BACKGROUND KNOWLEDGE

the missing piece of the comprehension puzzle

DOUGLAS FISHER
NANCY FREY

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In your hands is an important new book, *Background Knowledge*. This is a highly engaging, informative, and imminently practical conversation with two of the leading scholars in secondary reading comprehension and school learning. Doug Fisher and Nancy Frey have taken on the challenge of our times: How do we prepare all students for the reading comprehension and learning demands they will face every day—in school and throughout their adult lives? They answer this question in powerful ways throughout this new and important contribution to our understanding of effective instruction in subject area classes.

Improving the ability to read, comprehend, and learn is one of our most pressing educational priorities. Despite extensive effort, many students continue to struggle, increasing the possibility they will drop out of school. It is essential that all students become fully prepared in reading comprehension so that each and every individual succeeds in school, fulfills individual goals, and makes our world a better place through his or her accomplishments. Doug and Nancy show us how.

Grounded in the central research studies and national reports on literacy and learning, their book adds an important new dimension to our understanding of classroom instruction. The special focus of this book is on developing background knowledge through classroom instruction, a central aspect of reading comprehension and learning in every subject area classroom.

If you work with students in grades 6–12, the book that you hold in your hands is a special treasure. Doug and Nancy will show you the role of background knowledge in reading comprehension and learning. You will also discover how to systematically develop this essential aspect of reading comprehension, preparing students in all subject areas for their learning and literacy future.
There are several distinctive features to this volume. Most strikingly, the writing is clear, compelling, and personable. You will come to know both Doug and Nancy as your guides on this journey. They understand your classroom experiences and they share theirs. They provide an abundance of highly practical instructional ideas, designed to increase background knowledge and improve the comprehension of content area information. Each instructional practice is closely connected to central conclusions from the research literature, always in a manner that can be put to immediate use in your classroom. This is a book written by authors who know the classroom in all its complexity, diversity, and richness. Doug and Nancy teach; they do not simply talk.

We know that each subject area has its own special requirements. Doug and Nancy connect these requirements to comprehension instruction, with examples from each of the major subject areas. They also include a separate chapter on the new literacies of online reading comprehension, showing the many new skills required for effective reading comprehension and learning with information on the Internet.

Finally, this book is wonderfully cohesive and well organized. You will find the model of instruction, presented in Chapter 2, familiar and easy to use. Doug and Nancy apply this model to the development of background knowledge in a progressive, increasingly rich fashion. I appreciated the time these authors took to carefully structure the presentation of information. I know you will as well.

During the recent past, we have not paid adequate attention to the essential role of background knowledge in reading comprehension and learning. Doug Fisher and Nancy Frey return us to this powerful insight. Can we actually teach background knowledge and improve learning opportunities for all students in powerful ways? As Doug and Nancy remind us, “Yes, we can!”

—Donald J. Leu
Director, The New Literacies Research Lab
John and Maria Neag Endowed Chair in Literacy and Technology
University of Connecticut
Teacher as Archaeologist
Assessing Background Knowledge

Not long ago, we met with a ninth grader about an essay he’d turned in. We were concerned that he might have plagiarized it. “Tell us about your writing process,” we began. “How do you give credit to the ideas of others? When do you know when a sentence or set of ideas is your own, and when might it be plagiarized?” The student quite sincerely explained his process and that he hadn’t plagiarized, because he’d selected synonyms using the right-click feature on his computer. He even demonstrated it for us: he copied a passage from an Internet source and pasted it into a document, then changed most of the adjectives, adverbs, and verbs. He went on to explain that his previous teachers had taught him to paraphrase by “using [his] own words” and that’s exactly what he was doing. We knew right away he was telling the truth.
We share this story with you because we could have made a critical error at that moment. If we had failed to take the time to assess this student’s prior understanding of plagiarism, we could have rushed to judgment, giving him a zero for the assignment, making a call home to his parents, or taking some sort of disciplinary action. However, the conversation revealed what he knew and did not know about writing, and the result was a teaching opportunity. We’re happy to report that he left with a more nuanced understanding of how to use information in essays correctly.

This story also helps us make the point that to assess your students’ background knowledge, in a way you have to wear the hat of an archaeologist. You’ll need to ask yourself three questions:

1. What do students need to know?
2. What do they currently know?
3. How does this inform my instruction?

Peeling back the layers of understanding necessitates a careful and deliberate approach that can reveal the bones of students’ content knowledge. The process also allows the teacher to determine where the young learner’s understandings might be weak or incomplete and what needs to be done to strengthen them. To borrow the language of the field of archeology, it requires survey (knowing where to look), excavation (bringing it to the surface), and analysis (examining it closely).

The National Research Council’s Center for Education explains the same principles:

Every assessment, regardless of its purpose, rests on three pillars: a model of how students represent knowledge and develop competence in the subject domain, tasks or situations that allow one to observe students’ performance, and an interpretation method for drawing inferences from the performance evidence thus obtained. (2001, 2)

Assessment of background knowledge in principle does not differ from the more familiar formative measurement events common in classrooms. We like to think of background knowledge assessment as the most formative of all assessments because when it is done correctly or in earnest, it truly guides and informs instruction starting at the planning stage and carrying through lesson delivery and student feedback.
Surveying Background Knowledge: Knowing Where to Look

The starting point for assessing background knowledge begins with the teacher’s ability to identify the foundational understandings needed to comprehend new information. As noted in Chapter 1, new learning is best constructed on a bedrock of existing knowledge. Therefore, it is essential for teachers to name for themselves the information a learner must call upon. Quite simply: What are the nonnegotiable, core concepts my kids need to have from the get-go in order to proceed with my unit? This can be challenging, because sometimes we presume they know things they don’t. This is what we mean by peeling back the layers. For example, let’s take a fairly current situation: If some of your high school students don’t know about the stock market crash of 1929 and the Great Depression, their understanding of early 2009’s newspaper headlines comparing the two periods of financial crisis is going to be much thinner than yours or ours. To have a meaningful discussion of the pros and cons of President Obama’s plans for rebuilding the nation’s infrastructure, you’ll probably need to build background knowledge about FDR’s Works Progress Administration efforts first.

