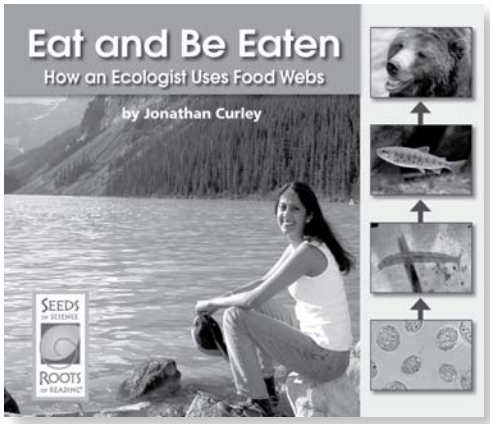
Strategy Guide

Making Sense of Data in Science Texts

with *Eat and Be Eaten: How an Ecologist Uses Food Webs* from *Seeds of Science/Roots of Reading*®



Introduction

This strategy guide introduces an approach for teaching students to make sense of data presented in science books. The ability to interpret data is particularly important in science where information is often communicated and summarized visually in tables, graphs, maps, webs, and diagrams. This guide includes an introductory section about the strategy of making sense of data, a general overview of how to teach this strategy with many science texts, and a plan for teaching students to make sense of data with the *Seeds of Science/Roots of Reading*® book *Eat and Be Eaten: How an Ecologist Uses Food Webs.*

Book Summary

Eat and Be Eaten introduces the work of ecologist Thara Srinivasan. Readers learn about her study of ecosystems and how she uses food chains and food webs—two kinds of diagrams that scientists use as models of ecosystems. Food chains and food webs show which organisms eat other organisms. Readers also learn how scientists like Srinivasan create computer models of food webs, which help make hypotheses about what might happen to particular species as an ecosystem changes (e.g., if pollution continues to accumulate in a lake). These models help scientists understand how ecosystems work and help them make predictions.

About This Book

Reading Level
Guided Reading Level*: S

Key Vocabulary
community, ecologist, ecosystem, food web

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

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

Science Background

A community of organisms living together within its environment is called an ecosystem, and scientists who study ecosystems are called ecologists. Ecologists seek to learn more about the workings of nature, such as the relationships of organisms with their environments and one another. Because ecosystems are so complex, many systems have been developed to try to organize and understand the interactions and processes that occur within them. Food webs and food chains are some of the ways scientists try to make sense of data about ecosystems. A food-chain diagram shows a single chain of organisms that depend on one another as a source of food. Food webs are more complex diagrams that show multiple connections between organisms that eat one another. These diagrams are useful to help scientists look for patterns. They also help scientists make predictions about how an ecosystem may be affected if one type of organism is removed or becomes more abundant. Sometimes, scientists are not sure about how a changing environment will affect the organisms that live there. By using computers to make food webs, scientists can make predictions about what will happen to the organisms as the environment changes. A change that initially affects one type of organism will often cause many other changes in the ecosystem.

About Making Sense of Data in Science Texts

Information in science texts is often communicated using formats such as tables, graphs, maps, webs, and diagrams. These formats, also known as data representations, are commonly used in content-rich texts to present large amounts of information in a concise manner. Data representations organize information, draw attention to relationships, and explain information that is difficult to describe in words. The ability to make sense of data is particularly essential in science texts because these texts often rely on data representations to convey important concepts.

Teaching Students to Make Sense of Data in Science Texts

The following guidelines can be used to teach students how to make sense of data in any content-rich text that contains visual representations of data.

- Begin by choosing one format of data representation on which to focus, such as tables, graphs, maps, webs, or diagrams. Find a text that includes data presented in the format you have chosen.
- Have students examine the data in the text. Ask them to describe what they notice about the way the information is presented. For example, they may observe that tables have columns and rows. (See the box on this page for examples of common features of each format.)
- Demonstrate how to interpret data organized in the selected format. Think aloud as you interpret a table, graph, map, web, or diagram. Present some sample questions that can be answered with the data presented. Demonstrate how to use the table, graph, map, web, or diagram to answer the questions.
- Invite students to share conclusions that they can draw from the data. Ask questions such as "What do you notice?" and "What can you tell from this (table, graph, map, web, diagram)?" Pose questions that encourage students to draw conclusions from the data presented.

