I Can Live Here, Can You? - Aquatic Organism Adaptations

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Introduction

Don't animals live in the zoo? Isn't a zoo a real home? Where are the places I see on TV? Are those places really real? How can animals live there if no one is there to feed them? Can lions live in Delaware? These are typical questions young learners have when they look at places and animals around the world. "Dolphins are the cutest fish." "I can catch a shark in a river." "All forests are rainforests." "Animals come out of eggs." "Plants are not living things." These are typical misconceptions young learners have about their world. Even though they truly believe themselves to be correct, young learners have a genuine desire to learn and explore the world. Given the current conditions of our natural environment, it is critical that students gain a true and accurate understanding of their world. Providing students opportunities to explore, examine and learn about their world is the purpose of this unit. I want my students to learn about their world in meaningful, engaging ways that will solidify true and accurate understanding of core information while teaching them to become learners of learning. I want my students to start to ask questions like: "What animals are living now that may not be living when I am as old as my teacher?"

As a seasoned first grade teacher, I am always inspired by the excitement and enthusiasm that science topics evoke in children. Their natural curiosity about the world and how things work that is innate in children is infectious. As a teacher leader, I have seen and been a part of implementing numerous educational changes including curriculum, social and administrative changes. With the constant changes in education, it is refreshing to know that natural curiosities of children do not change; however, with technology and social changes in our world, we must change how we lead our students in learning. To this end, eager to stay on the forefront of the upcoming changes in science instruction, I joined our state's Next Generation Science (NGSS) Team which is working on creating a smooth and efficient pathway for implementing the Next Generation Science Standards across the state. I have also worked with our state and district on formulating implementation plans for Common Core State Standards and have worked with my team and school integrating science and social studies across the reading, writing and math content areas.

Demographics

West Park Place Elementary is suburban Delaware elementary school, in Christina School District, that supports students from age 3 to grade 5 in their academic journey. For the past several years, the school was designated an ESL school and received the

majority of non-Spanish speaking English learners. However, the district is moving to having students enroll at their home school, and although our number of ESL students has decreased, their needs have not diminished. This year, we also added a pre-k to grade 2 Montessori program. I teach a self-contained classroom of 21 students. Students in my class receive pull out services for ESL support, reading and math intervention, and enrichment. I have a 30 minute block for teaching science and social studies. I switch the teaching of either in consecutive unit blocks so that I complete a unit of study or investigation. In the Christina School district, science is taught through the use of National Science Resource Center's Science and Technology for Children (STC) programs. I have not been provided with an updated teacher guide since my original training in 1999. Next Generation Science Standard techniques are being slowly integrated in very infrequent professional development sessions.

Rationale

In first grade, students are currently introduced to three science topics: weather, solids and liquids (matter) and organisms. I use the content in the kits as my primary resource for teaching science; however I have adjusted, modified and changed the lesson activities and format numerous times over the years. Although I can change my instructional strategies I cannot change the primary resources. I embarked in this seminar as a means to deepen my knowledge of the content, connect Next Generation Science and Common Core Standards and yet again enhance the teaching instruction of the Organisms. The program is intended to provide learners with opportunities to observe, measure and identify properties in a hands-on experimental environment when students make their own discoveries. I hope to build a unit that will further enhance students' curiosities. The NSCR states[1] "Inquiry-centered experiences generate one of the most essential ingredients of learning—curiosity."

While I teach organisms, I watch my students become extremely engrossed in the individual organisms as we observe and explore them when they initially arrive. We have already learned the definition of an organism as a living thing, identified the basic differences between the plants and animals, and discovered basic needs of all organisms. I help my students understand various habitats of the world including: polar/arctic, desert, rainforest, deciduous forest, grassland, ocean and pond. We then create an aquarium and terrarium for our organisms. We receive the following plants: elodea and cabomba for the aquarium and moss and tree seedlings for the terrarium. For animals we receive guppies and pond snails for the aquarium, and millipedes and pill bugs for the terrarium. My students excitedly observe the organisms and identify their parts. However, once the organisms are in their habitat the kids quickly lose their excitement because the animals are rarely seen, particularly in the terrarium. Each organism settles into the positive/artificial environment and there are few to no interactions occurring, once again, especially in the terrarium. The aquarium provides some activity but this is limited to the guppies eating the food that is fed to them, guppies swimming and inevitably dying.