Remember the old Gap ads? “For every generation there’s a Gap.” As we assess our students, our mantra might be “For every generation there’s a knowledge gap.” Think of it! Students in middle and high school have no recollection of a world without wireless communication, gene therapy, mainstream media’s embracing of cultural and ethnic diversity, the war on terrorism, or reality television. The 1960s civil rights movement, antiwar protests, cultural upheaval, the women’s movement—none of these is part of their psyches and knowledge banks. Sure, maybe it was their parents’ history, but the operative word is history. Consider, then, how this might affect students’ understanding of the following events:

- Ernest Shackleton’s ill-fated *Endurance* expedition in the Antarctic in 1914
- Crick and Watson’s 1953 discovery of the double-helix shape of DNA
- the Cold War and twentieth-century conventional warfare
- Frank Stockton’s 1884 short story “The Lady or the Tiger”
- Hilary Rodham Clinton’s bid for the presidency in 2008
- Barack Obama’s ascension to the presidency of the United States in 2009
Here’s the real challenge, though: deciding what is the superficial background knowledge that you can easily explain and don’t need to teach more fully and what “enduring understandings” (Wiggins and McTighe 2005, 17) you want students to accrue. You know your content pretty well, so our experience is that once you start thinking along these lines, you’ll be able to zoom in on the hot spots of the content pretty quickly. No archaeologist begins digging in a random spot. Instead, she possesses a rationale for the selection of the location based on what she is looking for, and researches it thoroughly before ever beginning to dig. In the same way, a teacher must examine the critical features of the content to be taught and then extract the most useful background knowledge possible. The method we use to determine what is core knowledge and what is incidental knowledge is based on four criteria:

1. **Representation**: Is it essential?
2. **Transmission**: Can it be easily explained, or must it be taught?
3. **Transferability**: Will it be used for future understanding?
4. **Endurance**: What will be remembered after the details are forgotten?

For the last criterion, we thank Grant Wiggins and Jay McTighe for their work on enduring understandings. A chart of this decision-making model can be found in Figure 3.1.

<table>
<thead>
<tr>
<th>Core Knowledge</th>
<th>Incidental Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>The information is foundational to understanding the main concepts.</td>
<td><strong>Representation</strong></td>
</tr>
<tr>
<td>Requires multiple exposures and experiences.</td>
<td><strong>Transmission</strong></td>
</tr>
<tr>
<td>Will be needed again to understand future concepts</td>
<td><strong>Transferability</strong></td>
</tr>
<tr>
<td>Will be remembered after details are forgotten.</td>
<td><strong>Enduring</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The information may be interesting, but it’s peripheral to the main concepts. Can be explained or defined easily (using a label, fact, or name). Specific to this concept; unlikely to be used in the future. Details and specifics are not likely to be recalled later.

**Figure 3.1** Decision-making model for identifying core and incidental knowledge
Surveying a Text in Ninth-Grade English

English teacher Cora Roberts wanted to use the Edgar Allan Poe short story “The Cask of the Amontillado” with her ninth-grade students but was discouraged from doing so by her colleagues who told her that “the kids really don’t seem to like it much.” Cora learned that the unit they designed began with building background knowledge on Carnival celebrations and its costumed participants. Cora decided that she needed to identify the types of background knowledge her students would need to understand this nineteenth-century story in a more systemic way. She brainstormed a list of elements and then divided them into two categories: core background knowledge and incidental background knowledge. As she reread the story, she realized that the Carnival celebration could be explained in a straightforward way, as could the traditions of wearing a costume, so she placed this in the incidental category, along with several other facts. She examined the items listed under “Core Knowledge” and recognized that a pattern was emerging—the importance of pride, revenge, and family honor (see Figure 3.2).

She understood that the enduring themes of revenge and murder would resonate with her students but also knew that their understanding would hinge on a critical piece of information: the symbolism of the coat of arms described in the story. She began by displaying drawings of such heraldry, including the use of a motto. “Many families used symbols to describe the strength of their people in times of war,” she began. “Look at this eagle. It symbolizes a swift and sudden death, like when an eagle attacks its prey.”

<table>
<thead>
<tr>
<th>Incidental Knowledge</th>
<th>Core Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnival celebrations</td>
<td>Knowledge of the era regarding maintaining pride and reputation</td>
</tr>
<tr>
<td>Amontillado is a kind of wine.</td>
<td>The importance of revenge to resolve grievances</td>
</tr>
<tr>
<td>Wine cellars and catacombs are underground.</td>
<td>Family reputation through the generations</td>
</tr>
<tr>
<td>Freemasons is a secret society.</td>
<td>Symbolism of the Montresor coat of arms</td>
</tr>
<tr>
<td></td>
<td>The unreliable narrator</td>
</tr>
<tr>
<td></td>
<td>Impunity: getting away with something with no punishment</td>
</tr>
</tbody>
</table>

Figure 3.2 Cora Robert’s list of background knowledge for “The Cask of the Amontillado”
She showed several others, including a lion, a cross, and an axe, and then distributed a drawing of the coat of arms in the story. This one featured a snake being crushed by a human foot as the snake strikes. “Take a look at this coat of arms. Talk at your table about what you think this symbolizes.” Most agreed that the snake is a traditional symbol of evil of the most deadly sort and that the bite might be a poisonous one. They concurred that this would be the coat of arms of a family that stamped out injustice in the world.

Cora wasn’t finished. “Now tell me what it means when you add the motto ‘Nobody provokes me with impunity.’ The word *impunity* means that you get away with something without being punished. Is it the snake or the human who represents this family?”

This question prompted quite a discussion in class. Raymond made a connection to the *Harry Potter* books he’d read in middle school. “Maybe this family is like Slytherin,” he offered. “You know, the evil ones.”

However, Sarah disagreed. “I think the foot is what’s most important,” she stated. “That’s the real action in this coat of arms. This family sees its duty as crushing the wrongdoer. They have no mercy.”

All agreed, however, that the ambiguous use of the pronoun *me* was intriguing. “I guess it could go either way,” Raymond conceded. Although they were not yet using the word *impunity* in their academic language, Cora noted that they were already beginning to consider punishment as a point of honor. She explained that the coat of arms belonged to the family of the narrator of the story and told them that this would be key to understanding him and his actions. By building this core background knowledge, the teacher readied her students for the first paragraph:

The thousand injuries of Fortunato I had borne as I best could, but when he ventured upon insult I vowed revenge. You, who so well know the nature of my soul, will not suppose, however, that gave utterance to a threat. At length I would be avenged; this was a point definitely, settled—but the very definitiveness with which it was resolved precluded the idea of risk. I must not only punish, but punish with impunity. A wrong is unredressed when retribution overtakes its redresser. It is equally unredressed when the avenger fails to make himself felt as such to him who has done the wrong. (Poe 1846/2002, 231)

“Whoa! I can already see that dude’s face!” exclaimed Raymond. “This Fortunato guy is gonna get whacked!”

