Using Adjectives to Describe Observations

Summary

Using video and audio sources, the student will write observations about various organisms.

Time Frame

2 class periods of 45 minutes each

Group Size

Large Groups

Life Skills

Thinking & Reasoning

Materials

- TV
- VCR
- Exploring the Diversity of Life 1 *A World of Difference* (available as an ITV video from public television - see reference link below for the ITV Guide schedule)
- paper and pencil
- optional: NPR Radio Expeditions: *Life on the Brink*
- optional: cassette player
- optional: picture of ring-tailed lemur

Background for Teachers

The goal of science is to produce a structured body of knowledge consisting of concepts, theories and generalizations that have predictive power. Science is a process used to obtain knowledge based upon observable evidence. Observation is the foundation upon which science is built. As our powers of observation increase, through the use of instruments like telescopes, microscopes, MRI imaging, satellites, etc..., our ability to obtain knowledge increases and our body of scientific knowledge changes.

So what does this have to do with facts, hypotheses, theories, and laws? These are the words we use to describe the body of scientific knowledge and it is important that we learn to use them accurately. A fact is something that is directly observable and that has been document to reoccur on a predictable basis. Under a standard set of conditions a fact will be observable by multiple individuals and can be validated consistently with instruments. For example: The sun rises in the east. The temperature outside is 25 degrees Celsius. Sandstone is more dense than water.

Based on knowledge and experience, inferences are suggested extensions of facts. For example: I could infer from the fact that John's temperature is 2 degrees above normal that he has an infection. I did not actually observe the infection. I infer that he has an infection based on the fact that his temperature is elevated. Perhaps his temperature is elevated because he just finished an intense game of soccer played outside under an afternoon sun. Perhaps his temperature is elevated because he is suffering from heat exhaustion. However, based on the fact that earlier in the week he did homework with a friend who has since been diagnosed with strep throat, I infer that his temperature is caused by infection. If we were to take a culture of John's throat and discover a strep-causing organism, then we would no longer have to infer that his elevated temperature was caused by an infection; it would be a fact.

Hypotheses are testable inferences. They are predictions that we make based on our current

understanding. Knowing what I know about infectious diseases, I could hypothesize that John's infection is caused by the same microbe as the friend with whom he did homework. We could test my hypothesis by taking a culture of both students' throats.
A scientific law is a statement of fact that has been validated by hundreds of thousands, if not millions, of pieces of observable evidence. For example, the law of gravity has been verified millions of times in millions of situations. A law can also be a statement of a relationship, for example the speed of light, the period of a pendulum, or the independent assortment of genes. Laws state facts and/or relationships. They do NOT give explanations.
Theories explain scientific laws. For example the Theory of Plate Tectonics explains the facts that mountains exist, the earthquakes happen, that the sea floor spreads. Theories give explanations about HOW and WHY things happen in our world. Theories are very big; they explain a lot of things. Theories tie together a lot of facts and observations that may seem unrelated. Referring again to our example, until scientists developed the Theory of Plate Tectonics earthquakes and sea floor spreading seemed to be two totally unrelated phenomenon. Now we understand that they are different manifestations of the same process. Theories also have predictive powers. Using what we know about plate tectonics, we can predict the general areas where earthquakes and volcanoes are likely to occur.
In summary, science is a way of knowing based on observable evidence. It is not the only way of knowing. We can know things about love, values, and faith however, knowledge based on love, faith, and values is not science because it is not based on observable evidence. That is not to say that it is wrong, it simply is not science.

Intended Learning Outcomes

Make observations. Use the language of science to communicate. Understand that the goal of science is to produce a systematized body of knowledge.

Instructional Procedures

Day One

1. Ask students to describe how they observe things around them. Remind them that any sense (sight, sound, touch, taste, or smell) can be used for observation. Discuss how they are affected when smelling fresh bread or another favorite food. Having an item of food that they can see and smell can assist in introducing this.
2. Make sure the students are prepared with paper and pencil. Instruct students to write at least two adjectives for the organism on the screen each time you pause the video. Turn off sound. Show video, *A World of Difference*, starting at the title screen "Tropical Rain Forest". Pause the video for 40 seconds as each of the animals are shown. (Do not pause as cutter ants carry the word "diversity" or later as they carry the word "species".) Stop the video when it gets to the species graph with Species on the left and Millions of Years on the bottom. (Students will have written about 27 different organisms.) Students trade papers with peers and compare the adjectives that were used as descriptors.
3. Rewind video to same beginning (after Tropical Rain Forest Title). While showing the video again (without any pauses), following a pattern (such as across rows from back to front), have individual students vocalize one adjective from their peer's paper relating to the animal observed.

Day 2

1. Take students outside and have them write two observations about six to ten different organisms on the school grounds. Bring the lists back to the classroom and discuss the various organisms students observed. Make a class list of all the different observations they made about the organisms.
2. Lead a discussion about the nature of science. What are the goals of science? How is science used to answer questions? What kinds of questions are answered by science? What is the role of

observation in scientific inquiry? What types of observations are effective in describing organisms? What is an observation and how are observations used to describe organisms? What is an inference? (See background material above.)
3. Have each student list two observations about an organism from yesterday's video and then make an inference about the organism.

Extensions

1. Play a segment of the NPR Radio Expedition: *Life on the Brink* using a cassette recorder. (Side 2, "Island of Biodiversity" start time 0:13 up through 4:41). Students should draw what they think the organism looks like after hearing its description. Explain that the sounds were made by a ring-tailed lemur. Show students a picture of a ring-tailed lemur (one website is listed above). Students could also search for ring-tailed lemur photos online.
2. Instruct the students to group the organisms seen during the video based on similar observed characteristics (example 1, 4, and 8...not using the names of the organisms).
3. Students take a school grounds field trip and write observations of living things they find in 20 minutes. (Done as a small group scavenger hunt, each group trying to find more than other groups do).

Assessment Plan

Present the students with ten objects. Instruct them to write 20 observations and 10 inferences about the objects.

Bibliography

1. ITV Program Guide (http://www.utahitv.org/)
2. Ring-tailed lemur (http://www.lastrefuge.co.uk/photolibrary/sp_ringtailed_lemur.htm)

Authors

G. Westbroek