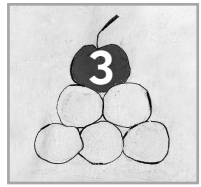

Teaching Comprehension

Does this describe you? If you have a student who is struggling to connect with his reading, you have a diverse collection of strategies you can draw from to help him engage with the text and monitor his comprehension, but when you have a student who isn't connecting with a math problem, you're not sure how to help her dive in. Good news! You already know a variety of ways to help that math learner comprehend her work.

Many years ago on a long car trip I volunteered to read aloud to my husband. As usual, Ken was reading two books at the time: *Iconology: Image, Text, Ideology*, a slim volume by W. J. T. Mitchell (1986), and *The Making of the Atomic Bomb,* the Pulitzer prize–winning nonfiction account of the Manhattan Project by Richard Rhodes (1995). I started with *Iconology*. As a former actress and teacher in training, I was comfortable cold reading—that is, reading an unfamiliar text aloud with expression. I opened the book to Ken's place marker and started to read. The text was well written, and I knew every word; in fact, with the exception of the title, I didn't encounter one unfamiliar word. Still, as I read, I became increasingly bored, confused, and even angry—I didn't *understand* a single thing I was reading. I made it sound like I did, and Ken was enjoying himself plenty. Eventually I confessed. *Iconology* was simply beyond my grasp—too advanced of a text on a topic unfamiliar to me. We switched to *The Making of the Atomic Bomb*. Ah, now that was the

ticket. Don't get me wrong—I stumbled over some of the scholarly names and scientific terms, but the story itself was completely absorbing. As Ken continued driving down the New Jersey Turnpike, the horror of Rhodes's description of the bombing of Nagasaki took over. I have never forgotten it.

Every teacher has encountered the child who decodes but draws no meaning—and little pleasure—from reading. Struggling through *Iconology*, though the words flowed freely, I gained little meaning and no pleasure. Decoding is a necessary component to reading, but it is certainly not everything.

In *Schools That Work: Where All Children Read and Write*, Richard Allington and Patricia Cunningham write, "Reading or writing without thinking would be senseless" (2006, 42). After all, the many functions of reading are all sense making—communicating, reflecting, reasoning, reminding, alarming, informing, recording, and so on. Either in our own reading or while observing students, we have all encountered the disquieting results of decoding without understanding, an activity that is at once boring and unnerving. Reading should be an engaging affair, whether it is purely business, deeply personal, or primarily aesthetic. It makes little sense, then, that in past decades so little elementary literacy instruction addressed the central issue of comprehension, focusing instead on the skills of decoding, spelling, grammar, and handwriting. Traditionally, comprehension instruction took the form of questions for the reader to answer—mostly literal ones relying on recall over reasoning. If such questions could be satisfactorily answered, comprehension was assumed.

Reading Comprehension: Understanding What Readers Do to Comprehend Texts

Fortunately, over the past couple of decades there has been a surge in interest in the teaching of reading comprehension. Research into the specific mental processes involved in understanding written text has inspired work by such educators as Ellin Keene and Susan Zimmermann (*Mosaic of Thought* 1997), Stephanie Harvey and Anne Goudvis (*Strategies That Work* 2000), and Diane Snowball (the CD-ROM course *Teaching Comprehension*). Though the authors approach the topics in their own ways, the same essential strategies turn up

again and again: tapping prior knowledge, questioning, inferring, visualizing, summarizing, synthesizing, and monitoring and repairing understanding:

Seven Comprehension Strategies

1. tapping prior knowledge (or making connections)
2. questioning
3. inferring
4. visualizing
5. summarizing
6. synthesizing
7. monitoring and repairing understanding

These strategies are habits of mind, and they're some of the same strategies learners use to make sense of math. Before looking at how we use these comprehension strategies in the math classroom, let's look at a brief definition of each one as it works in reading.

Tapping Prior Knowledge

Readers make use of prior knowledge to understand new texts. Personal experience, background knowledge, and previous reading experiences all support readers in making sense of reading. Educators may refer to this mental process as *activating prior knowledge* (Snowball) or *making connections* (Keene and Harvey). Readers use prior knowledge to make predictions as they read. Accurate or not, predictions pull readers through a text and encourage the forming and reforming of theories about a text's meaning. In reading, we encourage students to make three kinds of connections: text-to-self, text-to-text, and text-to-world.

Questioning

Readers ask questions as they read. Harvey and Goudvis (2000) borrow the phrase "puzzle drive" from physicist Richard Feynman to describe the power of questions to motivate learners. Readers may ask questions that are literal and specific ("How long is the fruit bat's gestation?" or "How can Charlotte save a pig's life?") or questions that

draw in the reader through the plot ("How is Percy going to get out of this mess?" or "Will Beth die?"). Readers pose questions to identify with their reading ("What would I do?"), challenge the author's ideas ("How in the world are you going to defend that?"), or clarify confusion ("What happened? Who stole the red sweater?"). Questioning is often a barely conscious but constant reading activity; it wires us to the texts we read.

