

Middle and high school teachers across the curriculum face the challenge of helping their students comprehend their subject area texts, which can be particularly difficult for those students who lack the literacy skills to succeed academically. This urgent challenge means that reading, writing, and thinking must be developed in every middle school and secondary classroom. We believe that it's you, the middle school or secondary teacher, who can make a difference in student success. For this reason, we offer this concise text with instructional routines that will allow you to develop the literacy skills students need to comprehend course content, no matter what content area or elective you teach.

New to This Edition

This decade has been an exciting one for those interested in adolescent literacy issues. The field emerged in the 1970s with the work of Hal Herber and his associates, who developed the field of content area reading and writing. In its early days, content area literacy was conceived as an approach that infused specific strategies into instruction when possible. In turn, this was expanded through the Writing Across the Curriculum movement that began in colleges and filtered to middle and high school classes. What has become clear in this decade is that adolescent literacy is not an add-on to content instruction, but is central to learning. This edition seeks to incorporate this stance. Here are changes that you can look forward to in this book:

1. *A new organization for the content* that focuses on the ways in which teachers can use reading, writing, speaking, and listening in their classes. The chapters range from reading and comprehending texts to creating graphic organizers to developing vocabulary knowledge to writing to learn. In each chapter, we provide examples from science, history/social studies, mathematics, English, and electives.
2. *New classroom examples.* In each chapter, we have new examples from our own teaching and our coworkers' teaching at Health Sciences High School. These examples include the use of technology and media as well as the impact that these approaches have on students who struggle in school.
3. *New instructional routines,* such as close reading and annotation, have been added to this book to provide all teachers with information about the ways in which students can be taught to engage with complex texts. Deepening interactions with texts is a theme that now runs through all of the chapters, which should result in students who can engage with texts and peers on a wider range of topics and ideas.
4. *Updated research base.* Although the tried and true structure of this book remains the same and we continue to focus on the same core ideas that were presented in the first edition, we have updated the research base for each of the chapters, providing readers with current sources of support and additional reading.

Text Organization

This book is organized into seven chapters. In Chapter 1, we introduce critical goals for adolescent literacy and a rationale for your involvement in improving adolescents' access to literacy. We also introduce a number of grouping and instructional strategies useful in engaging all students in their own learning. In addition, this chapter offers guidance and insight into the standards and assessments that hold middle school and secondary teachers accountable for student proficiency. We focus especially on the use of formative assessments and the ways in which teachers can use reading, writing, speaking, and listening to determine students' understanding.

Chapters 2 through 7 present sound, core instructional strategies that develop lifelong literacy skills and allow students to access text. The purpose of each of these key strategies is to enhance students' comprehension of the content—the ultimate goal of all educators—and develop students' access to vocabulary.

The core strategies covered in chapters 2 through 7 include the following:

- Discussion and questioning techniques (Chapter 2)
- Read alouds, shared reading, and close reading (Chapter 3)
- Vocabulary instruction (Chapter 4)
- Graphic organizers (Chapter 5)
- Notetaking and note making (Chapter 6)
- Writing to learn (Chapter 7)

Each of these chapters opens with a vignette, modeling how the instructional approach is implemented in an actual adolescent classroom. These scenarios are followed by a rationale for each strategy as well as the research base that supports its use. Each chapter ends with an example of the strategy being used in English, science, social studies, mathematics, and elective classes.

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We would also like to thank the reviewers who offered their thoughtful comments as this work progressed. Their feedback made this a better book and we thank them for that: Alysia J. Backman, Literacy Coach, South Burlington High School; Margaret Berg, University of Northern Colorado; John Bishop, University of Southern Mississippi; Glenda Moss, University of North Texas at Dallas; and Michelle L. Page, University of Minnesota-Morris. Previous edition reviewers include Linda Cole, The Barrie School; Karen Ford, Ball State University; Gay Ivey, James Madison University; Courtney Kelly, Manhattanville College; Margot Kinberg, National University; Valerie Kinloch, The Ohio State University; and Scott R. Popplewell, Ball State University.

Douglas Fisher & Nancy Frey

Make Content Area Strategies Work for You



As your eyes pass over these little squiggle marks, consider the amazing feat you're accomplishing. Small ink marks are being transferred from the page or screen through your eyes to your brain. Once there, your brain makes a series of connections such that you make sense of the ideas on the page or screen. It's amazing really, and it's how we learn. Humans learn through language. When we read, write, speak, listen, and view, we learn, and it's why we wrote this book. We want to ensure that middle and high school students have opportunities to use language to learn the amazing content introduced to them in school. Whether that content is in the form of a 15th-century sonnet, an experiment in physics, the analysis of a jazz composition, or perfecting a free throw, language is involved in learning.

