



Natural Inquirer Scientific Process Module



Unit 2: Lesson 1: Searching the Literature and Defining the Problem, Step 1

Background: Searching the literature to help define the research problem is a critical part of the research process. For a seasoned scientist, this part of the research process is often less intensive. He or she has had sufficient experience in the research area to know the previous research on the topic, and already knows what the next research questions could be. Young scientists, such as your students, may have many areas of interest that they would like to pursue. In this part of the scientific process, a scientist must begin to define the problem or question that will be addressed by the research.

It will be helpful to use a graduate student thesis as an example. The student has a general idea of their area of interest. Let's say that the graduate student is interested in the application of reading in science education. To help the student get to a researchable problem, he or she must begin reading scientific literature on the topic of reading in science education. As he or she becomes more familiar with the literature, an area of research can be more precisely identified. The graduate student's literature searching has started broadly and becomes more focused. At some point, the student will identify a problem or question of interest that has not yet been addressed by other scientists. For example, it may become evident that scientists have not correlated an understanding of scientific vocabulary with science achievement in middle school. It may be that this has been done for high school, but the question emerges: "What is the relationship between an understanding of scientific vocabulary and science achievement in seventh grade students?" There is usually a problem behind the research question. The problem behind this question may be grounded in trying to solve at least part of the problem of middle school students falling behind their global peers in science learning.

As scientists continue in their career, it becomes easier to identify problems. However, it is important for all scientists to keep updated on new research about their topic. This process enables the scientist to avoid duplicating work that has already been done, and to add new information to his or her own research projects.

Objectives:

- Students will be able to identify a problem.
- Students will be able to explain how research helps to define a problem.
- Students will read, analyze, and explain scientific information.

Time: 1-2 class periods

Materials:

- *Natural Inquirer* journals
- Worksheet (attached)
- Pencils

Procedure:

1. As a class, review some of the highlights from the Unit 1 lessons.
 - a. Who is a Scientist- reminder that we are all scientists
 - b. What it means to be a scientist- using the scientific process, being inquisitive and adaptive (Note: You may want to read the “Who are Scientists” section at the beginning of each *Natural Inquirer* journal as a review.)
 - c. BIG Ideas- understanding that scientific studies relate to larger science and environmental concepts
2. Pass out *Natural Inquirer* journals and the accompanying worksheet.
3. Ask students to read each article’s Introduction section and fill out the worksheet as they go.
4. After students have finished the worksheet, discuss as a class the answers they came up with and also highlight the importance of researching and obtaining information about an issue before defining the problem.

Assessment:

The worksheets can be used as a formal assessment tool and should be included in the scientific process portfolios. Additionally, class participation can be used as an informal assessment.

Modifications:

For students who would like an extra challenge, have them come up with a list of science questions that they would be interested in studying. From this list, students could pick a topic to study for the science fair or to begin researching for their *Natural Inquirer* article that they will write toward the end of the school year.

Extra Resources:

Science Fair Studio- coming up with a project idea

<http://school.discovery.com/sciencefaircentral/scifairstudio/ideas.html>

The Ultimate Science Fair Resource- Project Steps

<http://www.scifair.org/articles/reports/steps.shtml>

Newton’s Ask a Scientist

<http://www.newton.dep.anl.gov/aas.htm>