Cora knew that she was not finished building background knowledge with her students. As her lessons progressed, she would discuss the empha-
sis on maintaining family honor in the early nineteenth century, and they
would also learn about the literary device Poe pioneered—the unreliable
narrator. But this first foray into the dark wine cellar with the menacing
narrator had already been a success, because she had focused her students’
attention on revenge and honor as a core understanding of the piece.

As teachers, we often find ourselves at a crossroads; we can cave to the
temptation to water down our teaching because we think kids won’t under-
stand a story and therefore avoid challenging texts, or we can recognize the
disservice we are doing to them by failing to analyze, develop, and activate
their background knowledge such that they engage with interesting texts
that will help them understand themselves and the world around them.

Of course, conceptual knowledge is not always text based; take mathemati-
cal principles, for example. Many of us will recall we learned somewhere
along the way that the sum of the interior angles of a triangle is 180 de-
grees. Chances are that you memorized this fact through repeated exposure.
But do you know why this is true? And furthermore, would understanding
why it is so quicken the pace for learning?

Antonio Ventura, a sixth-grade mathematics teacher, planned a unit on
the properties of two-dimensional figures. In particular, his students needed
to be able to solve for complementary and supplementary angles of trian-
gles. Antonio also knew that students who rely on memorizing concepts
without understanding them more deeply quickly become confused when
confronted with plane geometry.

Antonio decided that he must first establish a rationale for why the inte-
rior angles of a triangle always add up to 180 degrees. He knew that bud-
ding mathematicians who understand core concepts are able to apply this
knowledge correctly in novel situations. He gave each student a sheet of
scrap paper from the copy room and a pair of scissors. After introducing the
concept, he told them that they would be able to prove whether he was cor-
correct or not using the materials on their desks. “I can’t wait to find out what
you discover,” he told them. He instructed them to cut out a triangle (right,
equilateral, or isosceles) and then to snip the three angles off. “Now line
those three clipped angles up so that they form a straight line,” he said. The
gasps began almost immediately.

“How can that be, Mr. V?” asked Gregory. “Does it always work?”
“Try it again for yourself,” the teacher encouraged. “Use a different tri-
gle this time. And don’t bother to cut it,” he said. “Just tear off the
corners.” (See Figure 3.3).
Again and again, the students tried variations, only to discover that the angles, no matter how irregularly separated from the triangle, could always be reassembled as a straight line. “Now let’s talk about the properties of a straight line, which you’ve already learned. How many degrees in a straight line?” asked Mr. Ventura.

“One hundred eighty degrees!” the class replied.

“Right! Now use your mathematical logic here. The three angles of the triangle always seem to make a straight line. So how many degrees are the sum of the three angles?” He cupped his ear for effect.

“One hundred eighty degrees!” they chimed in with even more enthusiasm.

“There you go! Now choose three angles from the same triangle and write ‘fifty degrees’ on one and ‘sixty degrees’ on another. Add that up to figure out what the third one equals.”

The students quickly got to work solving this problem. As the first of them arrived at an answer, he directed them to talk to a partner about the solution. Within two minutes, everyone in the class arrived at the correct answer of seventy degrees.

Antonio’s next lessons would continue to build on this major concept as his students mastered solving for complementary and supplementary angles. And he couldn’t wait to show them in a few weeks that the same principle applies to polygons (which are really composed of two triangles) and that a polygon’s angles always total 360 degrees.

Excavating Background Knowledge: Bringing It to the Surface

Once you’ve discovered and brought your enduring understandings to the surface, it’s time to set them next to what your students currently know and don’t know. Teaching is about sleuthing out the most meaningful ways to
get from students’ current knowledge to enduring understandings. We recently read an article in the *New York Times* that reminded us of our teacher-as-archeologist analogy (Haederle 2009). It featured archeologist Patricia Crown, who solved the mystery of the Pueblo jars. She and others had studied these decorated clay vessels excavated from the mesas of New Mexico for years and years and hypothesized their use as drums or sacred objects. Using her background knowledge about pottery and the trade routes of the Mayans, and collaborating with both an expert on Ecuadorian and Columbian history and a biochemist from the Hershey Company, who detected theobromine, a cacao marker, in the clay, she was able to prove the jars were actually used for ritualized chocolate drinking practices during special feasts! We love this story because it shows how background knowledge in real life gets put to use and how even experts can get sidetracked by details that lead them to stick to wrong hunches. We share the story at this juncture because it underscores the responsiveness of this archeologist—to arrive at the truth, the enduring understanding of those clay jars, she had to negotiate what she knew with others’ current understandings (or lack thereof) and probably do plenty of backtracking and regrouping along the way, much as a responsive teacher does as she builds students’ knowledge.

Responsive teaching—and responsive sleuthing of what students know—is closely linked, of course, to surveying the content for enduring understandings. Both require recognition on the teacher’s part of what must be understood by the learner. Two of the most effective means for assessing what students know and don’t know are anticipation guides that feature misconceptions and opinionnaires that elicit opinions through value statements.

Cognitive scientists have long been fascinated with understanding the role of misconception in learning. This interest consists of two subsets: identifying misconceptions associated with disciplines and determining how misconceptions can be corrected so that new learning can occur.

Misconceptions should not be confused with factual errors. A simple factual error, for instance, a belief that the Great Wall of China can be seen from space, can usually be cleared up with direct explanation (check out Wikipedia if you hold this factual error). Misconceptions, on the other hand, represent a fundamental flaw in knowledge and reasoning that then spills over into other facets of learning. Examples of misconceptions in various content areas can be found in Figure 3.4. Students use these misconceptions to explain other phenomena, leading to a cascade effect. New learning
predicated on a shaky foundation will topple, as evidenced in the well-known documentary *A Private Universe*. In this film, Harvard faculty members and newly minted graduates provided elaborate (and incorrect) explanations for why there are seasons or why there are phases of the moon (hint: it’s not because Earth casts a shadow). Despite their command of academic vocabulary and excellent educational experiences, twenty-one of the twenty-three people who appear on the film had failed to master a fundamental understanding of Earth’s movement in relation to the Sun. (To view this documentary, go to www.learner.org/resources/series28.html.)