Students are not provided with an opportunity to observe the connections between organisms since there are no real food chains and certainly no complex food webs.

I have gone through various journal and recording sheets for my students to authentically capture their learning. With the need to address Common Core Standards with the teaching of science, writing has become an even more critical component of science. Our district has a writing curriculum, Explorations in Non-fiction Writing, which is to be used to guide writing instruction. Therefore, this unit will serve as a bridge to marry the standards.

NGSS narrows the focus of organisms from broad observations and discovery to knowledge application by asking students to design solutions. Students have to not only make observations but also have to analyze purpose and functions, determine science related patterns, and construct evidence based accounts. These new science standards require students to explore, delve and go deeper into their discovery and understanding. How students express their understanding is just as critical as what they express. Students need to be given the freedoms and liberties to develop and share their own ways of thinking and rationalizing information. The current curriculum and resources do not provide students with what they need to successfully meet the new standards.

Objective

This unit will utilize the vast information about aquatic organisms to provide students with opportunities to explore ways to meet NGSS in Life Science and Reading, Writing, Listening and Speaking Common Core Standards. My students typically have a clear understanding of living versus non-living things so I usually do not have to spend much time on this concept which allows me to move directly into the biome concept. Students will research biomes and habitats, organism adaptations for survival in the habitat, then determine meaningful ways to record and share the information. Students will begin to think about synthesizing their information, so that their knowledge can be transferred and applied. Students will engage in conversations and debates that require comparing and contrasting information and supporting their ideas with evidence or proof found in the biome, habitat, or organism's structure. Looking beyond the visible and thinking deeply to problem solve in situations is a 21st century skill all learners need to develop.

At the completion of this unit, students will be able to: identify and explain the key aspect of biomes, explain how a habitat is different from a biome, identify a habitat within a biome, create a diagram of a habitat including the living and non-living occupants, determine the organisms within the habitat, define the key features of plants and animals, identify external parts or structures of an organism and explain how these parts help it to survive in the habitat, compare and contrast a parent and off-spring of the same species, identify and support with evidence patterns in an animal group and habitat.

Content//Background

As part of our DTI seminar on Organisms - Adaptations for Survival in Aquatic Environments, we began discussions about various aspects of organisms and their survival. We started with the basic question, "What is an organism?" which led to the discussion of the organizational structure of an organism. Breaking down a structure from organism to system, organ, tissue, cell provided the foundation of organisms. We identified single cell organisms (unicellular) such as bacteria and algae. Unicellular organisms grow, eat, excrete and reproduce like multicellular organisms. Inside the single cell are organelles that carry out life processes such as digestion, respiration, and water regulation. The cell membrane controls the flow of nutrients, oxygen and waste into and out of the cell. Reproduction delivers a complete copy of the parents' genes. Single cell organisms survive abundantly in aquatic environments, however they are not the focus of the seminar. Our seminar and my unit will address multicellular organisms. This was a lot of technical information, but it set the foundations for basic learning.

Science

As I listened in seminar and began to conduct my research, I realized the importance of having a clear understanding of the basic information relating to science topics as I teach them. It became apparent to me that there have been instances in my instruction where I have provided my students with misconceptions. "What is science?" is how I typically begin the initial introduction to science with my students. We usually talk about how science is the study of how the world works and recently added an activity where I play a fun kid video song of science. Actually looking more deeply into the word "science" provided some insight to build an even clearer understanding of the term and its meaning. The word science comes from the Latin root: "Scientia" which means "knowledge." Many branches of science end with "-ology." The Greek root – logy means "study of."[2] Therefore, science can be defined as the study of gaining knowledge as to how the world functions.

