Diving into the Deep: Grades K-1

Purpose:

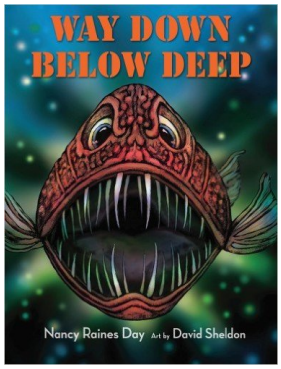
Young students attempting to understand the diversity of ecosystems can benefit from observing animal adaptations and the clues they give about animals' environments. In this lesson, students explore how animals see to learn how specific adaptations benefit the animals that live there. Students participate in hands-on activities and observations in order to describe characteristics and coloration patterns of animals. Additionally, students develop a basic knowledge of the light spectrum.

Connection to Next Generation Science Standards:

K. Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment

Performance Expectation	**Connections to Classroom Activity Students:**
K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.	-investigate how different habitats play a role in how animals use camouflage to hide and to hunt.
Science and Engineering Practice	
Obtaining, Evaluating, and Communicating Information	-engage in an investigation gathering information and communicating the findings to fellow students to explain why certain colors camouflage animals in the deep sea
Disciplinary Core Idea	
ESS3.A: Natural Resources	-explore the diversity of animals in aquatic environments by looking at animals and their adaptations in a specific aquatic habitat.
Crosscutting Concept	
Patterns	-Observation of patterns in the natural world
Connection to Nature of Science	
Scientific Knowledge is Based on Empirical Evidence	-observe the patterns in terms of animal coloration and bioluminescence

Materials:

Materials	Activity
Construction paper, template for paper glasses, blue saran wrap, dark blue plastic folder (transparent), handout with photos of deep sea animals, handout with spectrum of light in the ocean, tape	Explore/Explain
Small waxy cups, paperclips (large and small), 2 liter bottles, kitchen scissor (for adult use), large pin (for adult use), plastics bins, small washers, access to water	Elaborate
 *Way Down Below Deep* By Nancy Raines Day and David Sheldon; Pelican Publishing (32 pages) Grades K-3 ISBN 978-14-55619450	Engage

Lesson:

Engage:

A. Show a picture of a popular deep-sea animal such as an anglerfish and ask students:

What do you notice about this deep-sea animal?

What other ideas do you know about animals that live deep in the ocean?

Responses most likely will include comments about blind, scary, or unattractive animals, but you might also hear about patterns in coloration and the use of light as a lure. Once all of

the students have had a chance to respond, start a list on the board of the characteristics they have stated about the animals and their habitats.

B. Explain to students that the class will be adding even more characteristics to the list later on. Read to the students a book, such as *Way Down Below Deep*, to introduce a few deep-sea animals, including ones not popularly known. For each animal mentioned in the book find appropriate real life pictures of these animals. Choose a few red animals to aid in the next section of the lesson.

Explore:

A. Students begin this phase working in groups of three or four. Provide each student a pair of paper glasses (templates available online) with two layers of blue saran wrap affixed over each eyehole. Additionally provide each group with approximately five pictures of deep-sea animals and at least three of those animals should be mostly red.

B. Explain to students that the pictures are the same creatures you read and talked about from the book. Ask students to look at each picture and tell their group mates the color of the animals without their glasses and then with their glasses. Ask them

"Tell others in your group if you noticed any differences in how the animals looked with and without glasses."

C. Provide each group a large black piece of construction paper. On top of the black construction paper, place six different colored (red, orange, yellow, blue, purple, and green) small squares of construction paper. Ask the students

to look at each small square with and without their paper glasses. Encourage them share with *others in their group* what they noticed.

D. Provide each student an additional lens filter that can be held in front of their paper glasses. This filter should be dark blue. We suggest cutting up a transparent folder into pieces to fit over the paper glasses.

E. Have students repeat Steps B and C using the dark blue lens.

F. Ask the groups to share what they noticed about which colors they could and could not easily see when using each lens. Compile a list on the board as they share.

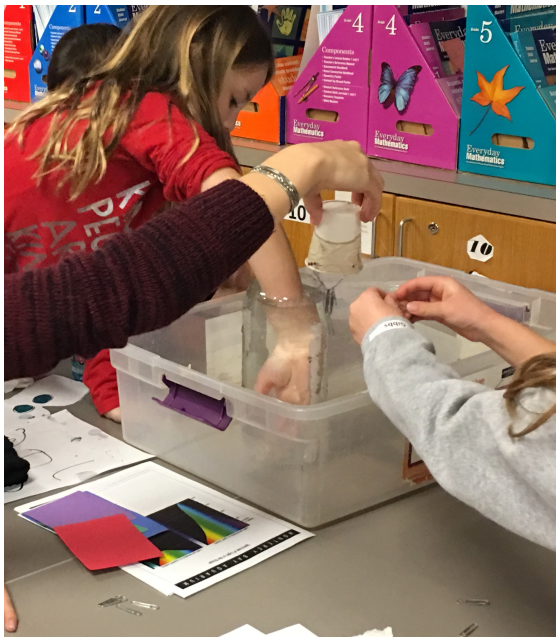
G. Provide each student a copy of the spectrum of light in the ocean (available through the Monterey Bay Aquarium reference link). This handout should show red up closer to the surface and then blue extending down into the depths of the ocean. The students at this point are usually looking at everything through their glasses and additional filter but ask them to take a look at this too (Adapted from Light in the Deep Sea, 1999).

