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"You can read this text—I'll show you how": Interactive comprehension instruction

Diane Lapp, Douglas Fisher, Maria Grant

Interactive comprehension instruction through think-alouds based on shared readings can contribute to the success of students, providing them with tangible and authentic experiences for reading.

Lapp is a distinguished professor of Language and Literacy Education at San Diego State University, California, USA; e-mail lapp@mail.sdsu.edu. Fisher is also a professor at San Diego State University. Grant is an assistant professor at California State University, Fullerton. All three are on the faculty of Health Sciences High School and Middle College in San Diego.

"You can read this text—I'll show you how" is what we heard teacher Maria Grant say to her students as we entered her high school science classroom. She stood in front of a linguistically, academically, and culturally diverse group of students. They were seated at their desks in clusters of five, staring at her and the document camera as she engaged them in an interactive think-aloud in an attempt to model how to use one's existing knowledge as the basis for constructing new knowledge (Bruner, 1986; McCarthy, 2005).

This constructivist approach to learning that she was modeling was designed to illustrate for her students how to flexibly use a wide variety of thinking, language, and reading strategies to acquire a more extensive understanding of the information they were attempting to process (Harste, 1994; Wilhelm & Friedemann, 1998; Wu & Tsai, 2005). Maria and her students often shared an interactive think-aloud. She realized that in order for students to gain independence at monitoring their own comprehension she needed to share this guided modeling through a gradual release of responsibility plan (Duke & Pearson, 2002), which enabled her students to take control of their learning over time. Her ultimate goal was that her students be able to independently monitor their own comprehension as they read challenging text. Guided modeling provides the scaffolding that allows them to see and practice the monitoring skills.

This interactive thinking out-loud, which situated the instruction within the student's zone of proximal development (Vygotsky, 1934/1978), provides students with adequate time to supportively and interactively observe, recognize, emulate, adopt, practice, and self-regulate these metacognitive strategies (Mathan & Koedinger, 2005; Schunk & Zimmerman, 1994).

To better illustrate this instruction, we've presented the interactive, shared reading and thinking out-loud Maria modeled with a science text about chemical reactions in Tables 1 and 2. The original text is in the first column, followed by the commentary Maria provided in the second column, and the strategies she used in the final column.

Her instruction was designed to accomplish the very general U.S. standard that "As a result of their activities in grades 9–12, all students should develop an understanding of chemical reactions"

Table 1
Maria's introduction

Text	Teacher commentary during the think-aloud	Strategies modeled/practiced
Going Through Changes (Photo of pancakes)	"As I look over this piece of text, I see a photo of pancakes cooking on a griddle. Some are golden brown and others are still a beige batter color. The title of this reading is *Going Through Changes*. I wonder if the pancakes, some uncooked and others fully done, represent changes at a chemical level. I'll read the first paragraph."	Predicting and using titles and graphics provides focus and motivation to read further.
At a dinner table, a cook is making pancakes. He mixes together an egg, milk, and flour into a batter. When the batter is placed on the griddle, it becomes solid and golden brown. The batter has had a chemical change. All the atoms of the original ingredients are still in the batter. But the griddle's heat has arranged those atoms in a different pattern. Like the pancake batter, many substances go through chemical changes. These changes can break down complex substances into simpler parts. Or they can join simple parts into complex substances.	"So the cooking batter does represent chemical changes. I see from reading these paragraphs that chemical changes involve substances breaking down and substances joining together. I think the next section will tell me about how this process of breaking down and building up occurs. Do you have any ideas?" (Maria listens as the students share a few possibilities.) Janette, a student in Maria's class, responds, "Maybe the next section will talk about molecules being broken down or atoms being joined together." Dave adds, "Yes, I remember when I was in 8th grade we talked about how salt molecules are broken down when salt is added to water." Maria then continues. "OK, let's read on to see if we're correct."	The prediction is confirmed by reading the text. Note that sometimes the prediction is refuted after reading the text. Afterward, the main ideas are identified by summarizing a few lines of the text, which is followed by another prediction based on the text just read.
It usually takes energy to combine substances in a chemical reaction. This kind of reaction is called an *endothermic* reaction.	"An *endothermic* reaction. Wow, I'm not sure what that means, but I do know that *thermic* sounds like a word part from *thermometer* or *thermal* and both of those terms relate to heat. Maybe *endothermic* also relates to heat in some way. I'll continue to read. Maybe I'll gain an understanding of the meaning of this word if I read on."	Segmenting words into word parts brings attention to root words or affixes that might offer clues to meaning. In addition, understanding that clarification might come from context or from continued reading.

