

# Gateways to Science Companion Guides

This research-based pedagogy series is designed to assist educators in the development of best practices specific to the science classroom. Each guide provides instructional methods for increasing science content knowledge using strategies to improve student comprehension of science concepts. These strategies are effective whether a teacher is using Region 4 materials or adopted textbooks. Instructions are provided to assist the teacher in the implementation of these materials.

Each guide:

- Addresses diverse student learning styles
- Emphasizes reflective learning
- Includes implementation and management tips
- Supports instructional delivery with a literacy focus
- Supports language development

## Gateways to Science Companion Guide: Literacy Strategies

*Literacy Strategies* is designed to strengthen student comprehension of expository texts by incorporating reading, writing, listening, and speaking in the science classroom. Editable templates and examples are provided via the Region 4 Hub to support implementation of these research-based strategies before, during, and after reading.

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# What Is the Companion Guide for Literacy Strategies?

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Have you ever handed out a reading passage to your class only to have students:

- ask “Why do we have to read this? This isn’t an English class.”?
- push back their chairs, cross their arms, and sigh heavily?
- try to escape the classroom to the nurse or restroom?
- put their heads down?
- say “Reading is boring!”?

Students’ feelings about reading are often tied to experiences they have had both in and out of school. If you consider your own reading history, you can probably recall things that helped or hindered you along your reading journey. You may have read at a different pace than your peers, had trouble locating important information, have uncomfortable memories of being asked to read aloud to the class, or never really enjoyed reading. Alternatively, you may associate reading with family time and memories of reading with parents, escaping to another world through a good book, or a belief that reading is valuable and contributes to understanding. The good news is that reading isn’t something that you master by the end of third grade. It is a skill that can be developed over time. Students may enter the classroom knowing how to read the words on the page. Fewer know how to read to learn in science.

Literacy is a topic that has been studied for years both within individual states and across the nation. The National Institute for Literacy (2007) published recommendations to help content-area teachers increase the literacy skills of students. This report did not expect all content-area teachers to become reading teachers or reading intervention specialists. Instead, it included recommendations designed to familiarize teachers with reading components to assist struggling readers.

This product is designed to help bridge the gap between research and implementation. It is organized into three sections: pre-reading, during reading, and after reading strategies. Each section includes five to eight literacy strategies that are designed to help students read to learn.

Each strategy includes a focused approach for reading, writing, listening, and speaking and is organized into the following sections:

- Overview of the strategy and benefits to the learner
- Advance preparation for the teacher
- Implementation supports designed to target anticipated student barriers
- Instructions for facilitation and implementation of the strategy
- Embedded listening and speaking opportunities (key components of language development)
- A writing connection
- Example using the strategy
- Template(s)

## **Reading in Science**

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Reading like a scientist requires students to simultaneously perform many tasks and skills. Students must read and decode the words on a page, integrate background and life experiences, monitor comprehension, and synthesize information as they read. Reading strategies promote comprehension of the science text through guided interactions between the reader and the text.

## **Listening and Speaking in Science**

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Thinking like a scientist is a skill that develops over time and can be strengthened through interactions with peers. Literacy skills are strengthened as students work in groups to problem-solve and reason their way through a difficult text. Teachers must provide planned opportunities for students to engage in academic scientific conversation with each other. Embedding speaking and listening in reading strategies allows students to share ideas and actively participate in reading comprehension, which contributes to their understanding of a text (Uttero, 1988). Each literacy strategy in this guide includes experiences that promote speaking and listening.

## **Writing in Science**

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Writing like a scientist does not require a specific format or advanced vocabulary. Writing is a way to process information. The act of writing about a topic or process often helps writers clarify their ideas and identify gaps in understanding. Examples of writing tasks in the science classroom may include summaries, descriptions, illustrations, examples, statistics, details from a lab, comparisons of topics, and detailed instructions. In the science classroom, writing often involves quick, informal tasks designed to help students interact

with and process information. The writing tasks in this companion guide are designed to help students process the information they encounter in the science classroom. They are not formal assignments such as lab reports or research papers.

## What Is Literacy?

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What does the term literacy mean? A quick Internet search of the term *literacy* produces myriad definitions.

In today's society, reading and writing are only a portion of what defines literacy. Students must also be able to interact with and communicate information as they listen and speak.

The 2003 National Assessment of Adult Literacy defines literacy as *the ability to use printed and written information to function in society, achieve one's goals, and to develop one's knowledge potential* (White and McCloskey, 2006). For our purposes, literacy will refer to the set of skills necessary to read, write, process, and communicate information.

## Why Is Literacy Important?

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Approximately 8 million fourth- through eighth-grade students struggle to read on grade level (Biancarosa and Snow, 2006). Students with limited literacy skills are unable to keep pace with high school curriculum and drop out of school (Alliance for Excellence in Education, 2006). Of the students who go on to graduate, more than 50 percent must take remedial college courses because they lack the literacy skills they should have gained in high school (NCES, 2001). This is a literacy crisis. Students struggle with literacy for a variety of reasons, including insufficient vocabulary, lack of reading strategies, low reading fluency, inability to comprehend what they read, and a lack of motivation to read. Any of these factors may contribute to student frustration as they grapple with increasingly complex texts.

In response to data that points to decreasing literacy, schools are placing an emphasis on increasing the literacy skills of students. Literacy is the responsibility of all teachers, not just Reading and English Language Arts teachers. Content-area teachers need to teach the literacy skills necessary to read, write, and communicate in their subjects. This includes exposing students to comprehension strategies designed to help with advanced and unfamiliar vocabulary, extracting meaning from text, and comprehending text. Literacy develops over time as students are exposed to a variety of texts and strategies. Before students can apply reading strategies to difficult text, they must receive direct instruction on how strategies can be used. Teachers must model the strategies and teach students when to apply the strategies (Biancarosa and Snow, 2006). In addition, teachers must actively monitor students' annotations and discussions to know when remediation is necessary. If a strategy is not working for a student, the teacher should provide necessary supports or an alternative strategy.

## **Why Is Science Text Difficult for Students? \_\_\_\_\_**

Scientists convey information through a variety of texts. These texts may include but are not limited to lab reports, scientific journals, textbooks, or articles. Most scientific texts are expository. The main purpose of expository text is to provide information. As readers shift from learning to read in kindergarten through second grade to reading to learn in grades 3–12, they are expected to shift from information in a story or narrative format to information in an expository format. Many students struggle with scientific texts that are full of challenging, complex, and unfamiliar vocabulary and information. Although the types of expository texts vary, they are often organized into one of five text structures as shown in the following table.