Lesson Plan—Ocean Observation

Summary

This activity will help familiarize students with methods scientists use to study the coastal ocean in the Pacific Northwest, and will encourage them to pose and investigate their own questions about the ocean.

Subject Area

Physical Science/ Earth science

Grade Level

6-12

Key Concepts

- Technology enables scientists to study global and local ocean characteristics over long periods of time.
- Scientists use technology to help them answer questions about the ocean.

Objectives

Students will be able to:

- ***Describe*** the various methods used by NANOOS researchers to study ocean characteristics, events, and ecology.
- ***Apply*** information found on the NANOOS Web Portal to answer questions.

Materials

- Computer lab with Internet access or projection screen
- Science journal or notebook for each student

Procedure

1. Engage students in a class discussion, considering the following questions:

   - How do scientists study the ocean?
   - How can they "see underwater"?
   - Why is the ocean studied?
   - What do we need to know about the ocean?
   - What are some things you would like to know about the ocean or things that live in the ocean?

2. Ask students to make their own list of questions, write them in their science journal, and share them with a partner.

3. Have students visit the NANOOS Web Portal (http://www.nanoos.org) and work with a partner to explore the various data and visual products and decision tools available.

   - On the left menu, click ***About NANOOS***, and from there, ***Ocean Observing*** to find out about ocean observing systems and what questions scientists are trying to answer about the ocean.
   - On the left menu, click ***About NANOOS*** then ***Sensor Platforms*** to discover some of the tools NANOOS researchers use to explore the oceans.
   - On the left menu, click ***Data***, then ***Data Explorer*** and ***NANOOS Estuarine and Shoreline Data.*** Examine the map to see the various locations ocean observing data are being collected. Clicking the different colored thumbnails, and from there, the station, will bring you to data from that specific platform. What are some of the types of data being collected?

4. Have students explore the NANOOS Web Portal to determine which data or visual products or tools could help answer the questions they recorded earlier in their science journals.

5. Have students keep a record in their journal of things they notice and things they wonder about during their exploration. These questions can be used later as possible investigation topics.
6. Keep a chart of student questions and refer to them as answers or connections come up during class study. This helps students see that research begins with questions and helps them recognize the value of asking questions.

Assessment

- **Performance—**Did students participate in discussion and web investigation sessions and demonstrate an understanding of how scientists study the ocean?
- **Product**—Did students compose appropriate questions for investigation in their science journal? Did students accurately describe some of the research projects and technology involved in studying the oceans? Did students apply the information found on the NANOOS Web Portal to answer their questions?

Resources

- "Bridge" Ocean Observing Resources: http://www2.vims.edu/bridge/search/bridge1output_menu.cfm?q=oos
- Coastal and Ocean Observing System Primer: http://web.vims.edu/bridge/Bridge_OOS_Primer.pdf
- Rutgers Coastal Ocean Observation Laboratory: http://rucool.marine.rutgers.edu/
- NOAA IOOS website: http://ioos.noaa.gov/about/basics.html

Standards

Content Standard or Essential Principle	LEARNING GOALS
A.1: Abilities necessary to do scientific inquiry *NSES*	Identify questions that can be answered through scientific investigations.
A.2: Understanding science as inquiry *NSES*	Scientists rely on technology to enhance the gathering and manipulation of data. New techniques and tools provide new evidence to guide inquiry and new methods to gather data, thereby contributing to the advance of science.
7. b: The ocean is largely unexplored. *OLEP*	Understanding the ocean is more than a matter of curiosity. Exploration, inquiry, and study are required to better understand ocean systems and processes.
7. d: The ocean is largely unexplored. *OLEP*	New technologies, sensors, and tools are expanding our ability to explore the ocean. Ocean scientists are relying more and more on satellites, drifters, buoys, sub sea observatories, and unmanned submersibles.

Acknowledgements

This lesson plan was adapted from a lesson on ocean observing from Monterey Bay Aquarium Research Institute, available at http://www.mbari.org/earth/ .