The first step in uncovering student misconceptions is to possess a working knowledge of the common misconceptions associated with your discipline. For example, many physics teachers know that students come to them possessing all kinds of misconceptions that end up affecting learning. One of the most common is the belief that the faster an object moves, the

<table>
<thead>
<tr>
<th>Content</th>
<th>Misconception</th>
</tr>
</thead>
</table>
| Life Science| • The water in the water cycle today is the same water from millions of years ago.  
• Organisms higher on the food chain are predators of all organisms below it.  
• Muscle cells push and pull.                                           |
| Physical Science| • Faster-moving objects have a larger force acting upon them.  
• Two objects traveling at the same velocity will also have the same acceleration. |
| History     | • World War II in Europe was waged against Germany (omitting Italy and Russia).  
• The American Civil War was fought to free enslaved people.  
• Failure to understand the progression of time in multiple locations simultaneously (the snapshot effect). |
| Mathematics | • The absolute value of a number is a positive number (rather than the distance from zero).  
• Variables stand for specific objects (e.g., $3d + 2c$ means three dollars and two cents).  
• Identification of a shape is based on appearance rather than properties. |
| English     | • A sentence must never begin with *And* or *But*.  
• A sentence should never end with a preposition.  
• Formal academic writing should never include the word *I*. |

*Figure 3.4 Commonly held misconceptions in secondary subjects*
larger the force is that acts upon it. Tom Brown and Jeff Crowder, authors of the website for the Physics Misconception Center at the University of Montana, note that “some students believe in their heart of hearts that force is proportional to velocity” and that this is a particularly difficulty notion to dislodge. Their website contains multiple-choice questions and explanations on physics topics and is useful for teachers who are creating questions meant to surface these misconceptions. Similar websites for other discipline areas can be found in Figure 3.5.

An anticipation guide is an effective way to determine the misconceptions held by students (Tierney, Readance, and Dishner 1995). Usually, you administer one near the beginning of a lesson or unit of instruction. It gives you formative assessment data to plan your instruction, and it draws the learner’s attention to assumptions he holds. To create one, devise five to ten statements constructed for true-or-false responses. You can either deliver the questions verbally or present them as a written handout. Don’t grade them; just use them as a barometer of class understandings and as prompts for an initial discussion on the topic at hand. Often, it’s useful to pose the statements again near the end of the lesson or unit, when students can provide justification for true statements and a reasoning for why false statements are incorrect. This provides you with excellent pre- and postlearning quantitative data, as well as qualitative information about the extent to which the learner understands key concepts.

Ellen Wexford’s sixth-grade earth science class was about to begin a unit on earthquakes and she knew from experience that despite being residents of an earthquake-prone region, her students held many misconceptions about tectonic activity. For instance, many of them believed that a megaquake on
the San Andreas Fault could cause California to break off from the continent. Ellen recognized that even though to some degree her students knew it was an urban legend, it nonetheless signaled that their understanding of earthquakes was, well, a bit shaky. So she constructed an anticipation guide (see Figure 3.6) that would be useful to her and her students. She had made guides in the past that she realized were flawed because they focused on isolated facts (incidental knowledge) rather than core knowledge. “When I first started using these a few years ago, I would include items about the names of faults, or knowing how many earthquakes occur each year worldwide. Those are important and they’ll be taught in the unit. They don’t necessarily let me know anything about misconceptions that will interfere with new learning,” she told us. The one she now uses was developed through a survey of the textbook materials and outside sources, especially the U.S. Geological Survey’s Earthquakes Hazard Program (earthquake.usgs.gov/learning/faq.php).

We asked her what she intended to discover about her students’ background knowledge. “I chose each item because it correlates to the core knowledge they will need for this unit,” she explained. She went on to describe that core knowledge:

1. Rocks possess a degree of elasticity that results in elastic strain energy. When the elastic strain is too much, an earthquake will occur.

2. Earthquake damage continues after the event is over, especially in populated areas where man-made structures are lost.

3. Magnitude measuring systems work on an amplitude scale, not on an intensity scale.

4. Earthquakes originate in Earth’s crust, usually less than one hundred miles deep.

5. The physics of seismic waves results in transmission through the mantle and core to the other side of Earth. Sensitive machines are capable of measuring these waves, even though they cannot be felt by humans.

6. The San Andreas Fault in California is a slip-strike fault between the North American and Pacific plates. Movement between the plates is roughly northwest, not apart (as in California breaking off).

“I give the guide to them on the first day of the unit, after we’ve watched some video footage of earthquakes and their aftermath. This activates their prior knowledge and experiences and gives us a good foundation for
Name: ___________________________  Period: ______________

**Directions:** Read each statement and answer true or false.

<table>
<thead>
<tr>
<th>Before</th>
<th>Statement</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Rocks stretch and flex during an earthquake.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Damage continues to occur after the earthquake ends because of landslides, fires, and tsunamis.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>An earthquake of magnitude 6.0 is twice as strong as one that is magnitude 5.0.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Earthquakes begin deep in Earth’s core.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Seismic waves from an earthquake can be measured on the other side of Earth.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>California might break off from the continent because of a large earthquake.</td>
<td></td>
</tr>
</tbody>
</table>

After: Explain why each statement is true or false.

1. ____________________________________________________________
   ____________________________________________________________

2. ____________________________________________________________
   ____________________________________________________________

3. ____________________________________________________________
   ____________________________________________________________

4. ____________________________________________________________
   ____________________________________________________________

5. ____________________________________________________________
   ____________________________________________________________

6. ____________________________________________________________
   ____________________________________________________________

**Figure 3.6a Anticipation guide for earth science**
Name: _______________________________________ Period: ________________

**Directions:** Read each statement and answer true or false.

<table>
<thead>
<tr>
<th>Before</th>
<th>Statement</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
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<td>2.</td>
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<td>3.</td>
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<td>4.</td>
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<td>5.</td>
<td></td>
<td></td>
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<tr>
<td>6.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**After:** Explain why each statement is true or false.

1. __________________________________________________________
   __________________________________________________________

2. __________________________________________________________
   __________________________________________________________

3. __________________________________________________________
   __________________________________________________________

4. __________________________________________________________
   __________________________________________________________

5. __________________________________________________________
   __________________________________________________________

6. __________________________________________________________
   __________________________________________________________


**Figure 3.6b** Blank anticipation guide
discussion,” Ellen continued. “I collect them and analyze them by student so I get a good sense of who knows what. I am often surprised to find out who the experts are! It also allows me to create new learning experiences for those who have already mastered this core knowledge.” She went on to describe the experiences she would create for students during the unit, including labs on elasticity and seismic wave measurement. “When I’m nearing the end of this unit, I give them their own anticipation guides back again, so that they can answer the items again and notice how their knowledge has grown. I also require them to explain why they know what they know.”