(continued)

Table 1
Maria's introduction (continued)

Text	Teacher commentary during the think-aloud	Strategies modeled/practiced
For example, heat was needed to turn the batter into a pancake.	"I guess I was right—*endothermic* does relate to heat."	Again, confirmation of a prediction, in this case of a word's meaning, may be confirmed or refuted by reading upcoming text.
If iron and powdered sulfur were mixed together, nothing would happen. But apply heat to those combined substances and you would form iron sulfide. This is an entirely new substance.	"So heat added to a mixture can cause a new substance to form. Interesting. Maybe *endothermic* means that heat is added."	Synthesizes and restates—examples offered in the text can help the reader to infer word meaning.

Note. Quotes from TIME and Teacher Created Materials (1993).

and the California standard that "Students know chemical processes can either release (exothermic) or absorb (endothermic) thermal energy."

In an attempt to situate the instruction within the students' existing knowledge base (Anderson & Pearson, 1984; Rosenblatt, 1978) and also to gain an initial assessment of their understanding about what they might remember from a very general introduction of the topic in their eighth-grade physical science class, Maria began by bending a light stick (glow stick) in front of the class and explaining that this causes a small vial of a substance to be released. As students observed the stick emit a brightly colored light due to a chemical reaction, she asked them to think-pair-share in response to the following question: What is causing light to be given off? After a lively discussion among the students and their teacher, Ms. Grant began thinking aloud to model how she gained additional meaning from the science text *Chemical Reactions—Going Through Changes* (TIME & Teacher Created Materials, 1993). Table 1 illustrates how Maria introduced the text.

After this initial introduction, Maria realized that it was time for the students to "try on" what they had observed her do. In order to coach them as they recognized, adopted, imitated, practiced, and self-regulated their metacognitive strategies, she continued with the interactive conversation illustrated in Table 2.

After the students shared what they learned, Maria invited them to read the next section of the text together and to model for a selected partner how they were making sense of their reading. As they read, she circulated among them to listen in and offer support as needed. If the text surpassed the independent reading level of a team of students, she offered them an alternate, less difficult text on the same topic (Garner, Alexander, Gillingham, Kulikowich, & Brown, 1991; Goldman & Varma, 1995). She did this because she believes that as the students' topical or subject-matter knowledge base and language grow so will

Table 2
Monitoring student practice

Text	Teacher commentary during the think-aloud	Strategies modeled/practiced
When a substance breaks down into smaller parts, it usually releases energy. This is called an *exothermic* reaction.	"*Exothermic* sounds a bit like *endothermic* but with a different prefix. (Turning to the students) What do you think *exothermic* means? Make a prediction. Write your prediction and then share it with your partner. (James, a student, tells his partner that if *endothermic* meant heat was added *exothermic* must mean that heat is taken away or given off.) Now read the next section with your partner to see if your predictions were correct. If not, look back in your own experiences or in the text to see if there were clues you missed."	Noting prefixes may help clarify vocabulary. After the teacher models a strategy, she or he may ask students to practice it later in the reading.
This happens in the flame of your gas stove. Oxygen from the air reacts with methane gas, giving off light and heat.	"Turn to your partner and decide if your predicted meaning of *exothermic* was correct or if you'd like to revise your ideas." (James turns to his partner and says, "I think I was right. Heat is given off or removed in an *exothermic* reaction.")	Allow students to practice verbalizing their thoughts so that they can consolidate their understanding of comprehension strategies.
At the same time, the methane breaks down into carbon and hydrogen atoms, which form carbon dioxide and water.	"We talked about atoms and compounds a few weeks ago in class. Methane must be a compound. It's broken down into atoms—smaller parts. Then the atoms form new compounds. I think I'm beginning to understand chemical changes. Compounds are broken down sometimes and other times they are formed from smaller parts like atoms."	Make explicit connections to previously learned content. Summarize what you know thus far and what you know based on prior or background knowledge.
There are signs that a substance had gone through a chemical change. These reactions might produce light, sound, bubbles or smoke. (Photo of fireworks)	"I see a photo of fireworks. I sat on the lawn watching fireworks last Fourth of July with my family. I remember the loud exploding sound and the colored light that filled the sky. I bet those fireworks were produced by a chemical reaction. Turn to a partner and share an experience you've had with a chemical reaction." (Jose talks to his partner, Sofia, about the changes he saw on a camping trip when wood logs were burned for a campfire. "Eventually," Jose relays, "all the wood turned	Use photos or other graphics to clarify novel ideas from the text. Graphics also provide information that may be used to make predictions. Ask students to make connections between the text and their own experiences. Have them articulate these connections.