Organisms

Further research and seminar discussions led me to delve deeper into understanding of organisms. I found that there are 7 defining characteristics of life for any organism: (1) Made of Cells, (2) Reproduction – sexual reproduction combines gametes from the parents resulting in a different genetic structure than either parent (totally unlike asexual reproduction where the progeny are genetically identical to the parent), (3) Growth and Development – growth features change from small size to large size through cellular

multiplication or actual cell growth; development – features physiological changes or transformation, such as sexual maturation, (4) Obtain and use Energy– comes from the sun and is captured through the process of photosynthesis in organisms called autotrophs (self-feeders such as plants and some bacteria); other organisms eat these autotrophs and organisms similar to themselves and are called heterotrophs (other eaters), (5) Response to environment – changes or stimuli in the environment trigger responses by the organism, (6)Regulation – homeostasis – internal conditions remain stable and constant, frequently through automatic control systems, (7) Evolutionary adaptation – genetic changes from one generation to the next resulting in adaptations that make the organism more fit for the environment, making them less susceptible to the forces of natural selection.[3] I will use this information to guide my students' understanding of organisms. We will not be able to focus on the specifics all the areas but having access to this information at an early stage will help better build upon their understanding.

Scientist

My research led me to think about the many types of scientists. During our weather unit, I call my students meteorologists, but during organisms, I call my students "scientists" as I've never really thought to clearly define their scientific identity during this unit. My research has led me to a list of titles of the specific scientists who specialize in and study some of the aspects of Life Science that may be related to this unit. For example, an **agronomist** specializes in soil and crops, a **biologist** studies living organisms, a **botanist** specializes in plants, a **cytologist** specializes in the study of cells, an **ethologist** studies animal behavior, a **geneticist** studies how traits are inherited, a **marine biologist** studies ocean plants and animals, and a **systemicist** specializes in the classification of organisms into groups based on structure, origin and behavior.[4] I am now better equipped to properly address my students more definitively during our studies. Providing students with the name of a specific scientist will build a learning foundation and set the stage for making connections as students gain more exposure to science topics in the future learning experiences. Also, noting that Galileo Galilei is the considered the father of modern science, Charles Darwin the father of evolution (how organisms change over time for our purposes), Gregor Mendel the father of genetics, and Aristotle the father of biology, will provide my students with historical information.

Biomes vs Habitats

I have consistently used the word "habitats," a natural home or environment for animals, plants, and other organisms, with my students, when discussing where organisms live. In our seminar, our discussion began with the term biomes and it occurred to me that I did not fully understand the difference. This realization led me to research the terms more thoroughly and I learned that biomes are regions of the world with similar climate (weather and temperature), animals and plants. There are terrestrial and aquatic biomes. Aquatic biomes include Freshwater, Freshwater wetlands, Marine, Coral Reef, and

Estuaries. Terrestrial (land) biomes include Tundra, Rainforest, Savanna, Taiga, Temperate Forest, Temperate Grassland, Alpine, Chaparral, and Desert.[5] Biomes are large areas of the earth's surface with the organisms that have adapted to the environment but biomes are not ecosystems themselves. Biomes have similar climate, plants and animals and usually contain many different individual ecosystems.

Polar

Located in the furthest points from the equator, the Arctic, in the north, is comprised of the Arctic Ocean, with land including northern parts of North America, Europe and Asia as well as numerous islands. Although large plants do not grow in the Arctic regions, there are over 1500 species of flowering plants, shrubs, grasses, mosses and lichens that survive in the area. Animals that live in the Arctic include arctic fox and hare, wolves, walrus, seals, snow owls, snow geese, whales and polar bears. Antarctica, in the south, is a continent surrounded by an ocean. It is the coldest, driest, windiest place on earth. There are only two native vascular plants, Antarctic hair grass and Antarctic pearlwort, which grow on the shore of the west coast of the Antarctic Peninsula. There are also many types of mosses, algae and lichens that grow and survive in Antarctica. Penguins, whales, seals, and albatrosses are notable animals that survive in Antarctica. Mammals live in the near ice caps and feed on fish and other food found mostly in the waters off the coast.