She explained that she doesn’t ask them for their reasoning when she first hands out the anticipation guide, based on prior experience. “I found that most of them don’t know why they know something initially. My students seemed to struggle with this, and I’d mostly get replies like ‘Because it is.’ That’s not very helpful. By the end, though, I want them to be able to support their position with evidence. I suppose that’s me using my own background knowledge!” she concluded with a grin.

Ellen’s use of an anticipation guide works well in content areas like science, history, and mathematics, but this tool is a bit more difficult to use in English and the humanities. That’s because misconceptions, per se, are less clear in these disciplines. Rather, students are drawing on their personal experiences to formulate opinions. These are often informed by belief systems, cultural traditions, and values. For that reason, labeling such beliefs as misconceptions would be inaccurate. However, it is helpful to learn about the opinions of students in order to craft new learning. An opinionnaire, an instrument used widely in social sciences research, is useful for locating the perspectives of students on topics that don’t have a right answer (Smagorinsky, McCann, and Kern 1987). Like anticipation guides, they consist of five to ten statements. In contrast, they feature a Likert-type scale ranging from strongly agree to strongly disagree. We do not include a neutral response since this is not consistent with the intent of this assessment (Fisher et al. 2007).

Ron Sato was looking forward to welcoming his new tenth-grade world history students and carefully planned his early assessments for the first week of September. Although his content draws on an enormous foundation of factual knowledge, he recognizes that the discipline also involves interpretation and analysis. “I teach students who come from all over the world,” he explained. “The background knowledge they use to understand history is shaded by their own experiences and cultures. I need to know some things
about their views of the world.” Ron developed an opinionnaire to learn about their perspectives so he could integrate these into his instruction (see Figure 3.7). “I’ve chosen these statements because they align with major units I’ll be teaching this year,” he said. “I’ll also use a version of each of these as a central issue for the units. I want them to wrestle with these complex issues.”

He went on to describe how he planned on using each during the school year:

- **Unit 1:** Is history only the winner’s story?
- **Unit 2:** Winston Churchill said that democracy is the worst form of government, until you consider the others. Was he right?
Name: ________________________________  Period: _________  Date: _________

**Directions:** Think about your own reactions to these statements and place a check mark in the column that best matches your opinion. There are no right or wrong answers.

**What’s Your Opinion?**

SA = Strongly Agree  A = Agree  D = Disagree  SD = Strongly Disagree

<table>
<thead>
<tr>
<th>Statement</th>
<th>SA</th>
<th>A</th>
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*Figure 3.7B Blank opinionnaire*
- Unit 3: You say you want a revolution—but at what cost?
- Unit 4: Did the Industrial Revolution make life better or worse?
- Unit 5: War: What is it good for?
- Unit 6: Was World War II worth it?
- Unit 7: Can you build a nation when it’s not yours?

“No one of these are answered simply,” Ron explained, “and I want them to appreciate the complexities of these questions. For example, kids at this age are ready to protest nearly anything, but they don’t necessarily think through the costs of their actions. I want them to more fully understand why some revolutionaries have used violence to overthrow governments, while others have staged bloodless coups. And what about civil disobedience? Under what circumstances has it been used to great effect?”

The teacher went on to describe how he would use the results of the opinionnaire. “First of all, it’s a good temperature check for me. Each period is a bit different, and this is one of the ways I can see that. I even share the class averages for each statement with them so that they can begin to see the ways their opinions are different and the same as their peers. I also gain some insight into the individual belief systems of students. A student who is a recent refugee from a war-torn area of the globe is going to see the world differently from the kid who’s rarely been outside of his own neighborhood. I survey them again at the end of the year, and they’re always amazed at the ways their opinions have shifted or not shifted at all. Regardless, they all have a lot more knowledge to use to support their opinions. And isn’t that a major goal in world history?” Of course, we know that effective teachers informally assess the accrual of background knowledge daily, via discussion, writing-to-learn prompts, and projects. Not a day should go by when the teacher is fuzzy on how the day’s teaching was understood by students.

**Examining Background Knowledge:**
**Tools for Analysis**

As we have noted, assessing background knowledge involves closely examining what students know to inform instruction. While anticipation guides and opinionnaires are useful for the broad strokes of assessment, finer tools are needed for systematic analysis of individual students’ background knowledge. Many school districts require that certain assessments be administered at the beginning of the school year in order to obtain informa-
tion about the skills each student possesses. For instance, many primary teachers collect reading assessment data using tools such as the Benchmark Assessment System (Fountas and Pinnell 2007), which is individually administered. The student reads a book while the teacher records errors on a scoring sheet. After the reading, the teacher and child discuss the content of the story. The teacher analyzes the resulting data using the guidelines included with the instrument to gain a sense of how the student uses graphophonic, semantic, and syntactic cueing systems to read and understand text. Teachers of older students may rely on informal reading inventories such as the Qualitative Reading Inventory—4 (Leslie and Caldwell 2005). These normed narrative and expository grade-level passages provide teachers with processes for assessing both silent and oral reading, as well as comprehension. Like the Benchmark Assessment System, these are individually administered.

However, these are much less common at the secondary level because of the class size of most classrooms. It is not possible for teachers to administer so many individual assessments that are this time-consuming; for the most part, they are reserved as diagnostic tools for students who are working well below grade level. Fortunately, there are instruments and techniques that can provide secondary teachers with a level of analysis for assessing what students know.

Shaqura Williams, a middle school English teacher, understands that her classroom is a place for students to learn about themselves as readers. She structures her course around literature circles (Daniels 2002) in order to differentiate texts to better meet the range of abilities in her class. Of course literature circles or book clubs can be used across content areas. Our colleague Maria Grant has groups of her chemistry students read in clubs like this to deepen their understanding of scientific discovery.

But back to Shaqura. She typically begins each class with a shared reading and think-aloud so that she can model her expert use of comprehension strategies, show how she comprehends new vocabulary, and demonstrate how she uses text structures and text features to aid in her understanding of the text (Fisher, Frey, and Lapp 2008). Her students then move to their literature circle groups, where they read and discuss a thematically related text using some of the same techniques modeled by their teacher. Given that the range of possible strategies is so large, Shaqura needed a way to analyze what her students did and did not need to have modeled. In addition, she wanted to determine their level of awareness, or
metacognition, in order to better understand what they knew about themselves as readers.

