

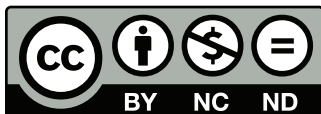
How to Use Question Writing to Build Comprehension in Science:

**A Guide for
Middle School Teachers**



The Meadows Center
FOR PREVENTING EDUCATIONAL RISK

This resource was developed, in part, with funding from the Institute of Education Sciences, U.S. Department of Education, through Grant R305A170556 to The University of Texas. The opinions expressed are those of the authors and do not represent views of the Institute of Education Sciences or the U.S. Department of Education.



© 2019 The University of Texas at Austin/The Meadows Center for Preventing Educational Risk

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view a copy of this license, visit <https://creativecommons.org/licenses/by-nc-nd/4.0>

For inquiries about using this product outside the scope of this license, contact licensing@meadowscenter.org

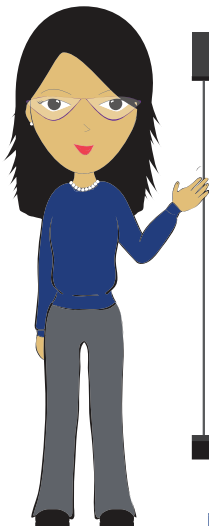
Overview of the Strategy

A COMMON CHALLENGE

Do your students read a science text from start to finish but have a difficult time understanding and remembering what they read?



A RESEARCH-BASED SOLUTION

Explicitly teach students to write questions about important information or facts from a text while they read.



How is it done?

- Step 1:** Students read a text or learn new information, either in small groups, pairs, or independently.
- Step 2:** Students pause at regular intervals to generate their own questions and write the questions in a log or notebook.
- Step 3:** Students answer their questions and cite text evidence.

Question Type	Description	Possible Stems	Examples
Specific questions 	<ul style="list-style-type: none">Questions can be answered in one word or one sentence.Answers can be found word-for-word in the text.	Who, what, when, where, why, how	<ul style="list-style-type: none">How thick is the Earth's mantle?What is the largest ocean?
Wide questions 	<ul style="list-style-type: none">Questions can be answered using information from multiple places in the text.Questions can be answered by making inferences (combining your prior knowledge with information from the text).Answers require one or more sentences.	5 Ws, how, describe, explain, summarize	<ul style="list-style-type: none">Describe some of the dangers associated with earthquakes.Explain why oil and gas are nonrenewable resources.

Teach this first!



Teach this later!



Why is this practice helpful? Teaching students to write questions while reading is one way of getting them to stop at regular intervals to think about what is being communicated and how information relates across paragraphs. Without this type of instruction, students tend to read through text with little understanding of what they are reading or awareness of when their comprehension has broken down.

Does research support the use of this strategy? Yes! Studies have shown that this practice can increase comprehension of content area text for students of different skill levels.

Instructions for Teaching the Question-Writing Strategy

I. Prepare your introductory lesson.

Before students can independently write questions related to important facts in their reading, they must be taught a strategy for doing so. When you first teach the strategy to students, it is best to model the steps while thinking aloud. We recommend these steps to prepare your model lesson.

a. Select a text for modeling.

The first time you model the strategy, use a short passage (about five paragraphs or sections) that is at students' **independent reading level** and on **a familiar and interesting topic**.

During the modeling phase, you want students to concentrate on learning how to use the strategy rather than struggling to read the text or understand the content of the passage. It may also be helpful to do a second round of modeling (on a different day) using a grade-level passage.

b. Chunk the text.

Divide the text into sections, if needed, so students know where to pause and generate a question. As a general guideline, sections of text could be anywhere from one to three paragraphs, depending on the length of each paragraph.

c. Prepare questions and answers.

Write your own questions for each text section. Then answer each of your questions in a complete sentence and indicate where the answer was found in the text. For example:

- Question: What is the largest ocean?
- Answer: The largest ocean is the Pacific Ocean (page 5, paragraph 4).

Writing questions before you model the strategy will also help you chunk the text appropriately. It's OK to revise your chunks, or text sections, as you prepare the questions and answers.



EXAMPLE: For questions (and answers) for a text about fossils, see *How to Model Question Writing in Science*, <https://greatmiddleschools.org/download-view/sciencelesson>



FAQ


Should I teach my students to write specific and wide questions on the same day?

No. We recommend teaching students to write only specific questions first. Students typically find these questions pretty easy to write, and guided practice using only this type of question will allow students to become comfortable with the strategy. Plus, it allows them to start using the strategy to improve their reading comprehension right away! After students have practiced writing and answering specific questions, you can model how to write wide questions.

II. Teach students how to write specific questions.

It is best to devote one 45-minute class period to explicitly teach the question-writing strategy, followed by several days of practice. **The first lesson should focus on only specific questions.** Wide questions can be taught in later lessons. Research supports the following process.

Day 1

- Set a purpose for learning. 
- Introduce the strategy.
- Model how to write and answer specific questions using information from the text.
- Facilitate whole-class guided practice.
- Facilitate guided practice in small groups or pairs.