Tundra

Just south of the Polar Regions, temperatures are cold and average about 18 degrees. There are two seasons, winter which is long and dark because the sun does not rise and summer which is short and bright because the sun does not set. The ground is permanently frozen, permafrost, so it is difficult for plants and animals to find nutrients. Plant life includes grass, mosses and small shrubs; the growing season is too short for trees. Animals in the tundra include polar bears, caribou, arctic fox and hare, musk ox and rock ptarmigan.

Forests

Located below the tundra, coniferous forest have evergreen trees that produce cones and needles. Spruce, pine and fir are the most common trees, as well as cypress, cedar and redwoods. Animals common to the coniferous forest are reindeer, foxes, lynx, moose, wolves, centipedes, cuckoos, hawks, thrushs, and tigers. Deciduous forest has trees with falling leaves and is located more southern in location than coniferous forests and have four distinct seasons. A variety of plants live in different areas of the forest lichen, moss, ferns and wildflowers, shrubs, and trees including, maple, oak, birch, magnolia, sweet gum and beech. Animals include hawks, cardinals, woodpeckers, deer, raccoons, opossums, porcupines fox and squirrels.

Grassland

Large rolling areas of land with a warm enough climate allow for low growing plants but limited rain prevents trees from growing successfully. They are typically found in the middle latitudes in the interior of continents and can have tall grass from a humid wet climate or short grass from a dry hot summers and cold winters. Plants in the sunflowers, goldenrods, clovers. Animals include bison, coyotes, bobcats, prairie dogs, aardvarks, antelope, elephants, hyena, wildebeest, zebra, crickets, dung beetles, ostrich, buzzard, eagles, cobras, and death adders.

Rainforest

Located at and around the equator and receiving lots of rain and staying warm year round, rain forests have the greatest number of plants and animal species as compared to any other biome in the world. Rainforests are comprised of distinct layers including the floor, understory, canopy and emergent layers, each with their own unique organisms. Plant life includes orchids, coffee, Brazil Nut tree, poinsettia, cacao, rubber tree, *Heliconia* and Bromeliads.[6] Animals of the rainforest include apes, anaconda, bats, caiman, capybara, howler monkeys, jaguars, toucans, butterflies, ocelots, tree frogs, cassowary and sloths.

Desert

Deserts can be very hot or very cold. Hot during the day, dry deserts receive less than 4 inches of rain yearly, but can't hold heat and may be freezing at night since there is no moisture in the atmosphere. Many plants are specialized to survive here including cactus, grass and small shrubs. Animals include rattlesnakes, spiders, scorpions, vultures, camels, toads, and lizards.

Habitats

So what is a habitat? First, habitat refers to a small area within an environment, whereas biome refers to a much larger global area. Habitat is the area or natural home within an environment that provides an organism what it needs to survive. Examples of habitats are a small wooded area where squirrels might spend their entire lives, or a stream in a mountain range that is home to rainbow trout. An ecosystem is an interacting set of organisms that also are influenced by the nonliving components of their environment (things like air, water and mineral soil). It is a system because of the interdependent nature of the interactions. Most habitats bear the same names as biomes even though they are technically subsets of a biome, such as oceans, rainforest, grassland, desert, and tundra. However, biomes are typically defined on a global scale and are defined by climate patterns that determine what the dominant vegetation will be. This, in turn, will

determine the kinds of animals that can exist there. Although the distinctions are subtle, it is important to equip students with accurate information about each. It is very confusing because the terms (biome, ecosystem, environment, and habitat) are often interchanged in publications, news reports, and general conversation.

Adaptations

In seminar we addressed organism adaptations and how they are genetic. Specifically defined, an adaptation is a morphological, physiological, or behavioral trait that has survivorship value. It is genetic and may be passed on from one generation to the next, or it may appear in the next generation of organisms due to genetic changes resulting from sexual reproduction of mutation.[7] According to Animal Planet, the top 10 animal adaptations are: living together, flight, migration, camouflage, hibernation, resource conservation, artificial bigness, hair, being prepared, and nest parasitism.[8] Most students are familiar with some of these adaptations when they come to first grade, hibernation being the most familiar. However, the actual purpose and need for this behavior is not fully understood to this age group.

