**Extension:**

**Investigating Dissolved Oxygen Using Sensors**

**Open Inquiry** Adapted from Vernier Experiments

*Teacher Notes*

Earlier, in a unit on Ocean Exploration, students constructed a working model of an ROV. The goal of this extension is to use that ROV to collect data by equipping it with sensors. This will provide a real world research application using technology that models that which scientists use.

In this preliminary investigation, students will research the factors that affect dissolved oxygen (DO) in an ecosystem. They will gain experience using the DO sensor and see the relationship between DO and temperature. They will test DO in 3 types of water samples; Fresh, Salt, and Brackish in order to make deductions as to why each water type has different DO. They will also test fresh water at 3 different temperatures in order to see the relationship between temperature and DO.

After completing the Preliminary Activity, students will first use reference sources to find out more about dissolved oxygen issues in the environment. Students will then choose and investigate a researchable question dealing with dissolved oxygen and one other variable. Some topics to consider are:

* Water Pollution
* Eutrophication
* Thermal Pollution
* Photosynthesis

Once students have designed their research question, they will write a proposal that includes their hypothesis and proposed methods. Using the ROV they constructed in phase 3 and the sensors available, they will collect real time data in a local aquatic or marine ecosystem.

**Teacher preparations**

* Collect water samples from local water bodies, or make 2 different salt solutions, one at 1% and one at 5% ( or at your own discretion)
* Calibrate and test the sensors the day before students use them
* Have the 10 degree water chilling so it is almost at temperature when students need it
* Have the 50 degree water warmed up in advance. Sitting around watching water heat up is a waste of time for your students.
* Measure the salinity of the water so that student can know the difference between brackish and salt water and perhaps make a connection between salinity and DO for their investigation.

**Sample Data Table**

|  |  |  |  |
| --- | --- | --- | --- |
| **Data** | **Fresh** | **Salt** | **Brackish** |
| **Dissolved O2 (mg/L)** |  |  |  |
| **------------------------** | -------------------------- | ---------------------- | ------------------------ |
| **Temperature**  | **10◦C** | **25◦C** | **50◦C** |
| **Dissolved O2 (mg/L)** |  |  |  |

There should be an inverse relationship for DO vs temperature when the data is graphed.