Lesson 5.1

Aquariums in the Classroom

Grades: 9-12
Integrated Subjects: Science, Biology, Chemistry, Mathematics
Essential Skills: Research, Inferring, Writing, Scientific design
Sunshine State Standards: SC.H.1.4.1, SC.H.1.4.2, SC.H.1.4.3, SC.H.3.4.1
National Science Education Standards: Meets Content Standards: 1) Science as inquiry; 2) Life science; 3) Science and technology; and 4) History and nature of science
Duration: 1 class period or entire semester

Objectives:

Students will understand the scientific method by conducting experiments of their own to support or void their hypotheses. Students will learn:

- How to interpret data
- The importance of replication in an experiment
- How scientists design and implement research studies

Preparation:

Teacher Preparation:

- Duplicate appropriate materials

Support materials:

- Aquarium supplies (if applicable)

Information Sheets:

- No. 15 – Experiments for the Classroom
- No. 16 – Aquarium Supplies
- No. 17 – Aquarium Water Quality

Activity Sheets:

- No. 19 - Data Collection Worksheet

Lesson Plan

Activity 1. Introduction (20 minutes)

Discuss with the students that science is one way we seek principles of order in our world. Explain that science has two parts: the collection of objective evidence (data) and the structuring or interpretation of that evidence.

Explain to the students that scientists often generate a hypothesis, or a temporary working explanation based on accumulated facts that are tested or at least testable. A hypothesis is tested by running a series of experiments to prove or disprove the explanation. Once a hypothesis is tested, it either voids or supports the original explanation, although a hypothesis can never be proven with certainty.

Activity 2. Forming a Hypothesis (15 minutes)

Distribute Information Sheet No. 15 which gives examples of experiments that can be conducted in your classroom. Have the students come up with hypothesis and expected outcomes for each experiment. Discuss which experiment(s) you would like your students to conduct. What will be your controls? How many replicates will you need? How will you present the data?

Activity 3. Supply and Demand (10 – 30 minutes)

Now that you and your students have decided which experiment(s) to conduct in your classroom, have the students make a list of supplies. Information Sheet No. 16 will help establish your list. You may be able to collect many of the supplies at your school.

Activity 4. Aquarium Set-Up (45 minutes)

Once you have the appropriate supplies for your classroom, you will want to set up your aquarium at least several days prior to the start of your experiment. Distribute Information Sheet No. 17 so the students have an understanding of optimum water quality parameters, as well as daily/weekly maintenance procedures and troubleshooting.

Once the aquariums are stable, add your conch and begin your experiment. Use Activity Sheet No. 19 as a sample data sheet if necessary. Have the students collect as much data as possible, and produce graphs and tables of their findings. More advanced classes may also be able to write up a scientific paper complete with an abstract, introduction, methods, results, and discussion. The longer the experiment can last, the more definitive the results will be.

Conclusion

Discuss how scientists make new discoveries by conducting research to help support or disprove their hypotheses.

Bibliography

Davis, M. & A.L. Shawl. In press (a). A guide for culturing queen conch, Strombus gigas. Manual of Fish Culture, American Fisheries Society, Vol. 3.