Features of Data Representations in Science Texts

Tables: title, column labels, row labels, the way in which each cell refers to a column and a row

Graphs: title, labels, key, axes

Maps: title, labels, key, scale

Webs: title, labels, arrows showing relationships

Diagrams: title, labels, key, symbols (such as arrows)

When eliciting responses, invite students to explain which information they considered in order to arrive at their answers.

- Discuss the purpose of organizing data in the chosen format. Ask students why authors (and scientists) might use this particular format to present information.
- After students have learned about several formats for representing data, guide them toward making comparisons between features that are similar or different across the various representations. For example, point out that both graphs and maps usually include a key to help readers understand the meaning of colors or symbols.
- Guide students in using different formats to organize and represent information based on data. For example, you might gather data about students' preferences for ice-cream flavors and create a bar graph to summarize that data. You might also gather data that documents the average rainfall for each month of the year, then create a summary table. If you plan to study food webs, you may wish to use or modify the Food Web copymaster included in this guide.
- You might also consider reorganizing data from a familiar text in a new format and discussing how the two representations are different.
- After students are familiar with several ways that data is represented in text, invite them to include these formats in their informational writing.

Making Sense of Data in *Eat and Be Eaten*

Getting Ready

Make a copy of the Food Web copymaster for each student.

During Class

1. Introduce *Eat and Be Eaten*. Tell students that this book is about an ecologist who creates food webs, which are a way to understand the complex interactions among organisms in an ecosystem.
2. Read the book in a way that is consistent with your classroom routines, giving students as much independence as possible. After reading, briefly discuss the text to be sure students understand the main ideas.
3. Continue the discussion of the book by stating that organisms in an ecosystem interact with one another in many ways. Ask students to turn to pages 6–7. Review that plants make their own food using energy from the Sun. These plants and algae are consumed by animals, and the animals, in turn, are eaten by other animals. Explain that scientists make sense of these interactions by creating food webs that show what eats what in an ecosystem.
4. Have students turn to page 13 and discuss what they notice about the food web on this page. Point out that the arrows indicate that the organism is food for another organism. For example, crustaceans are food for the yellow perch. Write the following sentence starter on the board: "The ____ is food for the ____." Using this structure, have students identify other relationships in the food web on page 13.
5. Let students know that they will reorganize some of the data from the book in a new way. Have them turn to page 23 and examine the table showing what eats what in the Yellowstone Park ecosystem. Point out the two columns: "Organism" and "Food sources." Using the sentence starter on the board, have students identify a few of the relationships they see in the data table. [The aspen tree is food for the elk.]
6. Explain that students will use data from this table to create their own food webs. Distribute the Food Web student sheets. Let students know that they will fill in the names of each organism from the table in the blank circles and draw arrows to show which organism is food for other organisms in the ecosystem.
7. Have students write the name of the ecosystem in the space provided on their student sheets. [Yellowstone Park.] Next, ask students to write each of the 11 organisms from the "Organism" column of the table on page 23 in one of the circles on their student sheets. The organisms can be arranged in any order.
8. Next, explain how to connect two organisms with an arrow to show which organism is food for another organism. Have students use the table on page 23 to find an organism that eats the chipmunk. [Wolf.] Explain that this relationship can be read as *The chipmunk is food for the wolf.* Have students locate the circles in which they wrote "chipmunk" and "wolf" on their student sheets, then have them draw an arrow from the chipmunk to the wolf.
9. Ask students to look at the table on page 23 again to find the other organism that eats the chipmunk. [Coyote.] Have students draw an arrow from the chipmunk to the coyote.
10. Students should continue drawing arrows on their food webs to show relationships among all the organisms. Have students check their work to be sure they represented all the relationships in the book.
11. Encourage students to think about how organizing data from a table into a food web helped them better understand the text and helped them think about the ideas in new ways. Have students share what they learned from making their food webs.

