A Fish Tale

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Objectives:

This lesson is designed for the primary level student.
The main objectives of this mini-teach are to:
- demonstrate how fish cells respond to fresh and salty water
- determine the age of a fish
- determine if temperature effects the movement of a fish's operculum (gill cover) and mouth
- identify the characteristics of fish

Materials Needed:

salt	hand lens
teaspoon	fish scales (from a local market)
masking tape	dark paper
marker	a small cucumber
fish net	2 shallow bowls, 1 large bowl
ice	aquarium with goldfish
large-mouthed jar	thermometer

Strategy:

1. Fill both bowls one-half full with water.
2. Stir 1 teaspoon of salt into one of the bowls, label this bowl 'salt' using the tape to make the label.
3. Cut the cucumber into thin circular slices.
4. Place 3 slices of cucumber into each bowl.
5. Wait 30 minutes.
6. Remove the slices and test their flexibility by carefully using your fingers to bend them back and forth.
7. Now switch the slices, placing the ones that were previously in the salt water into the pure water, and the pure water slices go into the salty water.
8. Wait 30 minutes and again test their flexibility.
9. Place a dried scale on the dark paper.
10. Study the ring pattern on the scale.
11. Count the wide, lighter bands.
12. Fill the large-mouthed jar with water from the aquarium.
13. Use the net to transfer a fish to the jar.
14. Allow the fish 30 minutes to adjust to its new environment.
15. Count and record the number of times the fish opens and closes its mouth and operculum.
16. Place the jar in the bowl.
17. Fill the bowl one-half full with ice and then add enough water to fill the bowl. Do not add anything to the jar containing the fish.
18. Wait until the temperature in the jar reads 10 degrees Celsius and again count the number of times the fish opens and closes its mouth and operculum in one minute.

Performance Assessment:

At the conclusion of the mini-teach, students will be able to answer the following questions:

1. What are the characteristics of fish?
   If it has scales, fins and gills-it's a fish.
2. How does fluid pass from one cell to another?
   Osmosis-water moves across the cell membrane toward where there are more dissolved materials in the water. The water moves because there are more particles of salt in the bowl than in the cell.
3. What is the effect of salt water on fish?
   Fish in salt water tend to dehydrate and they compensate for this by drinking large amounts of sea water. They excrete salt from their gills and their kidneys remove very little water from the body.
4. What is the effect of fresh water on fish?
   Water is absorbed into their cells, the surrounding water is less salty.
   They excrete large amounts of water through their kidneys.
5. How old is a fish?
   Fish scales form rings with each year of growth. The number of wide bands equals the age of the fish. The wider bands are formed annually, the smaller bands are formed seasonally.
6. How does temperature effect the number of times a fish opens and closes its mouth and operculum (gill cover)?
   There is more movement when the water temperature was warmer. Animals conserve energy when in a cold environment. Their body loses heat thus losing energy and movements slow down.

Conclusions:

Students will understand osmosis of cells and how to determine the age of fish. They will also be able to discuss conservation of energy in colder water and characteristics of fish.

References:

VanCleave, Janice. **Biology for Every Kid**, John Wiley & Sons, 1990.

Ward, Pat and Barbara. **Fishes: A Science Activity Book**, Mark Twain Media, Inc., 1993.