

Natural Inquirer Scientific Process Module



Unit 2, Lesson 2: Search the Literature and Define the Problem (Part 2)

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 Needed:

2 weeks

Materials (for each student or group of students):

- *Natural Inquirer* monographs or articles
- Search the Literature Graphic Organizer, completed
- Blank paper or notebook
- Writing utensil
- Research materials
- Computer (optional)
- Internet (optional)

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. Research 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 needs 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.

Methods:

Prep

Arrange the resources needed for students to conduct research, including time in the library or access to computers with Internet. Create an example one-page summary to share with students before they complete their own summary.

Week One

Ask students to pick a question or problem that interests them. Students may choose one of the three questions they listed for homework in Unit 2, Lesson 1. Alternatively, students may pick a question or problem they have discussed in previous classes or read in a newspaper.

Describe the process that scientists go through in collecting and digesting as much information as possible about their new research question or problem. Explain that scientists will often pick a very specific question which enables them to narrow down the amount of content they have to consume. As scientists do research, they may modify their question or problem due to the amount and type of information available.

Direct students to begin the process of reading and collecting citations for information related their topic of interest. Students should collect citations of quality information to ensure they can find those materials later. Students can summarize the content at each citation with a title and short sentence.

Note: It may be useful at this point to bring your media specialist or librarian to do a mini-lesson for the students about how to search for quality information on the Internet and in books, as well as how to cite sources of information. Citations are used at the end of each *Natural Inquirer* article, and the Web Resources section of each *Natural Inquirer* article provide an example of labeling the citation.

Prep

Once students have an adequate list of citations, direct students to use those resources to compile a one-page summary on the topic to share with others in the class. Share your example one-page summary with the students. The one-page summary should state the question or problem at the top of the page, then include a few paragraphs detailing some of the most important information related to that question or problem.

Remind students to re-read the “Introduction” sections from various *Natural Inquirer* monographs or articles, as well as their completed Search the Literature Graphic Organizer, to see how others share the summary of a topic.

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.

Then go through the book as a class to determine if each question or problem is considered basic and applied science.