ACTIVITY 32

UNDERWATER EXPLORATION

HOW IS MODERN TECHNOLOGY BEING USED TO STUDY THE PHYSICAL, GEOLOGICAL, CHEMICAL AND BIOLOGICAL NATURE OF THE OCEANS?

SCIENCE SKILLS:
- library research
- communicating

CONCEPTS:
- Technological advances in recent years are understanding of the oceans at a great rate.
- Creative applications of technology cross traditional boundaries of knowledge.

SAMPLE OBJECTIVES:
- Students will be able to find scientific information in a library.
- Students will be able to communicate their findings to other students.

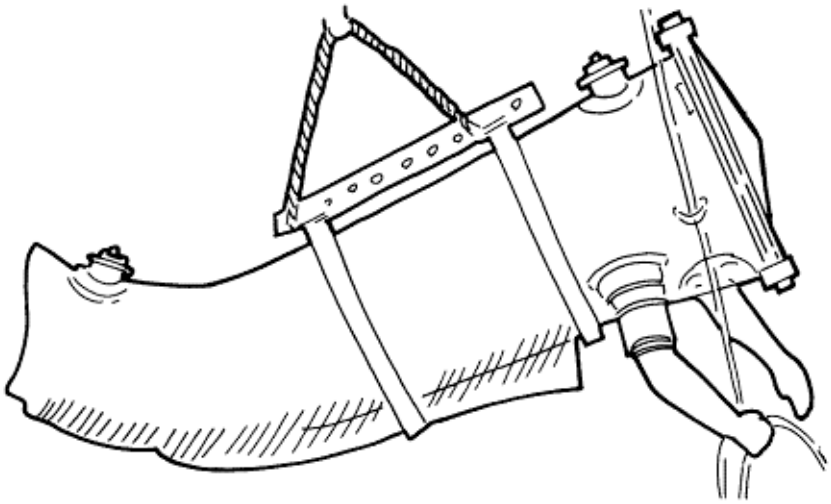
INTRODUCTION:

OCEANOGRAPHY is the study of the world's large oceans. It includes chemistry (i.e. components of sea water), physics (i.e. waves), earth science (i.e. formation of ocean vents), and biology (i.e. production of food by phytoplankton). Oceanographers study whole ocean processes. The word oceanography is often incorrectly used when the speaker means marine biology. Most elementary school oceanography curricula are in fact marine biology, leading children to think they want to be oceanographers. Most jobs in oceanography are in the physical sciences.

Serious exploration of the deep sea dates from the oceanographic voyages of the British ship *H. M. S. Challenger* from 1872-5. In recent years the applications of new technology have totally changed the means by which we gather oceanographic data. No longer is data on currents gathered by setting bottles adrift. Current meters can be anchored at specific depths, spend months recording data, release themselves to return to the surface and be retrieved. Bottom samples may still be gathered by a dredge or grab from great depths, but now scientists can also go to the bottom themselves in submersibles like the *Alvin* or they can send down remote television cameras to record what they see.

Instead of doing long and laborious phytoplankton tows to estimate primary production in an area of the sea, scientists use satellites to measure the standing crop of phytoplankton in vast areas over whole seasons, using surface tows for "ground truth" to make sure their measurements are valid. Satellites measure surface temperatures too, and recently gave us a wonderful picture of El Nino, a change in temperatures that affected the entire Pacific. Underwater habitats allow humans to live for weeks at a time in shallow water, avoiding the decompression problems SCUBA divers face in returning to the surface repeatedly. Discoveries like the deep vents along ocean rift zones or the ship *Titanic* are the results of applications of modern technology to oceanic exploration.

MATERIALS:
- public library
- popular scientific magazine articles and pictures



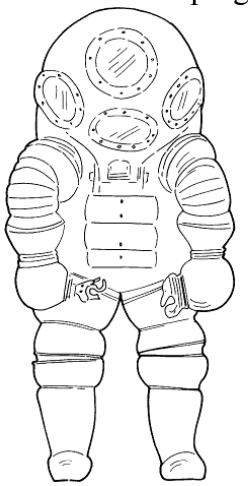
LESSON PLAN:

THREE TO FOUR WEEKS BEFORE CLASS:

This is not a scientific activity, but a library research activity. It will introduce concepts of scientific exploration which are beyond your classroom, but of great interest to your students. It also provides oral and visual communication skills practice in that your students will share their knowledge with each other. Provide the assignment in written form.

DURING CLASS:

METHODS: Use the dates for the first use of the technology to arrange the talks in chronological order from earliest to most recent. Draw a timeline on the blackboard so each child can locate his/her information with regard to the others. By working your way through the sequence, the students should get some idea of the tremendous progress that has taken place in recent years.



RESULTS:

Meet privately with each student for a few minutes during the following week to discuss what was best about his/her talk and provide examples of possible improvements for oral talks. Or have a group discussion of what each person did best. No bad things allowed.

EXTENSIONS:

1. Can you identify a local problem caused by low oxygen? Have your students 1. Follow up the talks with one of the best science films ever: "Dive to the Edge of Creation" made by the National Geographic Society. This film chronicles the first major expedition to a deep vent system on the east Pacific rise. It very clearly shows that science is not always clean and orderly, that scientists can get as excited as kids in a candy store over a discovery, and that all the good discoveries have not been made. The kind of science done in this film is the original observational level in which more questions are raised than answered. This film was shown on PBS and has won numerous awards. It may be available as videotape or film in your school system. The rental fee is high since the film is about 56 minutes long.

Ask the students to watch for answers to some of the following questions during the film:

Do you think an expedition like this is expensive? Did you discover some of the organizations who paid for this work?

What kind of planning was necessary to make this trip? What are some of the things that had to be planned that were not science? That were science-related?

Where did the scientists come from? Were they all from the same place? Did they all do the same kind of work or did they have different specialities?

What are some of the problems with working in very deep water and around the vents?

Were there people on the trip who were not scientists? What kinds of things did they do? Were they important? Could you become a person who helped marine scientists, yet not be one yourself?

Would you be scared to go clear to the bottom of the ocean in a little sphere of metal? Do you think these scientists were afraid? Why or why not?

Can part of doing science be boring? Dirty? Did these scientists all wear white coats? Did they look like "nerds" or ordinary people?