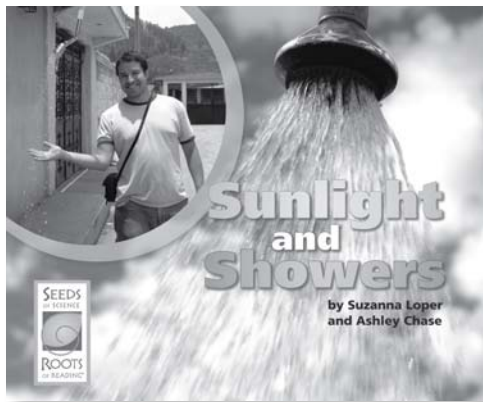


Interpreting Visual Representations

with *Sunlight and Showers*
from *Seeds of Science/Roots of Reading*®



Introduction

This strategy guide introduces an approach for teaching students about interpreting visual information found in science texts. Teaching students how to interpret visual information can enhance reading comprehension, particularly comprehension of content-rich text. This guide includes an introductory section about interpreting visual representations, a general overview of how to teach this strategy with many science texts, and a plan for teaching students to interpret visual representations with the *Seeds of Science/Roots of Reading*® book *Sunlight and Showers*.

Book Summary

Sunlight and Showers introduces readers to Dr. Ashok Gadgil, a scientist who uses his scientific knowledge to address real-world problems. Dr. Gadgil teaches a class about solving problems to students who are training to become scientists. A team of students in his class work together to find an inexpensive way to provide hot water for everyday use in Guatemala. The book describes various ways these students solve their design problems. It also explores how they work together as a team, each bringing his or her own expertise to bear as they investigate the issues, gather data, and test their solutions. Readers learn about the nature of science through this compelling example of ways that scientists can help solve problems for people.

About This Book

Reading Level

Guided Reading Level*: P

Key Vocabulary

analyze, data, investigate, temperature, transform, transformation

Text Features

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

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

Science Background

The Sun's light is a powerful source of energy. Though only a tiny fraction of the Sun's energy output falls on Earth, it is enough to give energy to almost all living things. Every day, people are figuring out new and better ways to use the Sun's energy to replace other nonrenewable sources, such as coal, oil, and fossil fuels. One way to use the Sun's energy is through solar cells, which convert light directly into electrical energy. Electrical energy is one of the most desirable forms of energy because it can be distributed easily through wires and transformed easily into other forms of energy. Another more direct way humans use solar energy is to warm things up. When light energy from the Sun is absorbed by a material (such as water or metal), it is converted into thermal energy, which can be used to heat water or to heat air in homes or buildings. Designing an efficient solar water heater, as the student scientists do in *Sunlight and Showers*, poses many challenges. Designers need to figure out how to get the water as hot as possible, but also how to retain the thermal energy when the Sun is no longer shining. Designers must also figure out ways to easily move cold water in and hot water out of the system. Nonetheless, low-cost solar water heaters are a promising solution to a real-world problem.

About Interpreting Visual Representations

Information in science texts is often conveyed visually as well as with words. Different forms of visual representations included in science books may include flow charts, labeled diagrams, cut-away drawings, or illustrations. While text in a book may tell about ideas, visual representations show complex relationships and processes in graphic form. These features aid in visualization and afford students another modality from which to derive meaning and solidify understanding of science concepts. Asking students to think carefully about visual representations and what they communicate can help them better understand what they are reading.

Teaching Ways to Interpret Visual Representations

The following guidelines can be used to teach the strategy of interpreting visual representations with any science text.

- Select a text with content related to your curriculum that includes two or more different types of visual representations. (Though not an exhaustive list, the box at the top of the this page contains four different types, with examples, that are common in science texts.) These should be central to understanding the main ideas in the book.
- Tell students that science texts incorporate different kinds of visual representations, or ways of showing information in pictures. These can include realistic illustrations, photographs, diagrams, or maps. Authors include these visual representations to help readers visualize and better understand ideas.
- Show examples of visual representations from a range of science texts and have students share what they notice about each.
- Draw students' attention to the text you selected before class. Point out one or two visual representations that are most prominent and central to understanding the content you selected. By thinking aloud, model how to use one of the visual representations to enhance understanding

Purposes of Visual Representations

- **Scientific illustrations** accurately depict detailed features (e.g., an illustration showing the placement of the human body's digestive organs).
- **Photographs** depict scientific ideas in a realistic way (e.g., snapshots of a snail's habitat).
- **Diagrams** show how the parts of something work together or how a process works (e.g., the water cycle). Diagrams are always labeled.
- **Maps** show where something is located or is taking place (e.g., a map of a stream showing where different species of fish live).

of the written text. Point out how the words and the images work together.

