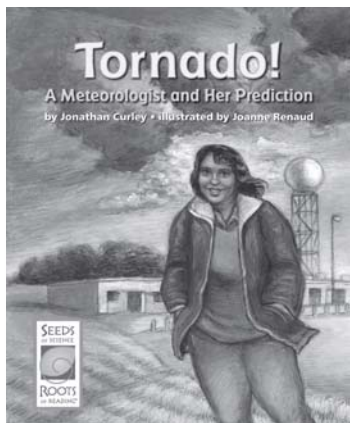


Teaching About the Nature and Practices of Science with *Tornado! A Meteorologist and Her Prediction* from *Seeds of Science/Roots of Reading*®



Introduction

This strategy guide introduces an approach for teaching about the nature and practices of science. Learning about the nature of science helps students understand that science is a process for inquiring about the world. Students learn about the scientific enterprise when they read about how scientists pose questions and engage in investigations. This guide includes an introductory section about the nature and practices of science, a general overview of how to teach this strategy with many science texts, and a plan for teaching about the nature and practices of science with the *Seeds of Science/Roots of Reading*® book *Tornado! A Meteorologist and Her Prediction*.

Book Summary

Tornado! A Meteorologist and Her Prediction introduces readers to Lynn Burse, a scientist who investigates weather. Burse works at a weather station where she gathers data using specialized tools. She makes predictions about the weather based on the evidence she gathers. Burse and a team of scientists collect information about changes in temperature, humidity, wind speed, and wind direction. This information leads Burse and her team to predict that a dangerous tornado was approaching. From reading about how Burse and her team warned people in the community about the tornado, readers learn that scientists have a role in helping society.

Science Background

Weather is a term used to describe anything that happens in the atmosphere related to temperature, water, and air. The scientific study of weather is called meteorology. In modern meteorology, computer models are used to recreate and predict weather patterns, but meteorologists also use sky observations and a variety of tools to collect information about the weather. Tools that meteorologists use include hygrometers (to measure humidity), anemometers (to measure wind speed), and wind vanes (to measure wind direction). Weather balloons can carry such tools high into the atmosphere to measure conditions at different altitudes. Meteorologists use these data to identify patterns that help them make weather predictions. For example, changes in wind direction at different heights, along with increasing wind speed at higher altitudes, can be signs that a tornado might form. Short-term weather predictions are quite accurate, but constant changes in the atmosphere make it difficult to make accurate weather predictions more than two weeks in advance. However, tracking weather conditions carefully helps meteorologists make predictions that can allow them to warn people when extreme weather is about to occur.

About This Book

Reading Level

Guided Reading Level*: 0

Key Vocabulary

evidence, measure, meteorologist, predict, tornado

Text Features

bold print, captions, glossary, illustrations, labels, maps, photographs, tables

*Guided Reading Levels based on the text characteristics from Fountas and Pinnell, *Matching Books to Readers*.

About the Nature and Practices of Science

Science is a process of continuous inquiry that yields new understandings about the natural world. Learning about the nature of science helps students understand how knowledge is developed by the scientific community. This understanding helps students see that science is not a collection of facts, but rather an ongoing process of discovery. Learning about what scientists do (the practices of science) allows students the opportunity to see valuable habits of mind (such as posing questions and critically evaluating evidence) modeled for them. Discussing how science is conducted encourages students to emulate the practices of scientists when they engage in scientific investigations and may generate student interest in science as a career.

Teaching About the Nature and Practices of Science

The following guidelines can be used to teach about the nature and practices of science with texts that discuss the work of real scientists or those that explore the process of scientific inquiry.

- Select an engaging science book or article that will prompt discussion about the nature and practices of science. Possibilities include biographies of scientists, interviews with scientists, or books featuring scientists who investigate a particular question or problem.
- Introduce the nature and practices of science by explaining that science is a process for learning about the world. Explain that scientists have particular ways of investigating, writing, and talking. Discuss a few examples of what scientists do that might be familiar to your students. On the board or on a class chart, record a list of what scientists do. (See the box on this page for a list of ideas.)
- Highlight one well-illustrated practice from the text and model how to locate and describe an example. You might suggest that students look for key words, such as *investigate*.
- Have students read the text and make notes about what scientists do. You can use the What Scientists Do copymaster included

Practices of Science

- Gather evidence.
- Investigate questions or problems.
- Make and test models.
- Make predictions or inferences.
- Make comparisons.
- Build on the work of other scientists.
- Work with other scientists.
- Make observations and collect data.
- Use specialized tools.
- Organize and analyze data.
- Use evidence to make claims.
- Make and revise explanations.

in this guide to support students as they locate practices of science in the text. (Not all practices listed on the copymaster will appear in all texts.) Students can use the blank boxes at the bottom of the copymaster to list additional practices they notice while reading.

- After reading, discuss a few of the science practices students read about. As necessary, guide students to generalize about the specific practices discussed in the text. For example, if a student says that a scientist he read about uses a microscope, you can rephrase this as *Scientists use specialized tools to help them investigate*. List these examples on a piece of chart paper.
- Pose questions to prompt further discussion about the nature and practices of science. For example, ask, “How did the scientist gather evidence?” “How did gathering evidence help this scientist answer her question?” “What are some ways that other scientists might gather evidence?”
- Continue adding to the list of what scientists do when students conduct hands-on science investigations, read other books about scientists, or explore the practices of science in other ways. You might find it beneficial to contrast the ways that science is similar to and different from the ways professionals in other fields learn about the world.

Teaching About the Nature and Practices of Science with *Tornado! A Meteorologist and Her Prediction*

Getting Ready

1. Make a copy of the What Scientists Do copymaster for each student.
2. Write “What Scientists Do” at the top of a piece of chart paper and post it in a visible place.