Days 2 and 3

- Review the strategy and why it is helpful.
- Model how to write and answer specific questions if necessary.
- Lead whole-class guided practice.
- Facilitate guided practice in small groups or pairs.

Helpful Resources

- Student cue card with example stems:
<https://greatmiddleschools.org/download-view/questioncuecard>
- Student question log:
<https://greatmiddleschools.org/download-view/question-log>

★ TEACHING TIPS ★

Set the purpose for learning by pointing out key facts about question writing.

- Teachers ask questions to see whether students understand what they read.
- Students can also ask themselves questions while they read.
- Creating and answering questions helps you do two things.
 1. It helps you understand what you read.
 2. It helps you remember important information about what you read.



FAQ

Some of my students struggle to write specific questions. What should I do?

One suggestion is to have students start by finding a key fact or an important idea in the text. Then, show them how to “flip” that fact into a question. For example, students could flip the fact “fresh river water and salty sea water meet in an estuary” into a question by asking “Where do fresh river water and salty sea water meet?”

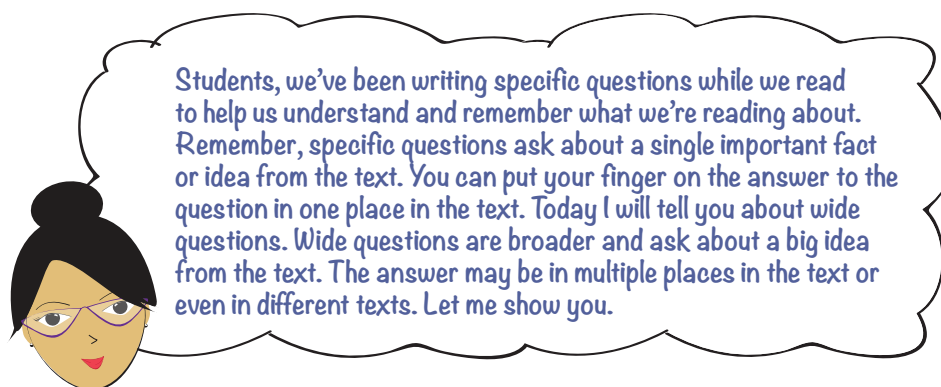
Second, model question writing for your students as many times as necessary. Struggling students often need more modeling and guided practice than other learners before they are able to use the strategy independently.

III. Teach students to write wide questions.

Eventually, we want students to write more complex questions so that they are challenged to think deeply about a text. Specific questions ask about a single fact or idea; **wide questions ask about a general topic and are answered with multiple facts or ideas from the text.** These questions are more difficult for students to write and require another round of explicit instruction with modeling and guided practice.

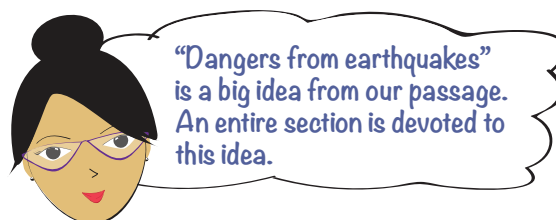
How to Introduce Wide Questions

When introducing students to wide questions, clearly explain what they are and how they are different from specific questions. Some example “teacher talk” is provided below. Additional examples of wide questions are provided on page 2 of *How to Model Question Writing in Science*.



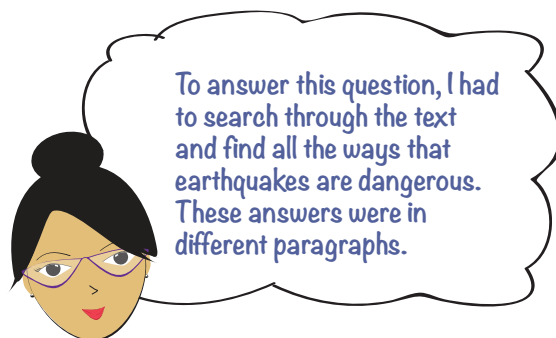
Wide Question

What are some of the dangers associated with earthquakes?
(Note: This question could also be phrased as “Describe some of the dangers associated with earthquakes.”)



Answer

The dangers associated with earthquakes include falling debris, collapsed buildings, landslides, and tsunamis (page 2, paragraphs 9, 10, and 11).



Question Log

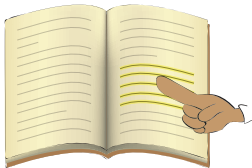
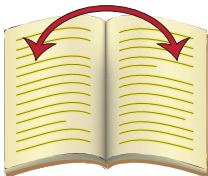
Student(s): _____

Class and Period: _____ Name of Text: _____

Question	Answer	Text Evidence

Writing Questions While I Read

While I read, I stop every once in a while to see whether the information makes sense.
I check my understanding by challenging myself to ask a question, just like a teacher does.

