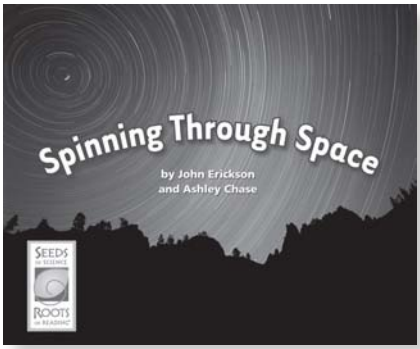
Strategy Guide

Using Science Text to Visualize

with *Spinning Through Space* from *Seeds of Science/Roots of Reading*®



Introduction

This strategy guide introduces an approach for using science text to visualize. The ability to visualize allows students to better understand something, such as a natural phenomenon, that they cannot observe firsthand. Scientific illustrations, photographs, and diagrams combined with descriptive text found in science texts aid students in visualizing. This guide includes an introductory section about using science text to visualize, a general overview of how to teach this strategy with many science texts, and a plan for teaching how to use science text to visualize with the *Seeds of Science/Roots of Reading*® book *Spinning Through Space*.

Book Summary

Spinning Through Space helps readers understand the rotation and orbit of planets in our Solar System. The book is framed around a series of surprising statements about Earth, day and night, the movement of planets, and the length of a year. Each statement is supported with a detailed explanation of why the way we often describe things is not quite what is really happening out in space. The book also provides readers with photographs and data tables that provide additional evidence about planetary motion. Through these examples, readers learn that the length of a day depends on how fast a planet rotates, while the length of a year depends on how fast a planet orbits the Sun.

About This Book

Reading Level
Guided Reading Level*: Q

Key Vocabulary
evidence, orbit, planet, rotate, Solar System

Text Features
bold print, captions, diagrams, glossary, headings, labels, photographs, table of contents, tables, text boxes

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

Science Background

Everything in space spins, or rotates. Most planets rotate in the same direction—counterclockwise as seen from the north. (However, Venus rotates clockwise, and Uranus rotates sideways.) Moons tend to rotate in the same direction as the planet they orbit, but not all moons do this. The length of a day on a planet depends on how fast the planet rotates. A day on Earth is 24 hours; days on other planets may be longer or shorter. For example, the length of a day on Mercury is 4,223 hours, while a day on Jupiter is only 10 hours! In addition to rotating, planets and moons also revolve, or orbit, around other objects. Planets orbit the Sun, and moons orbit planets. All planets orbit the Sun in about the same plane—a model with the orbits represented as solid rings would sit almost flat on a tabletop. Planets orbit the Sun in the same direction (counterclockwise as seen from the north). Moons tend to orbit in the direction of the planet's rotation. The orbit of a planet or a moon is nearly circular. The length of a year on each planet depends on how fast the planet orbits the Sun. Planets farther away from the Sun move more slowly and have farther to travel to make a full orbit, so their years are much longer than the years of planets that are closer to the Sun.

About Visualizing

Visualizing is a mental activity that students may naturally do when they think about or read something, but many students need to be taught how to visualize strategically. When readers visualize, they create mental pictures to accompany what they are reading. Visualizing promotes active reading, which enables students to pay closer attention to the text, especially when the text becomes difficult. In science, visualizing is a particularly important strategy. Many phenomena or events described in science texts are those that students cannot observe directly, and many processes are difficult to fully describe using words alone. Visualizing can help students understand these phenomena, events, and processes. It can also help students take another perspective on something they are observing—for example, envisioning how the Moon orbits Earth. Combining prior knowledge; description in a text; and information in photographs, illustrations, or diagrams aids students in creating a mental picture. Using visualizing strategically helps students develop a deeper understanding of phenomena that are difficult to observe directly.

Teaching How to Use Science Text to Visualize

The following guidelines can be used to teach how to visualize with many science texts.

- Select an appropriate text. Good choices include texts about natural phenomena that are difficult to observe firsthand (e.g., the movement of planets or moons, the process of cloud formation, how atoms and molecules change as they change phase). Look for texts that also use visual features (such as illustrations, photographs, or diagrams) that can support students in visualizing.
- Introduce visualizing with an example that is familiar to your students. You could ask students to visualize an object such as a particular rock, animal, or plant. Encourage students to use their background knowledge as they picture specific details about the object, such as color, size, shape, and movement.
- Tell students that scientists often visualize to help them understand things that are difficult to see, such as faraway planets or how atoms and molecules move. Explain that visualizing in this way involves combining what you already know and information from a text (gathered from both words and images) with your imagination to create a realistic mental image.
- Introduce the text that you selected. Briefly describe the topic and explain how it is difficult to observe it directly.
- Choose a page with text and images that describe the phenomenon. Read the page aloud and model how to combine the information from the text (both the words and the images) in order to create a mental picture. Describe what you are visualizing. You may wish to record this description on the board.
- Guide students in visualizing as you read another page aloud. Have students look at any relevant diagrams, illustrations, or photographs, and then have them close their eyes as you read aloud. Encourage students to create a picture or movie in their minds of what they "see" as you read. Have several students share what they visualized and discuss how the text and visual features helped their visualizations. You may wish to record their descriptions as well.
- Have students read the text you selected. As they read, ask them to pay careful attention to the parts of the text in which using visualizing would help them understand what is described. You may wish to have students use the Visualizing copymaster (included in this guide) to record notes about their visualizations for use in a class discussion.
- After reading, ask students to share their visualizations and point out specific places in the text where they used the text to create a mental image. Discuss what helped them visualize, as well as what science concepts the visualization helped them understand.
- Provide opportunities for students to practice visualizing using other science texts. Remind students that this strategy can help them understand by picturing something that they cannot observe directly or that cannot be fully explained using words and/or images.