Metacognition is a learner’s ability to describe his thinking and to monitor it (National Research Council 2000; Schmitt and Hopkins 1993). It is also a marker of what divides the novice from the expert (Ericsson and Charness 1994). While a middle school reader might not be described as an expert, there is evidence that there is a strong link between metacognitive awareness and reading ability (Cross and Paris 1988). Shaqura decided to use a tool called the Metacomprehension Strategies Index (Schmitt 1990) to analyze the ability of her students to notice their own reading processes (see Figure 3.8). The MSI is a twenty-five-item assessment that can be administered in one session. Students respond to questions about their reading, choosing the best answer from a set of four.

After collecting the results of the assessment, Shaqura analyzed it using the interpretation guidelines suggested by the author. She created a spreadsheet that gave her results by period and by individual student, and then she used this information to plan her modeling. She also used the results to confer with individual students who were having difficulty calling upon comprehension strategies to read challenging text, allowing her to further differentiate her instruction during literature circles. Thus background knowledge, in this case about strategic reading, significantly influenced the content of what was taught to which students.

The MSI is useful in an English class because it is reflective of the content taught. That being said, there isn’t a similar instrument for every discipline. This doesn’t mean that content knowledge can’t be assessed in other ways. One of the most useful and easily analyzed assessments for determining background knowledge is the cloze procedure. Originally developed as a measure of determining readability of text (Taylor 1953), the procedure was soon being used to determine levels of comprehension (e.g., Shanahan, Kamil, and Tobin 1982).

A cloze procedure, so named because of the closure effect prompted by the task, consists of a teacher-selected passage of 250 words. Every fifth word is deleted, and the first and last sentences are preserved in their entirety so that the reader can draw on context. This means that a variety of words end up being deleted—articles like a and the as well as content vocabulary. Students read the passage and fill in the missing words. Scoring is straightforward as well, with most sources recommending that a word be marked as correct only if it is an exact match. This may seem counterintuitive, but it
Name: ___________________________ Date: ___________________________

Metacognition Strategy Index

Directions: Think about what kinds of things you can do to help you understand a story better before, during, and after you read it. Read each of the lists of four statements and decide which one of them would help you the most. Circle the letter of the statement you choose.

1. In each set of four, choose the one statement that tells a good thing to do to help you understand a story better before you read it.
   1. Before I begin reading, it's a good idea to:
      A. See how many pages are in the story.
      B. Look up all of the big words in the dictionary.
      C. Make some guesses about what I think will happen in the story.
      D. Think about what has happened so far in the story.

2. Before I begin reading, it's a good idea to:
   A. Look at the pictures to see what the story is about.
   B. Decide how long it will take me to read the story.
   C. Sound out the words I don't know.
   D. Check to see if the story is making sense.

3. Before I begin reading, it's a good idea to:
   A. Ask someone to read the story to me.
   B. Read the title to see what the story is about.
   C. Check to see if most of the words have long or short vowels in them.
   D. Check to see if the pictures are in order and make sense.

4. Before I begin reading, it's a good idea to:
   A. Check to see that no pages are missing.
   B. Make a list of words I'm not sure about.
   C. Use the title and pictures to help me make guesses about what will happen in the story.
   D. Read the last sentence so I will know how the story ends.

5. Before I begin reading, it's a good idea to:
   A. Decide on why I am going to read the story.
   B. Use the difficult words to help me make guesses about what will happen in the story.
   C. Reread some parts to see if I can figure out what is happening if things aren't making sense.
   D. Ask for help with the difficult words.

6. Before I begin reading, it's a good idea to:
   A. Retell all of the main points that have happened so far.
   B. Ask myself questions that I would like to have answered in the story.
   C. Think about the meaning of the words that have more than one meaning.
   D. Look through the story to find all of the words with three or more syllables.

7. Before I begin reading, it's a good idea to:
   A. Check to see if I have read this story before.
   B. Use my questions and guesses as a reason for reading the story.
   C. Make sure I can pronounce all of the words before I start.
   D. Think of a better title for the story.

8. Before I begin reading, it's a good idea to:
   A. Think of what I already know about the things I see in the pictures.
   B. See how many pages are in the story.
   C. Choose the best part of the story to read again.
   D. Read the story aloud to someone.

Figure 3.8 Metacognition Strategy Index (Schmitt 1990)
9. Before I begin reading, it's a good idea to:
   A. Practice reading the story out loud.
   B. Retell all of the main points to make sure I can remember the story.
   C. Think of what the people in the story might be like.
   D. Decide if I have enough time to read the story.

10. Before I begin reading, it's a good idea to:
    A. Check to see if I am understanding the story so far.
    B. Check to see if the words have more than one meaning.
    C. Think about where the story might be taking place.
    D. List all of the important details.

II. In each set of four, choose the one statement that tells a good thing to do to help you understand a story better while you are reading it.

11. While I am reading, it’s a good idea to:
    A. Read the story very slowly so that I will not miss any important parts.
    B. Read the title to see what the story is about.
    C. Check to see if the pictures have anything missing.
    D. Check to see if the story is making sense by seeing if I can tell what’s happened so far.

12. While I am reading, it’s a good idea to:
    A. Stop to retell the main points to see if I am understanding what has happened so far.
    B. Read the story quickly so that I can find out what happened.
    C. Read only the beginning and the end of the story to find out what it is about.
    D. Skip the parts that are too difficult for me.

13. While I am reading, it’s a good idea to:
    A. Look all of the big words up in the dictionary.
    B. Put the book away and find another one if things aren’t making sense.
    C. Keep thinking about the title and the pictures to help me decide what is going to happen next.
    D. Keep track of how many pages I have left to read.

14. While I am reading, it’s a good idea to:
    A. Keep track of how long it is taking me to read the story.
    B. Check to see if I can answer any of the questions I asked before I started reading.
    C. Read the title to see what the story is going to be about.
    D. Add the missing details to the pictures.

15. While I am reading, it’s a good idea to:
    A. Have someone read the story aloud to me.
    B. Keep track of how many pages I have read.
    C. List the story’s main character.
    D. Check to see if my guesses are right or wrong.

16. While I am reading, it’s a good idea to:
    A. Check to see that the characters are real.
    B. Make a lot of guesses about what is going to happen next.
    C. Not look at the pictures because they might confuse me.
    D. Read the story aloud to someone.

17. While I am reading, it’s a good idea to:
    A. Try to answer the questions I asked myself.
    B. Try not to confuse what I already know with what I am reading about.
    C. Read the story silently.
    D. Check to see if I am saying the new vocabulary words correctly.