As a case in point, let's venture into a social studies classroom. As you read about Ms. Johnson's class, think about the reading, writing, speaking, listening, and viewing students do, all in service of learning history.

The students in this class are studying the rise of industrialization and immigration at the turn of the 20th century. These dual trends intersected tragically in the sinking of RMS Titanic on Sunday, April 14, 1912. Ms. Johnson uses digital reproductions of newspaper accounts from the

LEARNING OBJECTIVES

1. Describe how the responsibility for learning should be shifted from teacher to students and how teaching is different from learning.
2. Explain the features of sound classroom assessment practices.
3. Compare and contrast the types of informal assessments.
4. Summarize the uses of various formal assessments and the ways they work.
5. List the ways in which the results of formal assessments are best used.
6. Describe different ways the results of informal assessments can be used.
7. Explain how instruction and assessment are linked.

era, including the *St. Louis Dispatch* and the *New York Tribune*. Students will also read modern accounts of the event and an article on the recovery effort.

Ms. Johnson asks the class, “After viewing the video presentation of the Titanic accident, what are your thoughts about this tragedy? Write all you know. You have five minutes.” Ms. Johnson calls time, and the students share what they have written with peers and then begin to brainstorm their collective prior knowledge. Ms. Johnson follows with the question, “What would you like to know about the Titanic?” The students write their questions for later inquiry after reading the newspaper accounts. In the meantime, she invites students to share their questions as she records them on the board.

Anna reads her question, “Why didn’t they listen to the warnings? Why didn’t they look hard enough for an iceberg?”

Isaac asks, “What did they do to the ship that made them think it was unsinkable? How long does it take an iceberg to disappear?”

“I want to know, why didn’t they have enough life boats for everyone?” asks Cesar.

Marco adds, “Who were some of the people in first class? I would like to know about them.”

Latasha wonders, “Who were the survivors and are they still alive? Are they scared to go on trips in a boat?”

“Whose fault was it?” asks Josie.

Next, Ms. Johnson introduces relevant vocabulary, including *steerage*, *panic*, *transmit*, *SOS*, and *dispatch*, all of which appear in the news articles. She constructs a concept map to visually represent both the definitions and relationships among the target words. She also reviews the organization of the texts they are about to read. “We will read and question the text, so that we can build an understanding of the human experience in this tragic event.” She adds, “Newspaper text is often organized in a temporal sequence that tells a chronological description of events. We will pay close attention to see how this structure is used in the articles.” In addition, two other articles analyze the event using the research conducted at the wreckage site decades later. She explains that these texts are organized for cause and effect. To help students differentiate cause from effect, Ms. Johnson points out that a cause may have one or more effects and an effect may have one or more causes.

Then she posts springboard questions taken from students’ queries to stimulate the practice of searching for evidence:

- Why didn’t Captain Smith want the crew to announce that the ship was sinking?
- Why did Jack Phillips, the radio operator, think the disaster was his fault?
- What does SOS signify? What signal did it replace?
- Why did it take so many years for anyone to reach the wreck of the Titanic?

Ms. Johnson reads aloud the first news report, titled “‘Save Our Souls’ Was Titanic’s Last Appeal.” She encourages her students to follow the way she constructs meaning using three central questions: What do I think about this? Why do I think so? How I can prove it? She guides the students using a think-aloud approach to model her thinking processes, as well as purposeful questioning to structure their thinking such that parts of the new text confirm or challenge their prior knowledge. This directed questioning guides the students for their independent reading and leads them toward higher-level thinking.

After her guided preparation, the students participate in a pair-share reading of their assigned news articles. Chunks of text on the same topic will be interpreted using the springboard questions, and she directs them to consider the questions they initially wrote for themselves. As the partners read and discuss, Ms. Johnson monitors the students to formatively assess individual levels of understanding.

Shifting Responsibility from Teacher to Students

Over the course of the lesson, Ms. Johnson's teaching role is shifting from taking the lead on generating questions to one in which she fosters students' own inquiries. In order to do so, she advises them to use a time line or graphic organizer so they can see the sequence of details and again directs the students to the posted springboard questions. The students are guided to read inferentially because the answers to their questions are not always explicitly stated. She reminds them, "*Implicit* means you have to link main ideas with supportive or specific details to arrive at an answer. When you connect ideas with details to find the answer, you become a critical thinker."

After reading, the students review their answers to verify their understanding and accuracy. Their responses are shared in a whole-class guided discussion. The conversation focuses on the participants' roles. Ms. Johnson points out that the common link in the series of events that led to the sinking of the *Titanic* and its aftermath is human error. Students support their claims with evidence from the texts, and their written responses serve as talking points for their conversations. Ms. Johnson requires students to apply what they know, in this case by writing. She assigns them the role of journalists. As reporters, the students are to write news articles on the effects of the *Titanic's* sinking on the world today. In applying what they learned to a new situation, the students develop an extended perspective of their knowledge.