- Direct students to read the text and pay close attention to the visual representations in addition to the words. For instance, if the book contains diagrams, ask students to think carefully about what the diagrams show about a particular concept.
- As students read, encourage them to take the time to examine the visual representations closely. You may wish to use the Visual Representations copymaster included with this guide to record ideas about what the visual representations explain. Alternatively, students can discuss the visual representations with a partner as they read.
- After reading, encourage students to reflect on why they think the author might have included the visual representations and how the visual representations helped students understand the ideas presented in the text. Lead a class discussion reflecting on each of the visual representations in the text.
- Continue guiding students as they interpret visual information in other content-rich texts. Remind them to carefully examine visual representations during reading and think about what the visual representations communicate.
- As students become more comfortable with interpreting visual representations, ask students to include them in their own informational writing.

Interpreting Visual Representations with *Sunlight and Showers*

Getting Ready

Make a copy of the Visual Representations copymaster for each student.

During Class

1. Tell students that *Sunlight and Showers* is a book about a team of scientists who design a water heater that uses solar energy. The book includes visual representations of information, such as diagrams and photographs, to show and explain how the solar heater was designed and how it works.
2. Explain that illustrations, photographs, diagrams, and maps found in science books are collectively called visual representations. Visual representations are included to aid readers in more fully understanding important ideas.
3. Point out that all the visual representations in *Sunlight and Showers* help explain the design process used to solve the problem of getting hot water easily into homes. Draw attention to a few examples of visual representations from the book. [Page 5 has photographs, page 6 has a map, page 11 has a drawing, pages 14–15 have diagrams.]
4. Read the book in a way that is consistent with your classroom routines, giving students as much independence as possible. Have students take note of the visual representations in the book as they read.
5. Distribute the Visual Representations student sheets. Have students turn to page 6, reread the text, and examine the visual representation. Ask students which type of visual is included. [Map.] Tell students to write “map” in the column labeled “Type” and “6” in the column labeled “Page number” on their student sheets.
6. Point out the question in the heading of the third column on their student sheets: “What does the visual representation explain?” Have students share ideas about what this visual representation shows and what readers can learn from examining it. Guide students toward a response such as, *to show the location where the project took place*. Have them write this in the appropriate column on their student sheets.
7. Probe further by asking students to think about and discuss why the author might have included a map on this page. Ask students to reflect on how the map conveys information visually in a way that the words do not.
8. Have students turn to pages 14–15 and choose one of the diagrams to examine closely. Have them record the type of visual representation, page number, and what they think it explains on their student sheets.
9. Ask students to share ideas about what each diagram depicts. Again, ask students to think about and discuss why they think the author included diagrams on these pages. Ask, “What does the diagram show that is hard to explain in words?” “What did you learn from the diagram that you could not learn from just reading the words?”
10. Lastly, ask students to locate a few other visual representations in the text that they found interesting. For each visual representation, direct them to record the type and the page number. Students should reread the section of text, examine the visual representation carefully, and record what they think the visual representation depicts or explains.
11. After students have completed their student sheets, guide them in reflecting on their strategy use. Prompt them to think about how the visual representations in the book caused them to notice things they might not have noticed (or come to understand) without a visual representation.

Independent Extension

Sunlight and Showers contains diagrams on pages 14–15 and photographs on pages 18–19, but none has a caption that explains what is depicted. Have students carefully examine these visual representations and create captions that further explain what is shown. Students can use other captions in the book as a guide for writing their own.

Name _____ Date _____

Visual Representations

Title of book: _____

Type (illustration, photograph, diagram, map)	Page number	What does the visual representation explain?

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).

Available Student Books for Grades 3–4

Eighteen engaging student books are now 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. Nine *Weather and Water* student books and strategy guides will be available in late 2009.

<i>Digestion and Body Systems</i>	
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>
<i>Variation and Adaptation</i>	
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>
<i>Light Energy</i>	
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>

Extend Learning with *Seeds of Science/Roots of Reading*®

The strategy featured in this guide is drawn from the *Seeds of Science/Roots of Reading*® curriculum program. *Seeds/Roots* is an innovative, fully integrated science and literacy program.

The program employs a multimodal instructional model called “Do-it, Talk-it, Read-it, Write-it.” This approach provides rich and varied opportunities for students to learn science as they *investigate* through firsthand inquiry, *talk* with others about their investigations, *read* content-rich books, and *write* to record and reflect on their learning.

Take advantage of the natural synergies between science and literacy instruction.

- Improve students’ abilities to read and write in the context of science.
- Excite students with active hands-on investigation.
- Optimize instructional time by addressing goals in two subject areas at the same time.

To learn more about *Seeds of Science/Roots of Reading*® products, pricing, and purchasing information, visit www.seedsofscience.org



Light Energy Science and Literacy Kit



Developed at Lawrence Hall of Science and the Graduate School of Education at the University of California at Berkeley.

Seeds of Science/Roots of Reading® is a collaboration of a science team led by Jacqueline Barber and a literacy team led by P. David Pearson and Gina Cervetti.

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