Science Education Standards and Evaluations

In the back of the journal, you will find a matrix that enables you to identify articles by the national science education standards that they address. Each article also contains a list of the standards addressed. Evaluation forms for both educators and students are available on our Web site. We welcome any feedback, so please visit http://www.naturalinquirer.org and complete the online evaluation forms. In addition, you may contact Dr. Barbara McDonald at the address below with any comments you have.

If you have any questions or comments, please contact:

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(Please put "Educator Feedback" in the subject line)

Educator Resources

Visit the *Natural Inquirer* Web site at http://www.naturalinquirer.org. From this site, you can order more editions and read and download lesson plans, word games, and other resources to help you use the *Natural Inquirer* in your classroom. You can also view and download a yearlong lesson plan aimed at helping your students learn about the scientific process.

Visit the *Natural Inquirer* Web site at http://www.naturalinquirer.org.

Lesson Plan

Note: This is a generic lesson plan that can be used with any article in this edition or with any *Natural Inquirer* article. This is because each *Natural Inquirer* article follows the same format (See Note to educator, page 72).

If students have not yet been introduced to the *Natural Inquirer* and the written scientific format used by scientists, spend 5 minutes on this topic. Below is a sample introduction:

Just as you know the general format of a book or of a Web site, scientists use a particular format when they write up their research. This format usually follows the process they used when they did their study. Because this format is widely used, other scientists know what to expect when they read a scientific paper. Think about the format of a Web site. If you go to a new Web site that has the elements and format that you expect, you can much more easily understand how to search the Web site and find what you want to know. Scientists are able to do the same thing when they read the papers of other scientists.

The *Natural Inquirer* is a science journal that was written at your reading level. It was written directly from research papers that were written by scientists. Because of this, the *Natural Inquirer* follows the same format as the actual scientific paper and it includes additional sections to help you better understand what you are reading. The heart of a scientific paper has four sections: Introduction, Methods, Findings, and Discussion.

- Introduction: Introduces the problem or question the scientists addressed.
- Methods: Presents the method used by the scientists to collect and analyze their data.
- Findings: Presents the results of the research.
- Discussion: Places the findings into the context of the original problem or question.

The extra sections of a *Natural Inquirer* article:

- Meet the Scientists: This section introduces the scientists whose research is presented.
- Thinking About Science: This section provides one big idea, addressed in the article, about the nature of scientific inquiry.
- Thinking About the Environment: This section provides background information that introduces the topic studied by the scientists.
- Reflection Sections: These are questions placed after the Introduction, Methods, Findings, and Discussion sections to help you think about what you have read.
- Number Crunches: These are easy math problems that provide greater understanding about the research.
- Glossary: This section introduces potentially new terms used in the article.
- FACTivity: This is a chance to become a scientist as you conduct an inquiry or activity related to the article you read.

Scientific writing is nonfiction. Nonfiction is informational or factual. Although most nonfiction writing does not have a plot, scientific papers come somewhat close to having a storyline. This is because a scientific paper's format generally follows the process used by the scientists to do their research. To better understand a scientific paper, it is best to read it in the order it is presented. You can think of a scientific paper as a factual mystery that unfolds in the four sections outlined previously: Introduction, Methods, Findings, and Discussion sections. Scientists are like detectives who solve scientific mysteries.

Today we are going to read [title of the article you have chosen]. To help us think about what we are reading, we are going to follow a process. First, we will all become THIEVES. As THIEVES, we will think carefully about what we have read, and then we will identify our thinking as "Facts, Questions, or Responses."

Note: Students can do this exercise independently or in a small group.

Give each student or group a copy of the THIEVES chart reproduced at the end of this lesson plan. You may either write the questions below on the board, or give a copy to each student or group. Each student should have a copy of the *Natural Inquirer* article.

Go over the elements of THIEVES. Then, with the *Natural Inquirer* articles and their THIEVES chart, students may begin reading. Follow each step in THIEVES, which are as follows:

The Elements of THIEVES:

Title, **H**eadings, **I**ntroductory sections, **E**very paragraph, **V**isuals and **V**ocabulary, **E**nd of section questions, **S**ummary and **S**ection 1.

T

- Read the **t**itle. Using the THIEVES chart, complete the following:
- What is the title?
- Based on the title, what do I think I will be reading about?
- Does the title express a point of view? If so, what is it?

H

- Read each of the four main article **h**eadings, beginning with "Introduction." Using the THIEVES chart, complete the following:
- What do I think I will find out in the Introduction section?
- What do I think I will find out in the Methods section?
- What do I think I will find out in the Findings section?
- What do I think I will find out in the Discussion secction?

I

Introductory sections:

- Read Thinking About Science.
- Using the THIEVES chart, complete the "Facts, Questions, Responses" chart for that section.
- Read Thinking About the Environment.
- Using the THIEVES chart, complete the "Facts, Questions, Responses" chart for that section.
- Based on these introductory sections, what do I think the article will be about?

E

- Under each of the four headings, read **e**very paragraph. (This is the heart of the scientific article.)
- If you find a bolded word that you do not know, go to the step labeled "V," for vocabulary.
- If you come to a visual (photograph, map, chart, graph, or drawing), go to the step labeled "V2" for visuals.
- After reading each paragraph, complete the "Facts, Questions, Responses" chart for that section.
- Write a sentence or two summarizing each of the four sections.

V

- Review the **V**ocabulary (Glossary).
- Identify words that you do not know.
- Sound out words that you do not know how to pronounce.
- Make sure you understand every word.

V2

- Look at the **v**isual.
- Write the visual's number (such as figure 1, chart 1, etc.)
- What can I learn from the visual?
- How do the captions help me to understand each visual?

E

- At the **e**nd of each section, read the Reflection Questions. Think about (or discuss, if you are in a group) your answers to these questions.
- What do the questions ask?
- What do I learn from the questions?
- What do I learn from answering the questions?

S

Summary and **S**ection 1

- Reread the Discussion section, which serves as a summary. Review your "Facts, Questions, and Responses" to that section.
- Reread the Introduction. Review your "Facts, Questions, and Responses" to that section.
- What have I learned about the scientific process from reading this article?
- What have I learned about the natural environment from reading this article?

Reading Thieves

Title

T	What is the title?	What do I think I will be reading about?	Does the title have a point of view? If so, what is it?

Headings

H	What do I think I will find out in the Introduction?	What do I think I will find out in the Methods?	What do I think I will find out in the Findings?	What do I think I will find out in the Discussion?

Introductory Sections

I	Thinking About Science FACTS?	WHAT QUESTIONS DO I HAVE?	WHAT IS MY REACTION TO THIS SECTION?
	Thinking About the Environment		

Every Paragraph

E	Introduction FACTS?	WHAT QUESTIONS DO I HAVE?	WHAT IS MY REACTION TO THIS SECTION?
	Methods		
	Findings		
	Discussion		

Vocabulary and Visuals

V	Write new vocabulary (glossary) words here.		
V	Visuals (Phhotos, charts, graphs, illustrations): Write the number here:	What can I learn from the visual?	How does the caption help me to understand the visual?

Two reflection Questions - At the **End** of each section

	What does the question ask?	What do I learn from the question?	What do I learn from answering the question?
Introduction			
Methods			
E			
Findings			
Discussion			

Summary and Section 1	What have I learned about the scientific process from reading this article?
S	What have I learned about the natural environment from reading this article?

THIEVES was adapted from "Read Write Think," *http://www.readwritethink.org/lesson_images/lesson112/elements.pdf*

"Facts, Questions, and Responses" was taken from *www.readinglady.com*