Attract a Fish

Grade Level: Elementary, Middle School, High School
Ecological Concepts: **Behavior**, Food preference
Arizona Science Standards: Science as Inquiry; Life Science

Materials:
1) Thin sticks at least 1.5 m long for fishing poles
2) Pieces of copper wire, at least 1 m long to use as fishing line. Twist wire around the end of the pole to make the fishing line. (Note: You could use string or fishing line, but those would allow the lure to move quite a bit, making it more difficult to watch the lure and fish behavior.)
3) Collection of items such as string, cotton, paper, rubber bands, aluminum foil, clay, colored paper, wire, cork, small weights, shiny materials, etc. These items (or others) will be attached to the end of the fishing line. Lures need to be less than 0.5 cm in length and width.
4) Writing/drawing materials
5) Meter stick
6) Timing device (watch, stopwatch)

BACKGROUND

Fish feed on **zooplankton**, algae and plants, or insects and smaller fish. Fish also avoid danger such as **predators**. What are fish attracted to and what scares them away? This activity can be used to test fish behavior and fish preference for various items.

GUIDED INQUIRY

Observation/Exploration Period Observe fish behavior. Some behaviors and patterns to look for are where the fish are found, how long they spend in an area, what depth of water they are in, what they appear to be eating, and what makes them swim away.

Group Discussion and Question Period Are fish at the surface, or deeper in the water? Are they near the edge of the pond, in open water, or in among the plants? How much time do they spend in each area of the pond? Do they appear to be eating? What makes them swim away? What attracts fish to an area of the pond? What do fish like to eat? Do different species of fish prefer different foods or places to be in the pond?

Important aspects of guided inquiry are encouraging students to generate multiple hypotheses, and letting students make decisions about what data are important and create their own data sheets. Keeping these ideas in mind, the sample in the box below illustrates how ONE OF MANY possible investigations around this topic might develop.

Sample Hypothesis: Let's use the question "What attracts fish?" The hypothesis could be "Fish are attracted to shiny objects because they can see them better."

Sample Experiment Design: Use the "fishing poles" to present lures of different degrees of shininess (dull, a little shiny, very shiny) to the fish. The **independent variable** is the lure type and the **dependent variable** is the behavior of the fish. The **experimental unit** will be locations around the pond. **Replication** is accomplished by testing each lure type at more than one location in the pond.

The categories of fish behavior will be: Bites at the lure (Bite), Looks at the lure for at least five seconds before swimming away (Look), Ignores the lure completely (Ignore), and Scared away immediately (Scared). The variables to be **controlled** are: depth the lure is submerged, amount of time the lure is in the water, size of lures, and color of lures. If data are taken over multiple days, always do it at the same time of day, and when the weather is about the same as well. Only shininess of the lures will vary. Groups of two will work together.

Sample Prediction: More fish will bite the shiniest lure than the other two lures.

Record Results: Record Bites, Looks, Ignores, and Scares on a **table** using pictures or tally marks. Make notes of interesting behaviors.

Sample Analysis of Data and Presentation: Count up the number of times each behavior occurred. Make a **bar graph** of the numbers, with lure type on the horizontal axis and number of times for each behavior on the vertical axis. For students who can divide, calculate the **average** number of times for each behavior for each lure type separately. Graph the average number on the vertical axis.

Discussion: Was your hypothesis supported? Did fish bite the shiniest lure more often then the less shiny or dull lures? If yes, go on to test other hypotheses. If not, why not? What did happen? Why? This is a great opportunity to revise your hypothesis and do another test.

MORE:
1) Elementary:
(a) Use only natural objects as lures.
(b) Compare the reactions of different species of fish to the lures.

2) Middle School:
(a) Find the **mean**, **median**, **mode** and **range** of the data.

3) High School:
(a) Calculate the **variance** and **standard deviation** of the averaged data.
(b) Perform a **T-test** of species richness. (T-test is a standard statistics test comapring **means** of two treatment groups.) Perform an **ANOVA** when comparing three or more treatment groups.