During Class

1. Explain that science is a way of learning about the natural world and that scientists use specific processes and procedures to find things out. Tell students they will read a book about one kind of scientist called a meteorologist. Explain that meteorologists study weather.
2. Read *Tornado! A Meteorologist and Her Prediction* in a way that is consistent with your classroom routines, giving students as much independence as possible.
3. Invite students to reread pages 6 and 7 to learn about how Lynn Burse makes predictions about the weather using evidence. Explain that making predictions is one thing scientists do—a practice of science.
4. Distribute the What Scientists Do student sheets. Tell students that they will now read the book a second time, focusing on different practices of science.
5. Model how to identify one scientific practice using pages 8–9 of the text. After reading the pages aloud, identify the practice of science found in this section. [Gathering evidence and data.] Write this practice on the What Scientists Do chart you prepared before class. Discuss how meteorologists collect data. [By using tools to take weather measurements.]
6. Direct students’ attention to the “Gather evidence and data” box on their student sheets. Show students how to record, in the space provided, a specific example of the data a meteorologist collects. [Wind speed and direction, temperature, how much rain falls.]
7. Invite students to continue rereading to identify the other practices of science listed on their student sheets. Have them make notes about an example of each practice. You can also encourage students to identify additional practices and write these in the blank boxes.
8. Have students use their notes to engage in a class discussion. Ask, “How does Burse’s team investigate weather?” [They send weather balloons high above Earth every day, page 12.] Probe further by asking, “How did investigating help Burse make a prediction?” [She learned that the wind was blowing in different directions and a thunderstorm was coming, page 14.] As the class discusses each practice of science, record students’ ideas on the What Scientists Do class chart.
9. Repeat the discussion for each of the remaining practices of science listed under the “What scientists do” column (make explanations, work with other scientists). Ask questions that prompt students to refer to the text as necessary. Help students recognize the general practices of science. For example, if a student says “Burse measured the wind speed,” rephrase this by saying “Scientists (or meteorologists) take measurements.”
10. Ask students to share additional practices they identified from the text. [Use specialized tools, make predictions.] Briefly discuss each one, asking students to identify where in the text they read about each practice. Continue to add notes about students’ ideas to the class chart.
11. At the end of the discussion, have students read over the chart and reflect on what they have learned about what meteorologists do specifically and what scientists do in general.

Independent Extension

Have students return to page 8 of *Tornado! A Meteorologist and Her Prediction* and examine the chart. Invite students to discuss the answer to the question posed under the chart: “What pattern would Burse have noticed by looking at these temperature measurements?” Students can discuss their responses with a partner or write a response to this question.

Name _____ Date _____

What Scientists Do

Title of book: _____

What scientists do	Example from the book
Gather evidence and data	
Investigate	
Make explanations	
Work with other scientists	

About Strategy Guides

A six-page strategy guide is available for each *Seeds of Science / Roots of Reading*® student book. These strategies support students in becoming better readers and writers. They help students read science texts with greater understanding, learn and use new vocabulary, and discuss important ideas about the natural world and the nature of science. Many of these strategies can be used with multiple titles in the *Seeds / Roots* series. For more information, as well as for additional instructional resources, visit the *Seeds / Roots* Web site (www.seedsofscience.org/strategyguides.html).

Student Books for Grades 3–4

Twenty-seven engaging student books are available, each with a corresponding strategy guide. The books are part of the *Seeds of Science / Roots of Reading*® curriculum program described on page 6.

Digestion and Body Systems	
Strategy	Student Book
Analyzing Part-to-Whole Relationships	<i>Systems</i>
Teaching About the Nature and Practices of Science	<i>Secrets of the Stomach</i>
Teaching Process Description Writing	<i>Voyage of a Cracker</i>
Searching for Information in Science Texts	<i>Handbook of Body Systems</i>
Making Sense of Data in Science Texts	<i>What's the Diagnosis?</i>
Variation and Adaptation	
Strategy	Student Book
Teaching Scientific Comparison Writing	<i>Blue Whales and Buttercups</i>
Using Discourse Circles	<i>The Code</i>
Using Visual Evidence to Make Inferences	<i>Mystery Mouths</i>
Teaching About the Nature and Practices of Science	<i>Evidence from the Past</i>
Weather and Water	
Strategy	Student Book
Teaching About the Nature and Practices of Science	<i>Tornado! A Meteorologist and Her Prediction</i>
Teaching About Multiple Meaning Words	<i>Falling Through the Atmosphere</i>
Gathering Information from Science Texts	<i>Weather Encyclopedia</i>
Teaching Text Structure	<i>Water in the Desert</i>
Using the Cognates Strategy	<i>Drinking Cleopatra's Tears</i>
Connecting Science Words and Everyday Words	<i>Go with the Flow: Making Models of Streams</i>
Taking Notes Based on Observations	<i>Sky Notebook</i>
Teaching Text Features	<i>Wet Weather Handbook</i>
Making Sense of Data in Science Texts	<i>What's Going on with the Weather?</i>
Light Energy	
Strategy	Student Book
Teaching About Idioms	<i>Can You See in the Dark?</i>
Teaching Summary Writing	<i>The Speed of Light</i>
Teaching About the Nature and Practices of Science	<i>Why Do Scientists Disagree?</i>
Using Discourse Routines with Science Texts	<i>I See What You Mean</i>
Searching for Information in Science Texts	<i>Handbook of Light Interactions</i>
Teaching Scientific Explanation Writing	<i>Light Strikes!</i>
Teaching Vocabulary with Science Texts	<i>Cameras, Eyes, and Glasses</i>
Teaching Concept Mapping	<i>It's All Energy</i>
Interpreting Visual Representations	<i>Sunlight and Showers</i>

