Water Testing Activity Introduction and Overview

This activity guides students through reflecting on what is clean water for both humans and aquatic creatures and leads them in using the Earth Echo Water Challenge Test Kits to test creek water for dissolved oxygen and pH.

Phenomena

Phenomena forward teaching centers student curiosity and exploration in learning. The phenomena in this activity is a question: is this water clean enough for fish?

Learning Objectives

Students will understand you can test if water is clean for fish and will practice using a test kit.

Materials Needed

- Internet access and projector so everyone can see the video.
- Bucket of water from a local lake, river or stream. If you cannot get water from a local water body, then you can use water from a tap.
- Towels to mop up spills.
- A test kit for each student or pair of students. See Kit Request below. The kit contains:
  - A container
  - Dissolved oxygen bottle with cap
  - pH bottle with cap
  - Pipette
  - Color chart
  - Reagent tablets for dissolved oxygen and pH. Each kit has enough for 50 tests.

Water Testing Activity Instruction

Preparation

1. Watch the video and practice the steps to familiarize yourself with the steps, materials, and questions.
2. Collect a bucket of water the day before or morning of the event.
3. On the day of the event set out the kits to facilitate distribution.

Activity

1. Tell students that they are going to do an activity about clean water. Explain they are going to watch a video and follow along in the classroom.
2. Show them on a map where the video was recorded. Show them where they are in relationship to the Missouri River.
3. Start the video.
4. Pause the video at 0:44 to have small group and large group discussion about what is clean water. Resume video.
5. Pause the video at 1:44 to have a small group and large group discussion about what is clean water for fish. Resume video.
6. Pause the video at 2:44 to pass out the kits. Resume video. Review all the parts of the kit, pausing the video as needed to allow students to keep up in identifying each piece of equipment.
7. Pause the video at 4:28 to have students collect sample water in the kit's container. The container should be about half full. The containers do not have to be filled to the fill line.
8. First test: dissolved oxygen. Be prepared to pause video to keep students from falling behind.
    1. Students take the dissolved oxygen bottle (small glass bottle) and submerge it in their water. The bottles should be right side up without caps and bubbles should escape.
    2. Set the uncapped bottle to one side to ready the dissolved oxygen or DO tablets. Double check the back of the tablet packet so it says DO.
    3. On the "bumpy" side of the packet, push **2** tablets out through the smooth side of the packet into the bottle.
    4. Cap the bottle and shake.
    5. After a minute or two of shaking set the bottle to one side.
    6. If students are working in pairs, the first student can keep shaking the DO while the second student prepares the pH.
9. Second test: pH. Be prepared to pause video to keep students from falling behind.
    1. Students fill the pH bottle (taller plastic tube) to the 10 mL line with water either by submerging or pouring.
    2. They can get an exact measurement by using the pipette to add or remove water.
    3. On the bumpy side of the packet, push **1** tablets out of through the smooth side of the packet into the bottle. It's ok if the tablet crumbles. Try to ensure as much of the tablet goes into the tube as possible.
    4. Cap the tube and shake
    5. Set aside to allow to develop or if students are working in pairs allow the pH student to continue shaking the tube for the next part.

10. Dissolved oxygen color test
    1. Find the dissolved oxygen section on the color chart.
    2. Hold the bottle next to the three dissolved oxygen dots against the white card.
    3. Determine which color is the closest match. Sometimes, holding the bottle over the dots will make the more closely colored dot less visible. If the color is in between two shades, call it the halfway number between the two options. For example, a darkish pink might be a 6 instead of a 4 or 8.
11. pH color test
    1. Find the pH section on the middle of the color chart.
    2. Hold the tube in the middle of the U of color dots.
    3. Determine which color is the closet match. If it is between two colors, call it .5. For example, a sample might be 7.5 if it is between the 7 and 8.
12. Understanding the results
    1. The state of South Dakota says fish need a minimum of 4 mg/L of dissolved oxygen. Is there enough oxygen in that water for fish to breath?
    2. The state of South Dakota says fish need a pH between 6 and 8 to be healthy. Is the pH good for fish?
    3. Scientists will test water quality to understand if fish get sick or die to make sure it is clean enough for them.
13. Even without a test kit, you can tell water is clean by seeing if there is trash in it. It's important to keep trash picked up so it doesn't end up in the water.
14. Clean-up: the water in the tube and bottles can be emptied into the sink. The extra water that was not tested can be poured outside or down the sink.

Assessment/Extension

Have students write/tell a story or draw a comic strip about what they would do if they were scientists investigating a report of sick fish at a lake or stream.