Page number(s)	What I visualized
4	Earth is spinning in space. Earth is a huge sphere.
12–13	Earth spins around while it slowly orbits the Sun. Earth travels a long distance each year.

Teaching How to Use Science Text to Visualize with *Spinning Through Space*

Spinning Through Space provides the opportunity for students to visualize natural phenomena that are difficult to observe directly—how planets rotate and how they orbit the Sun.

Getting Ready

1. Write the pairs of page numbers 8–9, 12–13, 18–19, and 22–23 in the "Page number(s)" column on the Visualizing copymaster. You should have one blank space remaining in the column. Make a copy for each student.
2. On the board, create a table with two columns. Label one column "Page number(s)" and the other column "What I visualized." Leave the rest of the table blank; you will record information with students during class. (Suggested responses are in green for your reference.)

Before Reading

1. Introduce *Spinning Through Space* by telling students that the book will help them understand how planets in our Solar System move.
2. Introduce the strategy of visualizing. Tell students that scientists often visualize to help them understand things that are difficult to see, such as faraway planets. Explain that visualizing in this way involves combining what you already know and information from a text with your imagination to create a realistic mental image.
3. Conduct a brief visualization. Ask students to picture Earth in their minds. Have them shut their eyes and think about the shape, size, and colors of Earth. Ask several students to share what they visualized.

During Reading

1. Explain that students will use the words as well as the photographs and diagrams in the book to help them understand how planets move. Read page 4 aloud. Think aloud as you model using the text and the diagram to visualize Earth spinning. (You may wish to describe how seeing the diagram enhances your mental picture of Earth.) Record what you visualized on the table.
2. Next, read pages 12–13 aloud and ask students to visualize another way that Earth moves. Have several students share what they visualized and record this on the table. Have students discuss which parts of the text, photograph, and/or diagram helped them visualize.
3. Distribute the Visualizing student sheets and have students read *Spinning Through Space* in a way that is consistent with your classroom routines, giving students as much independence as possible. Ask students to stop, visualize, and record when they get to the page numbers listed on their student sheets. If they have time, students should record an additional visualization.

After Reading

1. Have students turn to pages 22–23. Discuss how the text, photograph, and/or diagrams helped them visualize two movements at once—rotating and orbiting.
2. Discuss what visualizing helped students understand. [Length of a day, length of a year, what is actually happening in our Solar System.] Emphasize that this strategy can be useful whenever they read science texts.

Independent Extension

Have students examine the table on page 11 of *Spinning Through Space*. Ask them to visualize each planet rotating in space. They should use the data about the length of a day to visualize the speed at which each planet rotates.

Name _____ **Date** _____

Visualizing

Title of book: _____

Page number(s)	What I visualized

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 4–5

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 *Aquatic Ecosystems* student books and strategy guides will be available in summer 2010.

Planets and Moons	
Strategy	**Student Book**
Connecting Science Words and Everyday Words	*Exploring Planets and Moons*
Using Science Text to Visualize	*Spinning Through Space*
Taking Notes Based on Observations	*Observing the Moon*
Using the Cognates Strategy	*How Big Is Big? How Far Is Far?*
Teaching Scientific Comparison Writing	*Handbook of Planets and Moons*
Using Discourse Circles	*What About Pluto?*
Teaching About How Scientists Use Models	*Planetary Scientist*
Using Anticipation Guides	*Tomato Landers*
Promoting Word Consciousness	*Technology for Exploration*
Chemical Changes	
Strategy	**Student Book**
Teaching Scientific Explanation Writing	*Chemical Reactions Everywhere*
Posing Investigation Questions	*Handbook of Chemical Investigations*
Teaching Text Structure	*What Happens to the Atoms?*
Teaching Procedural Writing	*Bursting Bubbles: The Story of an Improved Investigation*
Promoting Word Consciousness	*Communicating Chemistry*
Models of Matter	
Strategy	**Student Book**
Teaching Summary Writing	*Made of Matter*
Using Roundtable Discussions	*Break It Down: How Scientists Separate Mixtures*
Interpreting Visual Representations	*Phase Change at Extremes*
Teaching About How Scientists Make Inferences	*Science You Can't See*

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**

***Planets and Moons* Science and Literacy Kit**

SEEDS OF SCIENCE / ROOTS OF READING®

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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