Plants have many interesting adaptions. For example, succulents store water in their stems or leaves, may have no leaves or seasonal leaves, and frequently have long or deep root systems to absorb water. Some have a very short life cycle, germinating, flowering, and dying within one year in response to rainfall to evade drought. Leaves are greatly modified and can be hair-like to reduce evaporation and hinder the movement of insects or can be hardened into spines to discourage animals from taking water from the plant. Waxy coatings on stems and leaves help reduce water loss. Flowers that open at night lure pollinators who are more likely to be active during the cooler night. Succulents have a slow growth rate requiring less energy.[9] Looking at these adaptations should provide students with a deeper understanding that plants are living things and should evoke more questions about plants from young learners.

Evolution

Adaptations are genetic and a result of evolution. They occur over time and cannot pop up spontaneously in an organism that already exists. New adaptations come from off-spring who get a new genetic profile based on both parents' genes. Adaptations can be grouped as: Morphological or structural adaptations which involve some type of body form. Examples are arms, legs, tails, shells, horns, sensitive finger tips, eyes in front of head, mane. These adaptations provide some type of value to equip it for survival. Physiological - chemical or metabolic (how quick body processes things chemically). Most calories are used for body maintenance and the rate that they are used varies from one organism to the next. Behavioral adaptations are the actions and activities of an organism for its survival. Examples are traveling in a herd, flocks, or schools, playing dead or closing up, and migration.

Kin selection (commonly referred to as altruism, even though altruism as we normally define it does not truly exist) is an example of an adaptive behavior that directly influences the genetic composition of a population.[10] Kin selection is often used to explain the phrase "blood is thicker than water." An organism is more likely to put itself at risk if it is helping another organism that shares a substantial number of the same genes. The more genes that are shared, the greater the risk that will be taken. Sexual selection is an inheritable behavior. This trait refers to the competition for mates. Only those who can successfully compete will have their genes passed on because they will be the ones chosen by a mate for reproduction.

Young children can look at their own life experiences and recognize their own adaptations to various situations and circumstances. At this age, students do not have a true understanding of what "survival" really means, especially in the "natural" non-technical world of plants and animals. They often believe that animals are independent of each other or that they rely on humans for their needs. They do not comprehend the interdependence in the animal world and that animals often struggle to obtain the food sources they need and cannot just switch to a different food source. By looking at their own adaptive behaviors, students may begin to be able to see the kinds of relationships that are necessary for survival in the animal kingdom.

Natural selection, attributed to the work of Charles Darwin, is one of the basic mechanisms of evolution. Simplified, natural selection is the removal of individuals from the environment that do not have the adaptations that are necessary for survival and reproduction. Successful organisms will have the opportunity to pass their adaptations (genetically determined) on to the next generation at a higher rate than those that are subject to natural selection. Individual organisms are not necessarily concerned about the survival of the species – they have no concept of that. They are concerned about the survival of their genes.

Heredity

Heredity deals with how traits are passed from parent to off-spring and from one generation to the next. The study is called genetics and the scientists are called geneticists. Gregor Mendel is known as the so-called father of classical genetics, through his work which began with studying peas in his garden. He eventually came to the determination that certain traits were inherited following specific patterns, and that the traits were carried by "units of heredity," not blended together as you would blend different colors of paint.

All organisms are made up of cells and within certain cells are genes which carry traits. The genes are made up of a chemical called DNA (deoxyribonucleic acid). Every person has a unique set of genes, except for identical twins. Genes are like a blueprint for

the organism. Genes provide the potential for development but are influenced by interactions with other genes and the environment of the organism.

Heredity is the ability by which organisms pass their adaptations or genetic traits to their off-spring. Scientists, specifically, taxonomists, use these hereditary traits to classify organisms based on shared characteristics. The groupings, largest to smallest, are: Kingdom, Phylum, Class, Order, Family, Genus, and Species. I want my students to begin to look at characteristics of organisms and be able to compare and contrast feature of organism at least to the class level.