Question Type	Description	Possible Stems	Examples
Specific Questions 	<ul style="list-style-type: none"> Questions can be answered in one word or one sentence. Answers can be found word-for-word in the text. 	<ul style="list-style-type: none"> Who What When Where Why How 	<p>ELA: In <i>Number the Stars</i>, why did Annemarie's parents burn their newspaper?</p> <p>Science: What is the largest ocean?</p> <p>Social studies: How many original colonies were there?</p>
Wide Questions 	<ul style="list-style-type: none"> Questions can be answered using information from multiple places in the text. Questions can be answered by making inferences (combining your prior knowledge with information from the text). Answers require one or more sentences. 	<ul style="list-style-type: none"> Who What When Where Why How Describe Explain Summarize 	<p>ELA: Explain how the setting in chapters 7 and 8 contrasts with the city setting of previous chapters.</p> <p>Science: Describe some of the dangers associated with earthquakes.</p> <p>Social studies: How was the experience of the Jamestown colonists different from what they expected?</p>

IV. Provide practice opportunities.

After students learn how to write specific and wide questions, **provide opportunities to practice question writing at least twice a week**. These practice opportunities help students become more proficient at writing and answering questions while also improving their reading comprehension.

It is important that students practice question writing **while reading text**, but you may also choose to integrate the strategy into other types of instruction, including lectures, class projects, and science labs. Regardless of how you choose to integrate question writing into your instruction, **always provide feedback to students on their questions and answers**. Feedback supports students with becoming more proficient with the strategy and reinforces their learning of important information and concepts.

Instructional Delivery	Example Question Writing Activity	Time Requirement
Text-reading warm-up and exit ticket	<ul style="list-style-type: none">Upon entering the classroom, students read a brief passage related to the current unit of study and write one specific or wide question.Questions are shared, and the teacher provides feedback.The teacher selects one question for students to answer as an exit ticket.	5 minutes
Science lab or class project	<ul style="list-style-type: none">After a science lab, student teams write a specific question about lab procedures and a wide question about lab results.Questions are shared, and the teacher provides feedback.The teacher selects one specific and one wide question for students to answer.	10 minutes
Lecture/notetaking	<ul style="list-style-type: none">Individual students write specific questions each time the teacher pauses the "lecture."Students write a wide question as an exit ticket.The following day, teacher displays students' wide questions.Students answer one of the questions and share answers.	15 minutes

For more ideas, download our **Question Writing Practice Opportunities Chart**:
<https://greatmiddleschools.org/download-view/questionideas>



FAQ

Teaching students to generate questions is a bit time-consuming. Why can't students just answer questions after reading?

First, remember the true purpose behind the strategy—students are forced to slow down and read carefully when they are told to write questions about what they are reading. Second, having students generate their own questions instead of just answering the ones at the end of the chapter requires a much deeper understanding of information, even for the literal questions. Writing questions requires readers to determine what information is important enough to focus on. This is a higher-order thinking skill that will help students engage with the text at a deeper level.

Question Writing: Key Takeaways

- Use the question-writing strategy **at least twice a week**.
- If using question writing with a text for a full class period, **select text that is critical to learning content supported by the state standards**.
- **Chunk the text or information ahead of time** so students know when to pause and generate a question.
- Ensure that students write questions about **important information** being learned rather than about unimportant details.
- **Provide feedback** on students' question writing (and answers).

Helpful Resources

The following are available at
<https://greatmiddleschools.org/questions>:

- Professional development resources
- Strategy guides
- Model lessons and reading passages
- Student question log
- Student cue card
- Practice opportunities chart



Questions?

E-mail us at msmi-info@meadowscenter.org



Selected References

- Guthrie, J. T., Wigfield, A., Humenick, N. M., Perencevich, K. C., Taboada, A., & Barbosa, P. (2006). Influences of stimulating tasks on reading motivation and comprehension. *The Journal of Educational Research*, 99(4), 232–246.
- Hollenbeck, A. F. (2011). Instructional makeover: Supporting the reading comprehension of students with learning disabilities in a discussion-based format. *Intervention in School and Clinic*, 46, 211–220. doi:10.1177/1053451210389035
- Raphael, T. E., Highfield, K., & Au, K. H. (2006). *QAR now: A powerful and practical framework that develops comprehension and higher-level thinking in all students*. New York, NY: Scholastic.
- Simmons, D., Hairrell, A., Edmonds, M., Vaughn, S., Larsen, R., Willson, V., . . . Byrns, G. (2010). A comparison of multiple-strategy methods: Effects on fourth grade students' general and content-specific reading comprehension and vocabulary development. *Journal of Research on Educational Effectiveness*, 3, 121–156. doi:10.1080/19345741003596890
- Taboada, A., Bianco, S., & Bowerman, V. (2012). Text-based questioning: A comprehension strategy to build English language learners' content knowledge. *Literacy Research and Instruction*, 51(2), 87–109.
- Vaughn, S., & Edmonds, M. (2006). Reading comprehension for older readers. *Intervention in School and Clinic*, 41(3), 131–137.
- Vaughn, S., Klingner, J. K., Swanson, E. A., Boardman, A. G., Roberts, G., Mohammed, S. S., & Stillman-Spisak, S. J. (2011). Efficacy of Collaborative Strategic Reading with middle school students. *American Educational Research Journal*, 48(4), 938–964. doi:10.3102/0002831211410305



Notes