Inferring and Visualizing

Readers make inferences both while reading and while reflecting on their reading. Inferring is in fact a life skill; we are taught to use it through our daily interactions with other people. As children we learn to observe the faces of the people around us to discern the best time to ask for a treat or when it's best to leave someone alone. The inferring readers do is a complex skill. Reading requires that we go beyond the literal—considering both what we know and clues from the text—so we can capture mood, follow themes, and understand and evaluate ideas. Visualizing (and other sensory imaging) is a strategy that not only enhances the quality of the reading experience—"hearing" Chester Cricket's symphonies or "seeing" the lush and beautiful forests of Rivendell—but also helps readers infer meaning that is not explicitly stated. For example, the description of an ominously gloomy house clues us into danger, though such isn't mentioned directly. When we read that Mother says something curtly with her eyes averted, we envision her being unhappy. Visualizing also helps readers monitor their comprehension; if we can't see all elements of a setting or situation in our mind's eye ("How did Harry get out of that locked room?"), we get a powerful clue that we missed something in the text and that we might want to reread to straighten things out.

Summarizing

Proficient readers distinguish what is most important to the theme, plot, or thesis of the texts they read from less essential details. This is true for both fiction, in which some details create mood and others drive plot, and nonfiction, in which some pieces of information carry more importance than others (it is more important to know that the tiger is a carnivore, for example, than that he is a swimmer). The skill

of determining importance does not come easily or automatically to most readers. Readers must learn to distinguish the difference between what is important in the context of the text and what is personally important to the reader. It may be important to the reader, for example, that she shares a birthday with the runner Wilma Rudolph, but it is not important overall to the text of Rudolph's biography.

Synthesizing

In this complex comprehension strategy, readers use the text they are reading to go beyond the reading experience. Like inferring, synthesizing requires readers to consider both what they know and what they are reading, but in this case the object is to emerge with an entirely new idea or degree of understanding. Children reading one creation myth after another add new information onto old and build an understanding of this genre beyond what any one story contains. The same process occurs when students read several books on dinosaurs: each source contributes new pieces of information that the reader then adds to his bank of understanding. Synthesizing requires the fluid use of other reading strategies. In many respects, synthesizing is the goal of reading. We read to extend our understanding of ourselves and the world.

Monitoring and Repairing Understanding

Finally, readers must pay attention to the quality of their understanding. When understanding fails, readers need to take action. They may reread a confusing passage, seek clarification from another source, or select another text altogether. Again, this can be a difficult skill to acquire. Young readers in particular don't necessarily know what good comprehension feels like, especially when their primary focus is decoding. They need to learn that good comprehension is "like watching TV," as fourth-grade Lamar exclaimed.

Teaching comprehension is challenging. Though these strategies are distinct, it is artificial to isolate them. Proficient readers simultaneously visualize a scene while they are drawing on prior knowledge and posing questions. Therefore, teachers must take care not to oversimplify the strategies when we introduce them and should avoid teaching strict procedures for questioning, making connections, visualizing, and so on. Rather, we serve readers best by introducing them to the way our

own minds work, revealing and reflecting on our own comprehension processes, and teaching children to practice and reflect on theirs.

In order to help my students acquire these sophisticated habits of mind, I follow four steps:

Four Steps to Teaching Comprehension

1. *Teacher modeling:* In this stage I describe a comprehension strategy and model its use, explaining aloud what I am thinking as I do so.

2. *Guided practice:* My students then practice the strategy with my support. This may take place in a whole group, in small groups, or one-on-one. I encourage them to think aloud so I can give them immediate feedback.

3. *Independent practice:* Students then begin using the new comprehension strategy in their independent reading. Consciously applying the strategy, they jot down notes in the margins, mark pages with sticky notes, or engage in conversations with reading partners.

4. *Incorporation into real reading situations:* Finally, students make use of reading strategies, without my support, in a range of reading situations. If all has gone well, this use is automatic and spontaneous, responsive to the particular reading situation. To assess their comprehension work, I stay in touch with students through written responses, one-on-one conversations, and the monitoring of book clubs or reading partnerships.

Teaching Math Comprehension Using Reading Comprehension Strategies

As in reading, comprehension is the ultimate goal of mathematics. And as in reading, teachers can no longer rest on the assumption that when a mathematical skill is mastered, understanding will naturally follow. Instead, we need to teach students what math comprehension means—what it feels like to really understand the math they do—and how they can develop it.

It makes sense to borrow the language of reading comprehension when teaching math. We want students to apply the same sophisticated habits of mind they use as readers when they think about math. In the following pages, the mental strategies used for reading comprehension are applied to the world of math. It is my hope that such applications help us improve our teaching for math comprehension.