Having read about the students' experiences in Ms. Johnson's class, think about how their understanding would be different—compromised even—had they simply been told the information about the *Titanic*, rather than experiencing it through all of the various aspects of language. Listening is one aspect of language, but not the only one. If students are to reach high levels of achievement and understanding, both in terms of literacy and content knowledge, they have to read, write, speak, listen, and view on a daily basis.

Check Your Understanding 1.1



Video 1.1

In this video, Nancy discusses releasing responsibility from the teacher to the students.

Transparent Teaching and Transportable Learning

The instructional routines outlined in this book are designed to fit easily into the school day. Although we identify them as "literacy strategies," most could really be called "content area instructional approaches." Each of the routines that we profile in this book has a research base and a practical foundation for ensuring that students understand the content they are being taught. Students need guidance

through informational texts, not simply an assignment to “read pages 118 to 132 for homework tonight.” We like to think of these literacy strategies as being transportable across content areas. What we mean is that each is flexible enough to be applied to a variety of learning situations. For example, a strategy becomes transportable for a student when she uses vocabulary structural analysis skills learned during a history lesson on the *antebellum* era to figure out what *antecedents* are in her psychology class.

Another important goal of content literacy instruction is that, over time, these strategies become transparent to learners. As teachers, we are thrilled when we hear students murmur in recognition when we speak of graphic organizers or anticipation guides. It tells us that our colleagues have done a great job in creating a common vocabulary across the content areas. It also means that when we collectively teach these strategies, we end up spending less time mired in the mechanics of getting the lesson under way. Setting up a graphic organizer becomes an instructional routine that takes seconds, rather than half the period. In other words, it allows us to capitalize on an instructional shorthand that gives us more time to actually teach the content. Ultimately, we hope that these strategies are transparent in our students’ learning lives as they become aware of how they learn.

But instructional strategies alone are insufficient if they are not paired with the habit of seeking out evidence of student learning. And most importantly, they have to work for you, such that you can maximize your own teaching effectiveness. Ms. Johnson wasn’t just stringing together a series of instructional strategies to keep her students engaged; she used the data informally generated from these events to make decisions about her teaching. She observed learners, listening closely to the content of their questions. She gave students reasons to write and to visualize their thinking in the form of time lines so that she could determine whether they were making progress. The practice of regularly assessing student learning using both informal and formal tools can generate the data we need to make informed instructional decisions. We’ll be more emphatic: assessment takes the guesswork out of teaching.

Distinguishing Teaching from Learning

How will you know if your students have learned anything? How will you know if your students can use the strategies you have taught them? Naturally, you will assess them using a variety of informal and formal assessments. It is the act of assessment that distinguishes teaching from learning, because it is the teacher’s way of ascertaining whether learning has in fact taken place. In other words, it is insufficient to simply say, “Well, I taught them this content last week, so by now they must know it.” The various reading, writing, speaking, listening, and viewing tasks outlined in this book provide pathways for instruction, but they can also yield valuable data about students’ learning that you can use to determine understanding and guide future instruction.

But what kind of assessment is best suited for teaching? It all comes down to purpose. Students are assessed for a variety of reasons, including:

- diagnosing individual student needs (e.g., assessing developmental status, monitoring and communicating student progress, certifying competency, determining needs);

 **Struggling Readers
Are a Diverse Group**

- informing instruction (e.g., evaluating instruction, modifying instructional strategies, identifying instructional needs);
- evaluating programs; and
- providing accountability information. (Lapp, Fisher, Flood, & Cabello, 2001, p. 7)

The first two purposes mirror the reasons we assess for classroom instruction, while the latter two purposes are primarily used by schools and districts for long-term decision making. Of course, there are many types of assessments. Table 1.1 provides an overview of the various types of informal and formal assessments that teachers and schools use.