(continued)

Table 2
Monitoring student practice (continued)

Text	Teacher commentary during the think-aloud	Strategies modeled/practiced
	to a black, powdery substance—charcoal I think." Sofia describes how her mother placed a dime-sized tablet into a tall glass of water a few weeks ago. Sofia's sister was in need of a cure for her aching stomach and the antacid was supposed to do the trick. According to Sofia, "The tablet fizzled and bubbled away. The text we're reading says that bubbles are often produced during a chemical reaction."	
Often a new substance has a new color.	"The fireworks I saw had many colors. The colors were brilliant in the sky."	Make connections to the text and your experiences.
Remember that pancake batter? It went from white batter to golden flapjack. (Heading: Slow vs. Fast)	"The next heading says 'Slow vs. Fast.' This must be referring to the speed at which reactions occur. What does this make you think about? Turn to your partner and share your connection."	Connect headings to previous content to predict upcoming content.
Metals combine with oxygen. This can happen very slowly, as when iron rusts.	"Last summer when I was repairing my old fence, I left a few iron nails outside. After a few weeks, they were coated with reddish brown material—rust I think. They must have combined with oxygen from the air outside."	Use newly learned content to clarify real-world experiences.
Some metals tarnish. For example, when copper oxidizes it turns green, forming copper sulfate or copper chloride.	"Read the next section of the text with your partner and think out loud about a connection you can make between what you've read and what you've experienced in your life." After observing the students as they interact, Maria asks Angul to share her connection. (Angul: "That sounds just like that copper bowl I have on the corner table in my home. It has a greenish tinge to it."). The students confirm Angul's connection.	Again, connect content to personal experiences and background knowledge.
Fireworks are an example of very fast oxidation.	"*Oxidation*—this is a new word. Read on with your partner to see how I'm going to figure this term out."	Sometimes new or challenging vocabulary can be clarified by reading further in the text.

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Table 2
Monitoring student practice (continued)

Text	Teacher commentary during the think-aloud	Strategies modeled/practiced
Inside a firework is gunpowder, a combination of potassium nitrate, sulfur, and charcoal. When gunpowder is heated, the nitrate releases oxygen, making the sulfur and carbon burn fast. The gases they produce send the fireworks high into the sky.	"Yes, *oxidation* must mean that oxygen is added to another substance. So it seems that fireworks are the result of chemical reactions that cause new substances to be produced. You've seen how I think through a reading that has new vocabulary and challenging text. After I finish reading I always try to summarize what I've learned. If I can't do this I know I need to read the text again and chunk it into smaller segments. After each chunk I ask myself, 'What did I learn?' Let's see how this worked for you. Ask yourself, 'What did I learn from this text?' Now, write about three concepts you learned from this shared reading with a think-aloud." (Alexandra writes about the difference between *exothermic* and *endothermic* reactions, characteristics of chemical reactions, and *oxidation*.)	Clarify vocabulary by deciphering meaning from examples in the text. Ask students to summarize the main ideas. This will promote rereading and will guide students to clarify content.

Note. Quotes from TIME and Teacher Created Materials (1993).

their reading proficiency (Alexander, 1996; Anderson, 1977; Stanovich, 1986).

Section 1

It was obvious from Maria's think-alouds about the unfamiliar language, concepts, and structures of this chemistry passage that the challenges students face as they attempt content area reading, even with the support of a diligent teacher, cannot be underestimated (Pressley & Afflerbach, 1995). Thinking out loud during a shared reading of a content area passage models for students how a proficient reader grapples with the problems of unfamiliar vocabulary, new concepts, text features, and text structures that can seem quite foreign—even after years of success with narrative reading. The instructional comments this teacher shared while thinking aloud were neither unplanned nor inconsequential. Instead, they were deliberately planned to provide commentary and conversational support for comprehension, word study, and engagement by noting where students might need explanation, elaboration, or connection. While being implemented, the teacher drew students in during the think-aloud and then capitalized on points in the text where they naturally experienced anticipation. When engagement of this type occurs, we found that the teacher feels more fulfilled as a teacher and that the students will learn more subject-specific information (Lapp & Fisher, 2007). In addition, students are learning strategies for comprehending challenging text, which can be directly translated into a motivation to read.