Aquatic Biomes

There are two primary aquatic biomes, freshwater and marine (saltwater). Both are full of organisms, whose existence depends on their ability to survive in various levels of salinity of the water, in addition to other parameters, such as oxygen levels and temperature. An example of a saltwater or marine life zone is a coral reef and a freshwater life zone is a lake.[11] Coastal zones, which include estuaries, coastal wetlands, swamps and coral reefs are the most nutrient rich zones, making up only a small portion of aquatic biomes but contain almost 90% of marine species. In contrast, open ocean (pelagic) biomes are homes to only about 10% of marine species. Freshwater zones have water with a salinity of less than 1%. Freshwater zones include standing bodies of water such as lakes, ponds and inland wetlands, whose water sources are primarily streams, rainfall, and melting snow. Flowing bodies of water like rivers and streams are the other freshwater zones and are the conduits in the watershed for run-off from precipitation. Both receive nutrients as they erode sediments from the land. As residents of Delaware, we have access to aquatic biomes in all 3 zones, the Atlantic Ocean, various lakes and, and the Delaware Estuary.

Aquatic Organisms

The focus of our seminar is adaptations of aquatic organisms. To be considered an aquatic organism, a living thing must breed, breathe, grow, live and eat in water. There are 6 kingdoms of marine organisms: bacteria, protozoans, chromists, fungi, plants and animals. According to some, life originated from the seas 4,000 million years ago and today water habitats harbor an abundant variety of specifies of life. The aquatic biome where these organisms exist is quite expansive.

Texas A&M Agrilife Extention explains that aquatic plants can be divided into 4 groups. Algae are the most primitive plants and do not have roots. Floating plants are not attached to a bottom surface. They have roots that hang in the water. Submerged plants are rooted with most of their vegetative mass below the water surface. They have soft stems. Emergent plants are rooted along the shoreline and stand above the surface water. Stems are stiff or firm.[12]

According to the Regional Aquatics Monitoring Program, aquatic animals can be broken down into groups by structure. Invertebrate animals without backbones, including worms, mollusks such as snails, clams and mussels, crustaceans, and insects, the most diverse group of animals on earth (most insects are terrestrial, while some have life stages that are aquatic, such as dragonflies and mosquitoes). A few insects are entirely aquatic (e.g., aquatic beetles). Vertebrate animals that have a backbone also inhabit aquatic environments. They are generally the most familiar of the animals, and include fish, amphibians, reptiles, mammals, and birds.

Teaching Strategies

Working with young learners requires concrete, tangible evidence that can be directly connected to students' lives and experiences in order for them to begin to make sense out of their world. By using the real world, video and on-line resources, and fiction and non-fiction books in a humanistic constructivist approach, I can help students develop an understanding of naturally occurring phenomena. Students also have a deeper understanding and appreciation for knowledge when they can build on their knowledge from prior experiences. Some of the Science and Engineering Practices in the Next Generation Science Standards will provide the structure for the teaching strategies.

Questioning

Eliciting student questions about a naturally occurring phenomena via picture, video clip or field trip experience is an effective way to allow students to articulate their prior knowledge. Students will examine a natural phenomenon (a biome, habitat, plant, animal), and share what they see and what questions they have about the phenomenon. Students will engage in both oral and written communication techniques to express their ideas. Questions can be examined and sorted into two categories: one being questions to which students think they know the answer, the other being the questions students to which students cannot provide a response. Student research will include finding information to answer student questions. At the conclusion, students will re-examine the first category to confirm or change their thinking. Students will also begin to develop engineering habits of mind by identifying simple problems that can solved.

Teacher Modeling and Student Investigation/ Exploration

Working in collaborative teams is paramount for student development and growth. Investigation teams will be used throughout the lessons to provide students with opportunities to share in learning by listening and speaking to each other. Students will share their ideas and thinking before, during, and after investigations. Students will work together using resources to research information and find evidence to support learning.

Students will engage in conversations asking each other to prove their ideas with evidence.

Investigations

Students will develop research skills and learn to how utilize resources to gain meaning and understanding by examining various text features and taking notes of key information and details from on and above grade level resources. Students will compare and contrast scientific features of organisms and use the information to construct and support arguments from various viewpoints.

