesson on the different types of adaptations they could go to the website and create a fish with the knowledge they have learned about adaptations for survival.⁹

Apply understanding

The students will be presented with the question: how does a change in environment cause an organism to adapt? Use the evidence you have been taught this science unit with articles, notes, observations and field trips to support your reasoning.

Resources

"American Toad Bufo Americanus." ENature: FieldGuides: Species Detail. Accessed January 11, 2016. <http://www.enature.com/fieldguides/detail.asp?recnum=AR0006>.

"American Bullfrog." National Aquarium. Accessed January 11, 2016. <http://www.aqua.org/explore/animals/american-bullfrog>.

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"BESS BEETLE." BESS BEETLE. Accessed January 11, 2016. <http://lhsfoss.org/fossweb/teachers/materials/plantanimal/bessbeetle.html>.

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"What Is Aquaculture?" What Is Aquaculture? 2008. Accessed October 26, 2015.

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¹ "What Basic Things Do All Living Organisms Need to Survive?" What Basic Things Do All Living Organisms Need to Survive? 2008. Accessed October 26, 2015.

² "What Are the Characteristics of All Living Organisms?" What Are the Characteristics of All Living Organisms? 2008. Accessed October 26, 2015.

³ Relf, Patricia, and Joanna Cole. Scholastic's The Magic School Bus Hops Home: A Book about Animal Habitats. New York: Scholastic, 1995.

⁴ "What Is Aquaculture?" What Is Aquaculture? 2008. Accessed October 26, 2015.

⁵ Crandall, Keith. "Crayfish (Cambarus)." Crayfish (Cambarus). 1999. Accessed October 26, 2015.

⁶ "Frogs and Toads." Frogs and Toads. Accessed October 26, 2015.

⁷ "BESS BEETLE." BESS BEETLE. Accessed January 11, 2016.

<http://lhsfoss.org/fossweb/teachers/materials/plantanimal/bessbeetle.html>.

⁸ Relf, Patricia, and Joanna Cole. Scholastic's The Magic School Bus Hops Home: A Book about Animal Habitats. New York: Scholastic, 1995.

⁹ <http://fishwatch.dnr.sc.gov/FishFusion/FishFusionWindow.html>

Curriculum Unit Title

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KEY LEARNING, ENDURING UNDERSTANDING, ETC.

The students will understand that the structure and function of these living organisms dictates how organisms grow, behave and survive. The students will have access to a variety of articles to better understand their organisms and what makes them function. The students will then create habitats to best mimic their natural habitat. The students will make and record observations of classroom habitats and natural habitats in the local wetlands. The students will learn how organisms can be grouped based on similarities and differences in their structure and function. We will learn how the functions of a structure can be similar despite different appearances in the different organisms being observed. They will be exposed to an understanding of how different organisms use their similar structures to thrive in various environments. The students will gain knowledge of how all organisms have basic needs for survival and obtain energy to grow and thrive. The students will then interpret how organisms adapt in order to obtain their basic needs for survival. Does their growth and other features change with responses to internal and external cues that aid in an organism's survival? The students will gain a better understanding of how a change in an environment, such as a man-made classroom habitat, may cause an organism to change or acclimate, and possibly result in adaptations appearing in the subsequent generations.

ESSENTIAL QUESTION(S) for the UNIT

How do organisms survive change in Natural and Man-made Habitats?
What is the structure and function of these living organisms dictates how organisms grow, behave and survive?
How organisms can be grouped based on similarities and differences in their structure and function?
How all organisms have basic needs for survival and obtain energy to grow and thrive?
Does their growth and other features change with responses to internal and external cues that aid in an organism's survival?

CONCEPT A

Finding the research

CONCEPT B

Observations

CONCEPT C

Apply your knowledge

ESSENTIAL QUESTIONS A

How do organisms survive change in Natural and Man-made Habitats?

What is the structure and function of these living organisms dictates how organisms grow, behave and survive?

ESSENTIAL QUESTIONS B

How organisms can be grouped based on similarities and differences in their structure and function?

How all organisms have basic needs for survival and obtain energy to grow and thrive?

ESSENTIAL QUESTIONS C

Does their growth and other features change with responses to internal and external cues that aid in an organism's survival?

VOCABULARY A

Natural Habitats
Man-made Habitats
Organism

VOCABULARY A

Structure and function
Thrive
Survival

VOCABULARY A

Internal and external cues
Organism
Survival

ADDITIONAL INFORMATION/MATERIAL/TEXT/FILM/RESOURCES

<http://eschooltoday.com/science/needs-of-living-organisms/five-things-living-things-need-to-survive.html>
<http://eschooltoday.com/science/characteristics-of-living-organisms/characteristics-of-living-things.html>
<http://fishwatch.dnr.sc.gov/FishFusion/FishFusionWindow.html>
White, Nancy, and John Speirs. Scholastic's The Magic School Bus Explores the World of Animals.
Relf, Patricia, and Joanna Cole. Scholastic's The Magic School Bus Hops Home: A Book about Animal Habitats.