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As Deci (1975) explained, intrinsic motivation is founded in the human need to be competent and self-determining in relation to a person's surroundings. This explanation is illustrated in the work of Palmer, Codling, and Gambrell (1994); Gambrell (1996); and Guthrie (1996, 2004). Guthrie noted that students are motivated to read by rich literacy environments that offer choice and by supportive successful experiences in which they feel they can tackle an interesting albeit difficult text. Thus, specifically modeled and practiced comprehension strategies are a foundation to garner student interest through the development of reading competency. An interactive think-aloud provides a means for modeling, scaffolding, and practicing. It offers struggling readers the opportunity to see and hear how proficient readers approach a text, and it allows advanced students to engage in conversations that draw on their prior knowledge.

Section 2

What's new?

While thinking aloud during shared reading may seem like old news to teachers in grades K–5, we found as we visited the classrooms of middle and secondary teachers in three large urban schools (one middle and two high schools) that we were unlikely to see this type of instruction (Lapp & Fisher, 2007). Perplexed as to why interactive comprehension modeling and instruction did not exist in this arena, we realized through our conversations with these dedicated teachers that they echoed the insights of Moje (1996) and Shearer and Ruddell (2007). These researchers noted that content area teachers, trained to be content specific specialists, define themselves by their specializations as scientists, historians, athletes, and musicians first and teachers second. This doesn't mean that they are not committed to their students; it just means that they are intrigued by a content specialty that through study grew into an area of expertise they want to share with others. To do so, they decided to become teachers.

Students in the classrooms of these content experts often do not exhibit the same love for the topic or natural interest in studying it that their teachers do. These are students who need to be motivated through effective instruction to learn and enjoy the pursuit of the complexities of a particular subject. This entry-level mismatch between student and content is often exacerbated as students are asked to read textbooks that are rich with topic specific concepts, language, and structures. These textbooks are simply too difficult for a significant number of students. When examining this disparity, it quickly becomes obvious that these content experts, like all teachers, must become the liaisons between their students and the texts. Realizing this need, a common dilemma among secondary teachers, school administrators, and policymakers is how best to connect the expertise of the teacher or specialist to the interests' of the students in a way that accommodates students' diversity and promotes students' learning about content topics.

Section 3

What's next?

For many decades books and articles (Herber, 1978; Strang, 1938; Vacca & Vacca, 2007) have swept the field of secondary education in an attempt to provide middle and high school teachers with instructional supports that can strengthen their teaching and, thus, student learning. In spite of efforts to expand teachers' knowledge about modeling for students how to apply comprehension strategies to support the learning of content specific information, O'Brien, Stewart, and Moje (1995) and Bintz (1997) found that many of these efforts were not completely successful. The secondary teachers they studied noted difficulties when attempting to do any more than assign strategies for student use during instruction. Now, over a decade later, we are having the same experience as we spend time in classrooms and are asked by secondary teachers how they can "fill up" the allotted minutes of class time. Our recent experiences with these teachers, as well as a review of this research, have inspired our belief that

the instructional role of the content teacher needs continued study in order to better understand

1. How to provide content related interactive instructional experiences that engage students while at the same time teaches the language and concepts needed to understand a particular subject
2. How teachers can best model for a diverse population of students how to read, write, and think about issues and language related to a topic of study

The suggestions of Wood and Muth (1991) and Alvermann (2003) that drastic changes are needed in the types of teaching that currently exist in high school classrooms are supported by the percentage of students who are not succeeding in high school; the dropout rate now exceeds 30% for children of color. Increasing percentages of the students who do graduate and attend two- and four-year colleges are required to attend remedial classes (Sacchetti, 2005). Remedial writing courses also are becoming requirements for entry-level salaried and hourly employees (The National Commission on Writing, 2004).