Explain:

Ask them about what colors they think are visible in the deep ocean. If students are stuck, bring up camouflage and remind them that there are a lot of deep-sea creatures that are red. Students usually connect that since they had trouble seeing red through the blue lenses, that red must not be that visible deep in the ocean. Some may need help connecting that even though red is bright, its works as camouflage when you are deep in the ocean. At this point, you can discuss how certain colors of light are seen at different depths and bring up simply that we are able to see the full spectrum but deep-sea creatures can't because all of the light up here at the surface can't

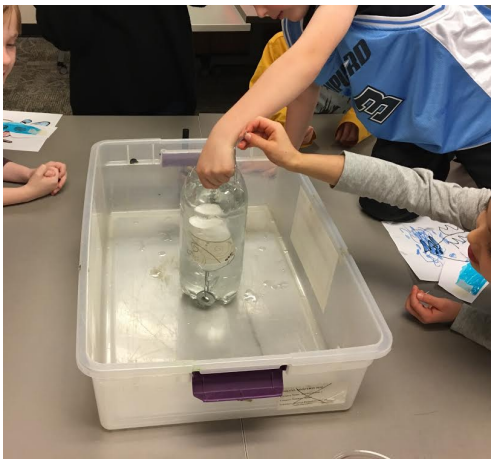
make it all the way down to where they live. You may ask students to draw themselves as a camouflaged sea animal in a habitat closer to the surface that they are familiar with. For example, if your students are familiar with tidal zones, they might draw a brownish sea star on the rocks. Then, ask the students to draw themselves as a camouflaged deep-sea creature. Some students might draw a red sea creature while others could draw a black one with small white dots indicating bioluminescence, which is popularly known due to the anglerfish or lantern fish. If bioluminescence is not well know amongst the class, this is an additional area for explanation. The students may do this individually or as a group and then either present their fish to each other in their respective groups or as groups to the entire class, explaining why they chose certain colors or adaptations.

Elaborate:



Once students have a basic understanding of how deep-sea animals are seen or not seen in the deep ocean, their camouflage characteristics, and their habitat, ask students how we even know all of this information about these creatures? Students will usually shout out submarines right away. This is an opportunity to have the students gain basic knowledge of buoyancy and pressure. Students will stay in their groups and build their own mini submarine to explore the concept of buoyancy and to understand how scientists learn about deep-sea animals and their habitat Give each group a 2-liter bottle, with the top cut off, filled with

water. It is best to have the bottle in a plastic tub to avoid water spillage in the classroom. Each group will also get a small waxy paper cup with a precut tiny hole on each side towards the lip of the cup. These holes should be opposite one another and a large pin works fine. Each cup should also have a precut larger hole, approximately a ½ inch x ¼ inch close to the bottom of the cup. You will want to have these made before the lesson. Taking a large paper clip, make a U shape and attach to the cup in the tiny holes. The paper clip will be the point where the students will hang their weights. Have students place the cup in the water where ideally it should float near the surface. Let the students know how submarines work by adjusting ballast to get to the right depth so now they will be adjusting the ballast on their submarine to get it to float in the middle of the 2-liter bottle. You may use small-unfolded paperclips to hang on the large paperclip weight bar, serving as hooks for other weights that you have available, such as small washers or other



paperclips. Students tend to be quite creative with how to attach objects to cause their submarine to float in the middle, by going through many trials. You may choose to lay out many options for each group and allow them to see what combination will work best. At the completion of the submarine activity, have each group imagine what animals they saw as their submarine adjusted ballast and floated through the deep-sea. Ask each group to share their discoveries with the class and to discuss the kind of habitat they were in (adapted from Underwater Dream Machine, 2006).

Evaluate:

Students are evaluated throughout the lesson, beginning with their understanding of basic characteristics of deep-sea creatures during the engage phase. Throughout the explore and explain phases, assess students on their ability to describe what colors they could and could not see through their light blue and dark blue glasses. Further assess students on their group discussions and the characteristics of the animals they shared in their discovery presentation and why they chose certain camouflage during the elaborate phase. Students should be able to describe what colors or patterns of light are better for hunting and hiding in the deep sea.

References:

PBS (2006). Underwater Dream Machine, grades 9-12. Retrieved from http://www.pbs.org/wgbh/nova/education/activities/3319_alicia.html

Monterey Bay Aquarium (1999). Light in the Deep Sea, grades 6-8. Retrieved from https://www.montereybayaquarium.org/education/classroom-resources/curriculum/exhibit#mission-to-the-deep