



Natural Inquirer Scientific Process Module



Unit 1: Lesson 2: What it Means to Be a Scientist and What is the Scientific Process?

Background: What does it mean to be a scientist? Scientists are curious and creative people who use their talents in search of new information. Although some scientists work in the arena of basic science, most scientists do applied science, which means that they try to solve problems or answer questions that will directly benefit society. Scientists are people who use a generalized and accepted scientific process to accomplish their goals. The scientific process requires accuracy, patience, and open-mindedness. Therefore, scientists are people who are willing to make mistakes and learn from them. They are willing to expose their work to others for review and comment. They are willing to take constructive criticism and learn from others. Scientists must also be critical thinkers, both about their own work and the work of other scientists. Scientists must be able to incorporate their creativity into a general process of scientific inquiry. Scientists also are good at developing and implementing plans, observing and recording, and employing technology to analyze their data. Finally, scientists must communicate their results to other scientists and to the public.

In this activity, you will introduce your students to these qualities of scientists. You will also introduce them to the general process of scientific inquiry. After completing step 1 and 2 in the Procedure, you can present the information given above to begin the discussion of what scientists do. Then, present the information provided in the “Introduction to the Scientific Process” at the beginning of these lessons for the remaining procedures in these units.

Objectives:

- Students will be able to describe the scientific process and what it means to be a scientist.
- Students will be able to identify the different parts of the scientific process through the reading of a *Natural Inquirer* article.
- Students will describe the difference between basic science and applied science.
- Students will be able to explain the difference between social science and science.

Time: 1-2 class periods

Materials:

- Any edition of the *Natural Inquirer*
- Student Notes sheet for the Scientific Process
- Pencils

Procedure:

1. Begin the class by asking students what they think scientists do.
2. Make a list on the board of their ideas.
3. Provide students with some additional information about what scientists typically do. The Background information at the beginning of this lesson provides this information.
4. Discuss with students the difference between basic and applied science and that many scientists engage in applied science. Then describe the scientific process and the different steps of the scientific process in which scientists engage to the students. You may want to refer to the “What is the Scientific Process” guide at the beginning of this module.
5. Ask students to fill out the Student Notes sheet for the Scientific Process as you discuss the process. You may want to help giving these notes using an overhead projector or a PowerPoint slideshow.
6. Once notes on the scientific process have been completed, inform students that they are going to see the scientific process at work in the *Natural Inquirer* article they read.
7. Read the article together as a class and challenge students point out different elements of the scientific process as they encounter them.
 - Thinking about Science- explains application of a larger science concept such as the importance of team work in science
 - Thinking about Environment- explains application of environmental theme or idea
 - Introduction Section- provides background research and defines the problem
 - Method Section- explains how scientists try to answer the problem
 - Findings Section- tells what the scientists discovered
 - Implication Section- describes what the findings mean or leads to more questions
8. To conclude this lesson, review with students the scientific process and reinforce the idea that no matter what type of science is done most scientists use the scientific process to “do” science. Then explain to students the plan for using the *Natural Inquirer* over the entire year to learn about the scientific process and that by the end of the year they will do a research project using the scientific method and each create their own *Natural Inquirer* style article that they will submit to be published on the *Natural Inquirer* web site.
9. Ask students put the Student Notes sheet in their portfolio for future reference.

Assessment:

Students can be assessed on reading fluency and comprehension. Additionally, the Student Notes Sheet for the Scientific Process can be used to assess on the steps in the scientific process and examples of the steps. Additionally, students can be informally assessed through class discussion and participation.

Modifications:

Instead of reading the article as a whole class, the article could be read individually, in pairs, or as a small group. Additionally, the vocabulary words at the beginning of the article could be used for a vocabulary test or spelling words. Students that have difficulty reading or doing other tasks can be paired with a partner or the educator may assist.

Students who would like an extra challenge can read an additional *Natural Inquirer* article and compare it to the one read by the whole class and then present the information to the class.

Extra Resources:

Natural Inquirer Web Site- From this web site you can download articles individually or as an entire journal in Adobe PDF format.

<http://www.naturalinquirer.usda.gov>

The Scientific Process Guide

<http://k12science.ati.stevens-tech.edu/exploration/collaborative/2.htm>

Lawrence Berkeley National Laboratory (Berkeley Lab) Basic Versus Applied Research

<http://www.lbl.gov/Education/ELSI/research-main.html>