*Natural Inquirer* **Scientific Process Module**

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

**Background:** Once an interesting and researchable problem (or question) has been identified, scientists begin an exhaustive literature search to learn everything that they can about all aspects of the problem. This search is different than the one described in Unit 2, Lesson 1. In this part of the scientific process, the literature review becomes more focused on all aspects of the identified research question. Once again, this exhaustive search becomes less necessary as a scientist continues his or her career.

To continue with our example, the graduate student would now begin reading everything possible on research in the understanding of scientific vocabulary. Another area of exploration might be the general relationship of vocabulary to educational achievement. As you can see, at this point the literature search becomes more focused, but may take the scientist outside of his or her field into other related scientific fields. All learning at this point is aimed at understanding everything possible about all aspects of the research question and the problem behind it.

During this process, a scientist may modify his or her research question to reflect the new learning. At the conclusion of this process, a scientist has a well-defined, researchable question, based on a problem that begs to be solved. He or she also has learned as much as possible about what is scientifically known about the problem and question. The scientist also has a good idea of the methods other scientists have used to examine similar questions.

For experienced career scientists, this part of the process becomes less intensive over time. Although keeping current in the literature is important for all scientists, the focused and exhaustive literature review described here is usually not necessary for a seasoned scientist.

**Note:** You may want to have your media specialist or someone else do a mini-lesson for the students about how to find quality information on the Internet and through books and how to cite sources of information. Additionally, there are some web sites listed below under extra resources that may help.

**Objectives:**

- Students will be able to identify a science problem
- Students will be able to research a problem and find information about the problem.
- Students will read, analyze, and explain scientific information.

**Time:** 2 weeks

**Materials:**

- *Natural Inquirer* journals
- Completed worksheet from Lesson 1 for reference
- Pencils
- Access to the Internet or a library

**Procedure:**

1. Ask students (either individually or in pairs) to either pick a contemporary science topic in the news or a topic that is currently being studied in science class that they would like to know more about.
2. Once they have picked a topic, ask them to find out as much information as possible about the topic and create a one-page hand out on the information they found. Students should summarize the information they find and provide appropriate citations when necessary. Note: Students can look at the citations used at the end of each *Natural Inquirer* article to see an example of how to cite information.
3. After students have completed their one-page summaries and made revisions, collect all the summaries on all the different topics and make a class book "Sharing Science: Things We Always Wanted to Know" that contains a page from each student.

**Assessment:**

The one-page summary about the science research topic can be assessed. You can make a rubric that contains guidelines for how many facts or paragraphs should be written, grammar, spelling, and creativity. Additionally, students should include some information about themselves in the one-page summary (similar to the "Meet the Scientist" section in the *Natural Inquirer*). Finally, after students have finished their one-page summaries, each student should present their research question to the class. Create a chart for basic and applied science and have the class decide where each student's research question would belong. Display the chart as a reminder of the difference between basic and applied science.

**Modifications:**

For students who would like an extra challenge, they can make their one-page summary into a web page.

For students that have difficulty reading or writing, they can be paired with a research buddy. Additionally, there are some computer programs that can help students with writing.

**Extra Resources:**

Evaluating Internet Resources
http://lib.nmsu.edu/instruction/evalcrit.html

Evaluation Rubrics for Web Sites
http://www.siec.k12.in.us/~west/online/eval.htm

Teaching Middle School and High School Students to Read and Write Well
http://cela.albany.edu/publication/brochure/guidelines.pdf

University of California Berkley Evaluating Web Pages
http://www.lib.berkeley.edu/TeachingLib/Guides/Internet/Evaluate.html