What is causing this? Consider classrooms you've recently visited. Was lecture the primary mode of presenting new content? Were the lessons you viewed interactive with lots of student engagement and participation? If you can answer no and then yes to these two questions, it is highly probable that the students won't drop out of school and also won't be those in the remedial classes. If you answered yes and then no, you probably viewed the familiar arrangement of rows of desks with students facing front so as not to miss the lessons in which information is told, mentioned, and assigned. For example, a teacher might tell her or his class to read a chapter about momentum and then to write a paper about a particular topic by stating the required number of pages without emphasizing a purpose for writing, establishing an audience for the piece, or explaining how to go about the process of writing. The resulting paper would typically include the scientific definition of momentum, copied directly from teacher provided notes, and the regurgitation of information from the textbook in a dry, aimless manner. It would most likely lack personal input from the student and would probably be devoid of applications or extensions of concepts related to momentum.

Section 4

In contrast, in a classroom to which you would give a positive nod you would expect to observe students learning through interactive conversations and teacher modeling—through engagement that motivated and supported their learning. In this type of classroom, you would witness interactive think-alouds during shared reading in which a teacher like Maria would explicitly demonstrate the transformation of energy from potential to kinetic, offering some choices to her student scientists about energy transformation projects they could construct. She would model through interactive think-alouds how to compose a series of text-explicit and text-implicit questions while guiding students to predict, clarify, and summarize the procedures of an upcoming lab experiment. This conversational engagement with students creates interactive thinking about the new language, topic, and strategies being explored.

Another example of the supported learning we witnessed in Maria's classroom involved her initiating a lesson by inviting students to participate in a writing-to-learn prompt. Students were asked to describe what they saw as they watched an object fall to the ground after being dropped by a classmate. The rich discussion that ensued from the writing helped Maria to understand what the students knew about acceleration due to gravity and changes in velocity. It also provided engaging information that motivated the students to better understand the work of Galileo Galilei, the scientist who first explored the ideas of freefall and gravity. This conversation was followed by an interactive shared reading of *Starry Messenger* that explored the life of Galileo Galilei and a think-pair-share activity in which the students discussed

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Galileo's work during a period of history when new ideas were being suppressed. At this point, students were motivated to tackle reading a text about Galileo's ideas regarding acceleration. They were given excerpts from *Galileo Galilei and the Science of Motion* to further explore the science behind falling bodies. With this preparation, students were ready to independently review the chapter on acceleration due to gravity in their textbook. To support their independence as readers, they were then introduced, as needed, to problem-solving strategies that have been designed through the years to make content area reading more accessible to students. A few of these strategies we have seen science, social science, and English teachers use are Survey, Question, Reread, Question, Compute, Question (SQRQCQ) by Fay (1965); Read, Encode, Annotate, Ponder (REAP) by Manzo (1994); and Student Symbolic Response (SSR) by Wilhelm (1997).

As illustrated, these examples acknowledge the diverse educational backgrounds and needs of students while providing planned opportunities to develop high-level oral, reading, and writing skills. As evidenced by Maria's teaching (Tables 1 & 2), the interactive think-aloud implemented during shared reading provides a venue for the classroom teacher to engage students in conversation about targeted information on which they are all visually focused. During the conversation, the teacher thinks out loud about the topic, the vocabulary, and the structure of the text while making connections to prior personal or subject-related experiences learned through other materials.

STOP - End of Section 4

Dimensions of interactive comprehension instruction

Having now observed 65 lessons in which teachers like Maria model their thinking of discipline-specific texts, we identified four dimensions of think-alouds: vocabulary, comprehension, text structures, and text features (Lapp & Fisher, 2007). Teachers use these dimensions differently based on the demands of understanding the text, their purpose in reading the text, and the discipline in which they are engaged. In other words, a social studies teacher might focus on different dimensions of interactive comprehension modeling than an art teacher or science teacher. A summary of the four dimensions can be found in Table 3. We'll explore each of these here.

Vocabulary

Given the vocabulary demands of most content areas, it's not surprising that teachers commonly focus on understanding vocabulary as part of their think-alouds. Teachers do not simply define a word during their interactive comprehension instruction. Instead, they solve unknown words as they read by using context clues, their understanding of word parts or related words, or the resources available to them. Consider the following quote from an art teacher reading the biography of Vincent Van Gogh:

> An *asylum*. I wonder what that means? I understand from the paragraph that Van Gogh needed treatment for his psychiatric problems. It might be the place that they provide this treatment, but I can't be sure. I don't know any word parts that will help me. I guess I better look this one up.