Figure 3.8 Metacognition Strategy Index (continued)
18. While I am reading, it is a good idea to:
   A. Try to see if my guesses are going to be right or wrong.
   B. Reread to be sure I haven’t missed any of the words.
   C. Decide on why I am reading the story.
   D. List what happened first, second, third, and so on.

19. While I am reading, it is a good idea to:
   A. See if I can recognize the new vocabulary words.
   B. Be careful not to skip any parts of the story.
   C. Check to see how many of the words I already know.
   D. Keep thinking of what I already know about the things and ideas in the story to help me decide what is going to happen.

20. While I am reading, it’s a good idea to:
   A. Reread some parts or read ahead to see if I can figure out what is happening if things aren’t making sense.
   B. Take my time reading so that I can be sure I understand what is happening.
   C. Change the ending so that it makes sense.
   D. Check to see if there are enough pictures to help make the story ideas clear.

III. In each set of four, choose the one statement that tells a good thing to do to help you understand a story better after you have read it.

21. After I’ve read a story, it’s a good idea to:
   A. Count how many pages I read with no mistakes.
   B. Check to see if there were enough pictures to go with the story to make it interesting.
   C. Check to see if I met my purpose for reading the story.
   D. Underline the causes and effects.

22. After I’ve read a story, it’s a good idea to:
   A. Underline the main idea.
   B. Retell the main points of the whole story so that I can check to see if I understood it.
   C. Read the story again to be sure I said all of the words right.
   D. Practice reading the story aloud.

23. After I’ve read a story, it’s a good idea to:
   A. Read the title and look over the story to see what it is about.
   B. Check to see if I skipped any of the vocabulary words.
   C. Think about what made me make good or bad predictions.
   D. Make a guess about what will happen next in the story.

24. After I’ve read a story, it’s a good idea to:
   A. Look up all of the big words in the dictionary.
   B. Read the best parts aloud.
   C. Have someone read the story aloud to me.
   D. Think about how the story was like things I already knew about before I started reading.

25. After I’ve read a story, it’s a good idea to:
   A. Think about how I would have acted if I were the main character in the story.
   B. Practice reading the story silently for practice of good reading.
   C. Look over the story title and pictures to see what will happen.
   D. Make a list of the things I understood the most.

**Figure 3.8** Metacognition Strategy Index (continued)
Interpreting the Results of the Metacomprehension Strategies Index

The MSI is a measure of a student’s use of strategies with narrative text. It may be read to the student or administered silently. The wording of the items can be substituted to reflect expository text. For example, you can replace the wording of item 2 to read:

Before I begin reading, it’s a good idea to:
A. Look at the illustrations to see what the chapter will be about.
B. Decide how long it will take for me to read the chapter.
C. Sound out the words I don’t know.
D. Check to see if the information is making sense.

Answer Key: These answers represent the best answers; items may include strategies that are somewhat useful but not as efficient for the situation described.

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Figure 3.8 Metacognition Strategy Index (continued)

really does make scoring easier and consistent across students. The scale reflects the variation in word selection that will occur:

- **Independent Level**: 60 percent correct or above
- **Instructional Level**: 40 to 59 percent correct
- **Frustration Level**: 39 percent correct or below

Because a cloze procedure is easy to develop and score, it is ideally suited to content area classrooms. We recommend that cloze assessments be administered before instruction begins to ascertain background knowledge of students. If the text is drawn directly from reading materials the students will use, it can serve the dual purpose of measuring text readability as well as content knowledge. This is especially valuable when there is a wide range of reading ability in your classroom.

Aaron Grayson used a cloze assessment before each unit of instruction in his civics course. He selected a passage from the textbook, looking for a
Interpreting: The following item analysis is organized to more fully describe the types of metacomprehension strategies tested.

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Items</th>
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<tbody>
<tr>
<td>Predicting and Verifying</td>
<td>1, 4, 13, 15, 16, 18, 23</td>
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<tr>
<td>Predicting and verifying the content of a story promotes active comprehension by giving readers a purpose to read (i.e., to verify predictions). Evaluating predictions and generating new ones as necessary enhance the constructive nature of the reading process.</td>
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<tr>
<td>Previewing</td>
<td>2, 3</td>
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<tr>
<td>Previewing the text facilitates comprehension by activating background knowledge and providing information for making predictions.</td>
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<tr>
<td>Purpose Setting</td>
<td>5, 7, 21</td>
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<tr>
<td>Reading with purpose promotes active, strategic reading.</td>
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<tr>
<td>Self-Questioning</td>
<td>6, 14, 17</td>
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<tr>
<td>Generating questions to be answered promotes active comprehension by giving readers a purpose for reading (i.e., to answer questions).</td>
<td></td>
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<tr>
<td>Drawing from Background Knowledge</td>
<td>8, 9, 10, 19, 24, 25</td>
</tr>
<tr>
<td>Activating and incorporating information from background knowledge contributes to comprehension by helping readers make inferences and generate predictions.</td>
<td></td>
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<tr>
<td>Summarizing and Applying Fix-Up Strategies</td>
<td>11, 12, 20, 22</td>
</tr>
<tr>
<td>Summarizing the content at various points in the story serves as a form of comprehension monitoring. Rereading or suspending judgment and reading on when comprehension breaks down represent strategic reading.</td>
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Figure 3.8 Metacognition Strategy Index (continued)

section that contained both new content and previously taught concepts. After preparing the passage, he distributed it to his students (see Figure 3.9 for an example from Remy et al. [2003]). “You’re pros at this by now,” he said to one class, “but I still want to remind you of some good strategies to use. Remember to read the passage all the way through before answering. That gives you some contextual clues. And remember that you can skip one and go back to answer it later,” he continued. “Finally, remember that this isn’t a test; this is part of your participation in the class. I use the results to get a good idea of what you know and don’t know. Go ahead and begin.”
Market Economies

Not all economic systems are alike. Some, like the one in the United States, are based on markets. Others, like China's, include far greater government control. These different economies deal with scarcity in different ways. Societies face the basic questions of what to produce, how to produce it, and whom to produce it for. The way these questions are answered determines a society's economic system. In a pure market economy, these decisions are made in free markets based on the interaction of supply and demand. Capitalism is another name for this system.

One of the chief characteristics of a market economy is that private ownership—not the government—own the factors of production. As you recall, these factors include natural resources, capital, labor, and entrepreneurship. Because the factors of production are in private hands, a market economy offers a degree of individual freedom. Businesses make their own decisions regarding what to produce, how to produce it, and for whom to produce it. Driving these decisions is the business owner's desire to earn a profit. At the same time, consumers make their own decisions about what to buy.

