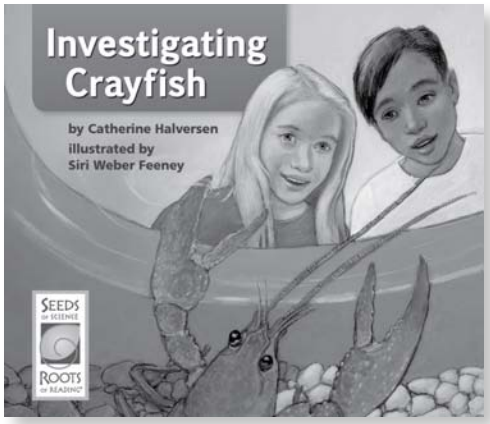
Interpreting Visual Representations

with *Investigating Crayfish* from *Seeds of Science/Roots of Reading*®



Introduction

This strategy guide introduces an approach for teaching students about interpreting visual representations. Teaching students how to interpret visual information can enhance reading comprehension and is particularly important for understanding science texts. 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 *Investigating Crayfish*.

Book Summary

Investigating Crayfish describes a backyard investigation enacted by two curious children. Hannah and Manny decide to explore a creek near their homes and soon discover that there are many crayfish living there. Guided by Hannah's mother, who is a scientist and a teacher, the two children create their own investigation to answer a question about the crayfish they find. First, they make a plan for how to set up their investigation. Then, they set up a backyard pond and collect and record data about it. Finally, they share their findings with Hannah's mother and with others using a Web page. By reading about Hannah and Manny's investigation, readers learn about steps for conducting an investigation in an engaging way.

About This Book

Reading Level
Guided Reading Level*: S

Key Vocabulary
camouflage, data, explanation, hypothesis, investigation, observe

Text Features
bold print, diagrams, glossary, graphs, illustrations, labels, tables

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

Science Background

Asking questions is at the heart of the scientific enterprise. Many scientists ask questions about organisms and how those organisms behave in nature. One way to investigate these kinds of questions is by observing the organisms, either in nature or in a controlled setting. Before conducting an investigation, scientists often make a hypothesis—a possible explanation about what will happen—along with the reasons why they think that. During an investigation, scientists observe carefully and record their observations. They may organize data into tables or graphs. Both of these visual representations of data allow scientists to notice patterns in their results more easily. Also, by organizing the data in different ways, scientists may be able to notice different patterns in their results. After carefully considering their data, scientists make explanations based on the evidence they gather. Another important part of science is communicating the results of investigations to the other members of the scientific community. Scientists are always building on the work of other scientists. Often, the results of one investigation leads scientists to ask new questions, and the investigative process begins again.

About Interpreting Visual Representations

Information in science texts is often conveyed visually, as well as with words. Different forms of visual representations found in science texts may include flow charts, labeled diagrams, illustrations, and cutaway drawings. While the text in a book may *tell* about ideas, visual representations *show* information, 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 these representations communicate can help students better understand what they are reading.

Visual Representations in Science Texts

- **Models** represent something in a simple way that makes it easier to see or understand (e.g., a model of a DNA molecule).
- **Photographs** depict scientific ideas in a realistic way (e.g., photographs of a snail's habitat).
- **Diagrams** are illustrations with labels and/or symbols that explain something (e.g., a diagram showing the water cycle or the parts of a crayfish).
- **Graphs** display data about the relationship between two variables (e.g., a graph showing the average temperature for different months of the year).

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 kinds of visual representations. (Though not an exhaustive list, the box on this page contains four different types of visual representations that are common in science texts.) These should be central to understanding the main ideas in the text.
- Tell students that science texts incorporate different types of visual representations, or ways of showing information in pictures. These can include models, photographs, diagrams, and graphs. Authors include these 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 of the text. Explain that the words and images usually work together to convey ideas.
- Direct students to read the text and pay close attention to the visual representations in addition to the words. For instance, if the text 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 in 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 them 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 examine visual representations during reading and think about what the visual representations convey.
- As students become more comfortable with interpreting visual representations, ask them to include visual representations in their own informational writing.

Interpreting Visual Representations with *Investigating Crayfish*

Getting Ready

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

During Class

1. Tell students that *Investigating Crayfish* is about two friends who explore a creek and investigate an organism they find. Point out that the book uses visual representations of information (such as diagrams, sketches, data tables, and graphs) to help readers better understand how the kids make sense of the data they collect during their investigation.

2. Read the book in a way that is consistent with your classroom routines, giving students as much independence as possible. Remind students to pay close attention to the visual representations as they read.

3. After reading, have a brief discussion about what the two kids learn in *Investigating Crayfish*. Make sure students understand the results of Hannah and Manny's investigation.

4. Turn to page 11 and read the text aloud. Model how to examine the diagram, thinking aloud about how it helped you understand more about the parts of a crayfish. Point out that Hannah was able to make a detailed diagram because she observed very carefully.

5. Turn to page 5 and read aloud the description of how a crayfish moves. Ask students to study the diagram on page 11 and notice how it differs from the description on page 5. Discuss what the diagram shows that the description does not explain. [The diagram shows all the different body parts in detail. The description only gives general information about the color and a few parts of the crayfish.]

6. Distribute the Visual Representations student sheets and have students record notes about the diagram on page 11 of the book. First, direct students to record "diagram" in the first column on their student sheets and the page number in the second column.

7. Summarize a few of the suggestions that came up during your discussion and have students record these in the last column on their student sheets. [The diagram shows all the parts of a crayfish and where they are located.]

8. Invite students to work with a partner to identify three more visual representations in the book. If your students need more support, write the names of the remaining visual representations, along with the page numbers on which they appear, on the board as a guide (sketch, page 12; data tables, pages 14 and 17; graphs, pages 18–19).

9. Ask students to discuss each visual representation with their partners. Remind them to talk about how the visual representation is used to show more information about something that the text describes in words. Students can record their ideas about what each visual representation explains on their student sheets.

10. When students have finished discussing with their partners, lead a whole-class discussion about each visual representation. To begin, have students turn to page 12 and share their ideas about the sketch.

11. Next, turn to page 14 and discuss the data table. Ask students to reflect on why the author might have included this table without any data at first. [The table shows how Hannah and Manny will collect the data.] Then, have students examine and discuss the completed data table on page 17.

12. Discuss the graphs on pages 18 and 19. Continue to reinforce the idea that the visual representations add to the text and show how to share information in different ways.

Independent Extension

Have students compare and contrast two visual representations found in *Investigating Crayfish.* For example, have them compare Hannah's graph on page 18 with Manny's graph on page 19. Invite students to discuss reasons why the author included graphs that summarize the data in two different ways.

Name _____ **Date** _____

Visual Representations

Title of book: _____

Type of visual representation	Page number(s)	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**).

Student Books for Grades 4–5

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.

Aquatic Ecosystems	
Strategy	**Student Book**
Teaching Scientific Description Writing	*Visit to a Pond*
Gathering Information from Science Texts	*Tabletop Pond Guide*
Interpreting Visual Representations	*Investigating Crayfish*
Using Roundtable Discussions	*Dragonfly Explanations*
Making Sense of Data in Science Texts	*Eat and Be Eaten: How an Ecologist Uses Food Webs*
Teaching Concept Mapping	*What Makes Living Things Go?*
Teaching Scientific Comparison Writing	*Ecosystems Around the World*
Teaching Text Structure	*Ecosystem News*
Teaching Vocabulary with Science Texts	*Making a Difference*
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**

***Aquatic Ecosystems* 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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