Comprehension

Most teachers we observed provided comprehension strategy instruction during their think-alouds. They used common terms, such as *predicting* and *visualizing*, to help students incorporate these processes into their own habits (e.g., Harvey & Goudvis, 2000). The teachers we observed used comprehension strategy instruction purposefully and strategically. They often paused to model their use of a comprehension strategy and then asked students to discuss other comprehension strategies in pairs or small groups. They did not interrogate students about their thinking or focus on a single strategy at a time. Instead, they allowed the text and their purpose for reading the text to guide their selection of the comprehension strategy to be modeled.

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Table 3
Dimensions of interactive comprehension modeling

Dimension	Definition	Components
Vocabulary	Focus on solving an unknown word, not providing the definition of the word	• Context clues • Word parts (prefix, suffix, root, base, related words) • Use of resources (peers, dictionary, Internet)
Comprehension	Strategic moves to support understanding the text	• Summarizing/synthesize • Predicting • Inferring • Visualizing • Questioning • Connecting • Monitoring • Activating background knowledge
Text structures	Structures used in presenting information that readers can use to predict the flow of information	• Cause/effect • Compare/contrast • Problem/solution • Temporal/sequence • Descriptive • Story grammar (plot, setting, character, conflict, etc.)
Text features	Components of the text added to increase understanding or interest	• Captions • Illustrations, diagrams • Headings, titles • Bold, italic words • Glossary, index

In the same art class, this time for a shared reading of the song "Vincent (Starry, Starry Night)" by Don McLean, the teacher paused a recording of it to share his thinking about a verse that the students saw on the document camera. He said,

> This line, "now I understand what you tried to say to me, how you suffered for your sanity" reminds me of the asylum from the biographical sketch [of Vincent Van Gogh]. I've made this connection between the song and the fact in the biography we read. Van Gogh had to live in an asylum for treatment.

Text Structure

In addition to vocabulary knowledge and comprehension strategies, readers use their understanding of text structures to understand what they read. While there are a number of text structures, five informational types and one narrative type are very common. Developing students understanding of text structures and how they aid understanding is another support teachers can provide through modeling. During his reading of

the biographical profile of Vincent Van Gogh, for example, the art teacher paused and said,

> I think that this is going to compare and contrast the life of Van Gogh before and after his time in the asylum. I see that the author has provided us some information about Vincent and is starting to use some signal words that I know are used when comparing things. I see here in this paragraph that he used *in comparison, nevertheless,* and *in contrast.*

Text Features

Finally, authors and editors use specific text features to aid readers in understanding complex information and in maintaining interest in the reading. There are a number of text features that can be used, including table of contents, chapter or section headings, glossary, index, captions, and illustrations. While struggling readers often skip over these features, they can be critical to understanding. Text features can also be used to focus readers on key ideas or important points. As such, the teachers we observed regularly commented on their use of text features during their interactive comprehension instruction and modeling. For example, during his shared reading of a picture book about Vincent Van Gogh, the art teacher focused on the captions for each of the illustrations and how these captions reinforced and extended the main text. In his words,

> I see this caption and know that it's going to do a couple of things. First, it's going to tell me the name of this specific painting. That's helpful because the text describes a number of paintings. This caption also provides the date of the painting, which is critical. I know when Van Gogh was hospitalized in the asylum and what was happening to him before that. The date in the caption helps me know what was going on in Van Gogh's life around the time he completed each work.

Close the Reading Achievement Gap

If we are ever going to radically change the literacy achievement of the majority of adolescent youth, we must alter the significant amounts of time they spend doing independent work, reading from books that are too hard, and being asked questions based on things they have not read. We must ensure that students are not merely physically present, coasting from class to class in an unspoken agreement with adults to behave as long as the challenge remains low. We need to scaffold the experiences students have with texts so that they develop repertoires and habits for reading them. To do so requires significant teacher modeling as well as extensive class discussions. Interactive comprehension instruction, through think-alouds based on shared readings, can contribute to the success of students, providing them with tangible and authentic experiences for reading. Over time, across content areas, and with repeated practice, students will begin to incorporate these thinking processes into their interactions with texts. Only then will we see the achievement gap close and students engage in reading and writing.

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