Modeling

I will utilize modeling to demonstrate various strategies for obtaining appropriate resources, extracting relevant information, recording pertinent notes, devising diagrams or models and relaying information to others. Although I want my students to explore and learn on their own, at this young age I want them to be aware of appropriate techniques of research with limited time and resource access.

Vocabulary

Young learners need to be exposed to and encouraged to use accurate vocabulary as frequently as possible during learning experiences. The more they use words accurately the deeper their understanding becomes. Acquiring vocabulary should be interesting and exciting for students.

Classroom Activities

Activity 1 – Biomes

Essential Questions: What is a biome? Locate the 6 major biomes of the world and explain how they are different? Which biome do I live in?

Essential Outcomes: Students will be able to explain the differences between each of the 6 major biomes. Students will be able to locate the general location of each biome and explain the unique features of each including climate and topography. Students identify their biome and provide evidence of the unique features

Materials: Pictures, fiction and non-fiction text, website and video clips from the internet of biomes (suggestions can be found in the bibliography and appendix 1), RAN chart (appendix 2), natural resources from outside (grass, leaves, etc.)

Instruction: Students will observe the natural phenomena in the various biomes, share their observations and construct questions. They will sort questions, share answers, and identify areas to research.

We will chart the names of each of the major biomes. I will model strategies for exploring and recording information from one biome (our biome – deciduous forest). With teacher guidance, we will research biomes to determine location and record unique features.

Students will work in teams on an "at school" field trip to find evidence to prove they are in a deciduous forest biome. Teams will share their evidence and create a class "what is a deciduous forest biome?" mural. Students will use the information to create a compare and contrast biome chart.

Students will work in biome teams to research using non-fiction books and on-line resources the other biome. Teams will share their biome information and we will create a biome reference chart. The chart will spotlight the unique features of each biome and distinguish the common features of all biomes (see appendix 3). Teams will have to prove their unique features with evidence they have gathered from their research.

Activity 2 – Field Trip

Essential Questions: Which biome am I in? What is a habitat? Which habitats do I see within this biome? What is living and non-living in that habitat? What plants and animals are in this habitat? How are plants different from animals?

Essential Outcomes: Students will be able to name the biome they are in and provide actual evidence to confirm their choice. Students will explain the key components of a habitat. Students will provide evidence based explanations of the habitats they discover. Students will distinguish between living and non-living things as well as plants and animals within various habitats.

Materials: Outdoor natural habitats, hand lenses, recording sheet/ data table (appendix 4), nets, cups, gloves

Instructions: Teams will participate in a field trip for a hands on discovery experience of various habitats within a biome. For my students, we will go to the local nature center and explore marsh, stream, meadow, and forest habitats with a deciduous forest biome. They will observe the plants and animals living in the habitats and explore how specific habitats provide different animals with the requirements they need. Teams will determine

the best way to gather data and record information about the habitats as they are exploring. Teams will select a habitat from the trip, share all they recall about that habitat and devise a team plan to create a collaborative depiction of their habitat. Students will work together to draw, color, label all the organisms (and non-living things) that comprised the habitat. Each team will present their habitat to the class. During class discussion, displayed products can be revised if evidence based suggestions are provided.

Activity 3 Aquatic Plants

Essential Questions: What are the unique features of the plant that help it survive? What are the common features of all plants?

Essential Outcomes: Students will identify the common characteristics of a specific plant. Students will explain how at least one unique feature of a plant help it survive.

Materials: plants including cabomba, arrowhead, cattails and trees, modeling clay, pipe cleaner, string, nonfiction books and on line resources (see appendix 5)

Instructions: Teams will select a type of plant from the pond. Teams will examine a real life example of the plant, share observations and questions they have. Teams will research their plant using non-fiction books and on-line resources to confirm the basic plant structures and determine the unique features and functions of the plant. Using notes and diagrams from their research, teams will create a model of the plant highlighting its unique structures. Teams will share final products and record results in the plants compare contrast chart.

Common Core State Standards for First Grade

Reading Informational Text:

CCSS.ELA-LITERACY.RI.1.5 : Know and use various text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) to locate key facts or information in a text.

CCSS.ELA-LITERACY.RI.1.6: Distinguish between information provided by pictures or other illustrations and information provided by the words in a text.