In a market economy, these decisions take place in the marketplace. Supply and demand interact to set prices, and producers and consumers base their decisions on prices.

Market economy is decentralized; decisions are made by all the people in the economy and not by a few. The economy seems to run by itself; no one coordinates these decisions.

There are no pure market economies in the world. In the United States, for example, government provides public goods such as defense and a system of justice.

1. in
2. based
3. China's
4. control
5. with
6. All
7. questions
8. how
9. for
10. The
11. answered
12. system
13. economy
14. in
15. the
16. demand
17. for
18. the
19. market
20. citizens
21. factors
22. recall
23. resources
24. autonomy
25. are
26. market
27. degree
28. make
29. what
30. produce
31. to
32. decisions
33. owner's
34. goal
35. make
36. about
37. a
38. take
39. Supply
40. prices
41. their
42. A
43. That
44. by
45. the
46. just
47. seems
48. because
49. decisions
50. market

Figure 3.9 Close assessment in civics

Students began reading the passage silently, and within a few minutes they were writing terms on notebook paper. Aaron chose this passage because it required them to use their background knowledge about factors of production, which they had covered in a previous unit. It also contained new information about market economies, which he had alluded to but not yet taught. In addition, he planned on analyzing the results of Antonio's work more closely than the rest. Because Antonio was new to the class, Aaron did not yet have a good sense of his reading ability or knowledge of civics, and this would be an ideal opportunity to find out about both. He
was pleased with the content vocabulary that they would need to successfully complete it, with words like *entrepreneurship, supply, consumers,* and *production* missing from the passage. When he first began using the cloze procedure, he thought that it would be better if he chose the deleted words. However, he quickly discovered that the results from deleting every fifth word worked just fine. He made a mental note to include this passage again on the unit test, since that would give him some valuable postinstruction information to compare.

Of course, cloze procedures, like the other assessment tools we’ve discussed in this chapter, are not limited to use in the social studies classroom. Our colleagues in chemistry, Spanish, and art history have all used cloze to assess their students’ background knowledge.

Interest surveys have been used in marketing research since the early twentieth century as a means for determining product design and advertising. They are widely used in assisting people with career choices, and corporations use them frequently with their employees to determine need and improve the workplace to increase retention. Yet outside of reading selections, interest surveys are rarely used in secondary education. Perhaps we are intimidated by what we may discover—what if they’re not interested in our class? As well, we may feel as though we have little influence over what gets taught, since standards-based textbooks and tests define most curricula. Yet interest greatly influences learning, as it is a mixture of subject knowledge (Is the topic interesting?) and situational context (Is the task interesting?) (Deci and Ryan 1985). Therefore, understanding what topics and activities are of interest to your students can boost learning, and knowing what they’re not interested in can be helpful as well. It’s not a license, of course, to skip “the boring stuff,” but it is a heads-up that you may need to pay more attention to the learning experiences designed around a particular topic.

Tenth-grade biology teacher Tiffany Glass has a good sense of the topics that most interest her students, but it doesn’t mean that she takes it for granted. “Anything about sex and reproduction is always a winner with everyone,” she shared. “But after that, it varies quite a bit.” As a science educator, she is concerned with fostering more interest in the sciences among females and traditionally underrepresented students, and she sponsors an after-school science club. She also keeps up with research findings on this topic and read with interest the reported findings of the international Relevance of Science Education (ROSE) survey conducted with more than
Rate These Topics!

**Directions:** I am designing several mini-units for you to explore this year, but first I need some help. On a scale of 1–4, please rate your interest in these topics.

1: I’m there—sign me up!
2: This sounds interesting and I would possibly choose this.
3: Only if I have to.
4: Not a million years!

<table>
<thead>
<tr>
<th>Topic</th>
<th>1</th>
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<tr>
<td>What are the causes and effects of eating disorders (anorexia, bulimia)?</td>
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<td>What happens after something dies?</td>
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<td>What are the effects of poisons on the body?</td>
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<td>What are the advances in cancer treatment?</td>
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<td>Why do some brain injuries result in behavior changes, while others don’t?</td>
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<td>What’s the debate on stem cell research?</td>
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<td>How do epidemics (black plague, bird flu) spread?</td>
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<td>What contributes to the loss of endangered species?</td>
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<td>How does war advance biotechnology?</td>
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<td>What are the effects of radiation on the body?</td>
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<td>How close are we to a vaccine for HIV/AIDS?</td>
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<td>Why don’t hereditary diseases like cystic fibrosis ever disappear?</td>
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<td>How can organisms tolerate the hottest, coldest, wettest, and driest places on Earth?</td>
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<td>Does everyone really have a twin?</td>
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*Figure 3.10 Interest survey in biology*
twelve hundred European adolescents (Elster 2007). The findings confirmed many observations she had made on her own through her years of teaching—namely, the girls in the study showed a higher interest in life sciences topics related to health (especially cancer, AIDS/HIV, and bulimia) while boys as a group were more interested in physical and technological science topics (especially atomic bombs and explosive chemicals) and had less interest in the life sciences overall.

Inspired by this study, Tiffany designed her own interest survey modeled on the ROSE instrument. She began with the standards document and her curricular materials and crafted statements for students to respond to (see Figure 3.10). She asked students in each of her periods to complete the survey anonymously. She used the results to design choice research activities throughout the year. For example, she had a strong response to the item “Why don’t hereditary diseases like cystic fibrosis ever disappear?” and designed an activity that gave these students an opportunity to apply what they had learned about the Hardy-Weinberg principle of population equilibrium to the study of recessive mutation. “Finding out about their interests inspired me to get creative about my teaching,” she told us. “This has been a great way to witness the ways to use what they’re learning in meaningful ways.”

■ Conclusion

As we have noted, background knowledge is linked with student achievement. It’s a major contributor to student understanding and reading comprehension. Naturally, students have different sets of background knowledge based on their previous schooling and life experiences. The first step in developing and activating background knowledge is assessment. Teachers must first assess the content to determine which knowledge is core and which is incidental. From there, teachers must determine the knowledge their students already have—and the gaps in their current content knowledge. We’ve provided a number of tools that you can use to uncover students’ background knowledge including anticipation guides, opinionnaires, cloze assessments, and interest surveys. Armed with information about the demands of the content and what students already know, you’ll be ready to focus on activating the knowledge students already have.
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