Independent Extension

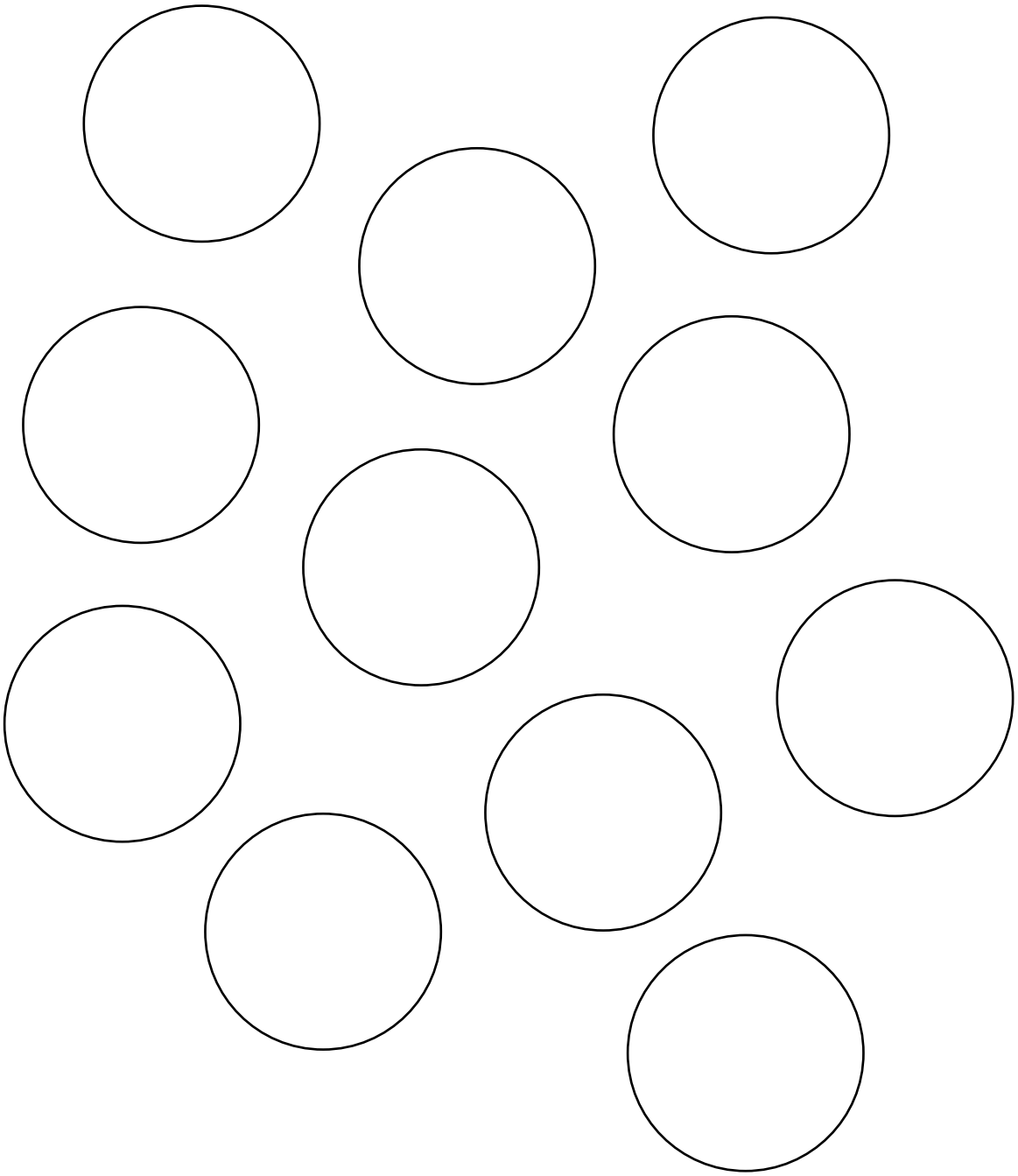
Write the following sentences on the board: "In the Yellowstone Park ecosystem, all the organisms are interconnected. For example, the budworm is food for the chipmunk, and the chipmunk is food for the wolf." Ask students to use their food webs to complete the paragraph, providing several more examples.

Name _____ **Date** _____

Food Web

Title of book: _____

_____ Ecosystem



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.deltaeducation.com**

***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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