CCSS.ELA-LITERACY.RI.1.7: Use the illustrations and details in a text to describe its key ideas.

CCSS.ELA-LITERACY.RI.1.10: With prompting and support, read informational texts appropriately complex for grade 1.

Writing:

CCSS.ELA-LITERACY.W.1.7: Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions).

CCSS.ELA-LITERACY.W.1.8: With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

Speaking and Listening:

CCSS.ELA-LITERACY.SL.1.2: Ask and answer questions about key details in a text read aloud or information presented orally or through other media.

CCSS.ELA-LITERACY.SL.1.3: Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.

CCSS.ELA-LITERACY.SL.1.4: Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.

CCSS.ELA-LITERACY.SL.1.5: Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.

CCSS.ELA-LITERACY.SL.1.6: Produce complete sentences when appropriate to task and situation.

Next Generation Science Standards for First Grade

1-LS1-1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs

1-LS1-2: Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive

1-LS3-1: Make observations to construct an evidence-based account that young plants and animals are like but not exactly like, their parents

Appendix 1

What's the Difference?

Biome research compare and contrast charts

Write notes or key information in each box

Team Biome Unique Features/Characteristics

_____

Biome common Features with other Biomes:

_____

Appendix 2

Comparing Biomes of the World – Discovery Chart

Teams color biome location on map and create own representation of special/unique features in boxes. Common Features of all biomes will be listed in middle section

Polar	Tundra	Grassland

Rainforest	Forests	Desert

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Usable resource for elementary students. Text features can be utilized for research with small groups or independently.

Science for All Children: A Guide to Improving Elementary Science Education in Your School District. Washington, D.C.: National Academy Press, 1997.
Timeless research information with helpful teaching strategies in an easy to read format

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Clear information, easy to read, students benefit from text features they can utilize

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Interesting adaptation information in text rich details

Mintzes, Joel J., James H. Wandersee, and Joseph Donald. Novak. *Teaching Science for Understanding: A Human Constructivist View*. San Diego, CA: Academic Press, 1998.
Solid teaching resource with consistent research

Mostofsky, David I. *The Behavior of Fish and Other Aquatic Animals*. New York: Academic Press, 1978.
Teacher resource, too technical for elementary students

Moya, Andrés, and Enrique Font. *Evolution: From Molecules to Ecosystems*. Oxford:

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Notes

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[8] http://www.animalplanet.com/wild-animals/migration.
[9] www.mbgnet.net/bioplants/adapt.html
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Curriculum Unit Title	I can Live Here, Can You? Aquatic Organism Adaptations	**Author**	Jamett Garlick

KEY LEARNING, ENDURING UNDERSTANDING, ETC.

Students will learn the difference between a biome and a habitat. They will investigate 6 major biomes and compare and contrast the plants and animals that live within each biome. Students will explore that specific characteristics (adaptations) of organisms that live within an aquatic biome.

ESSENTIAL QUESTION(S) for the UNIT

How does an organism effectively survive within its biome?

CONCEPT A	**CONCEPT B**	**CONCEPT C**
Biomes	Organisms, Biomes and Habitats	Plants
ESSENTIAL QUESTIONS A	**ESSENTIAL QUESTIONS B**	**ESSENTIAL QUESTIONS C**
What is a biome? Locate the 6 major biomes of the world and explain how they are different? Which biome do I live in?	Which biome am I in? What is a habitat? Which habitats do I see within this biome? What is living and non-living in that habitat? What plants and animals are in this habitat?	What are the unique features of the plant that help it survive? What are the common features of all plants?
VOCABULARY A	**VOCABULARY A**	**VOCABULARY A**
Biome, Polor, Tundra, Forest (coniferous/deciduous), Grassland, Desert, Rainforest	Habitat, Organism, Features/Characteristics	Plants, Root, Stem, Leave, Flower

ADDITIONAL INFORMATION/MATERIAL/TEXT/FILM/RESOURCES

http://www.burpee.com/gardening/content/gygg/growing-zone-information/growingzoneinfo.html

www.teacher.scholastic.com/fieldtrip/index.htm