 **Check Your Understanding 1.2**

TABLE 1.1 Guide to Informal and Formal Assessments

INFORMAL ASSESSMENTS		
Type of Tool	Purpose	Administration
<i>Observation</i>	Gathers information about a student's academic, behavioral, or social skills in an authentic setting.	Teacher records observational data in anecdotal notes, journals, or daily logs.
<i>Portfolio</i>	Provides evidence of a student's academic growth through the collection of work samples.	Student and teacher select representative samples of student work for display in a binder or other organizer.
<i>Inventory</i>	Documents student use of specified skills during a single observation.	A commercially or teacher-produced form of observable behaviors, completed by the teacher.
<i>Conference</i>	Involves the student in direct feedback to the teacher in a one-to-one discussion.	Often scheduled by teacher at regular intervals to gauge progress on more complex academic behaviors, such as reading comprehension.
<i>Self-assessment</i>	Allows student to engage in reflective learning.	Student assesses his or her own academic performance using an age-appropriate checklist of indicators.
<i>Survey</i>	Collects student feedback about interests, prior knowledge, or motivation about a topic.	Student completes a commercially or teacher-produced survey of items.
FORMAL ASSESSMENTS		
Type of Test	Purpose	Administration
<i>Standardized</i>	Yields a student's academic performance ranking compared to a normed sample of students.	Schedule determined by state and local agencies; often yearly. Tests are usually timed and have strict protocols.
<i>Criterion Referenced</i>	Measures a student's performance compared to a set of academic skills or objectives. Scores are reported as the proportion of correct answers.	Tests may be untimed or timed. May be administered annually or more frequently.

Classroom Assessment Practices

Assessments are the link between teaching and learning. This concept lies at the heart of teaching because our classrooms are based on learner-centered instruction. This means the teacher doesn't merely march lockstep through the content of a standards-based curriculum but rather balances the content with the needs of the learner. These needs are identified through ongoing assessment that is linked to subsequent instruction. In this model, assessment and instruction are considered to be recursive because they repeat as students learn new content. In learner-centered classrooms, teachers first assess to establish what students know and do not know, then plan instruction based on this information. Next, they deliver the instruction they have designed and observe how learners respond. Based on these observations, educators reflect on the results and assess again to determine what needs to be taught next.

This model may sound as though it would take a lot of time to complete; in fact, effective teachers perform these complex tasks rapidly. In well-organized classrooms, informal assessment happens throughout the day as teachers use questioning, discussions, and assignments to measure progress. In addition, teachers administer assessments to monitor progress and formulate future instruction. This book is filled with content area instructional routines that are transparent and transportable for learners. But the value of these strategies is undermined for the teacher if they are utilized without purpose and if the formative assessment data they offer are left untouched. Therefore, the first step is selecting the correct assessment to match one's purpose.

Selecting the Right Assessment

The usefulness of every assessment is dependent on a proper fit between purpose and type of assessment used. It is important to remember that every assessment is useful and not useful *at the same time*. Any given assessment is useful in the hands of a conscientious educator who understands the limitations of the tool being used. Any given assessment is useless if the results are misunderstood or if it is used incorrectly to demonstrate something it was not intended to show. You would be very suspicious of a doctor who ordered a chest X-ray when you were seeking help for a sprained ankle. There is nothing inherently wrong with a chest X-ray; it is simply the wrong test for the task. In the same regard, the type of learning assessment selected must match its intended use.

Guillaume (2004) offers these considerations for selecting an assessment. Each assessment needs to be:

- tied to your stance on learning;
- driven by learning goals;
- systematic;
- tied to instruction;
- inclusive of the learner; and
- integrated into a manageable system. (p. 131)

Tied to Your Stance on Learning. Every teacher brings a philosophy of education and a view of literacy to his or her practice. It is important to recognize how assessment choices fit into that perspective. For example, an educator who

possesses a viewpoint of learning as a developmental phenomenon will be interested in assessment instruments that reflect benchmarks of developmental phases of learning. Teachers with a skills-based orientation will find skills measures to be useful.

Driven by Learning Goals. Assessments used should be consistent with state content standards for the grade level. As teachers, we need to regularly assess students' understanding of the content and determine appropriate goals for students to master.

Systematic. Teachers select assessments that can be administered and analyzed in systematic ways at both the individual and class levels. Good assessments should contain data recording protocols that make it easy for the teacher to interpret the information at a later date. In addition, the teacher must determine how often assessments will be administered. Finally, each assessment should measure what it purports to measure (valid) and yield results that are consistent across administrations and assessors (reliable).

Tied to Instruction. Although this seems apparent, it is worth stating again. Assessment should be linked directly to instruction, either to determine what should be taught next (pretesting) or to check for understanding of skills or strategies that have just been taught (posttesting). Assessments that are not connected to instruction are likely to be frustrating for students because they appear purposeless and inadequate for teachers because they do not provide relevant information.

Inclusive of the Learner. Assessments are intended to be completed in conjunction with the needs of the learner. Most of the assessments in this chapter are not completed in isolation by students who then return the completed tests to the teacher. Instead, these assessments are designed to capture the work of children in the act of learning. Whether through listening to a student reading text or using a rubric to discuss a student's writing, these tools are intended to involve learners in their own measures of progress.

Integrated into a Manageable System. No teacher can devote all of his or her time to collecting and analyzing assessment data. The demands of assessment on the time available can become overwhelming and even crowd out equally valuable instructional time. Therefore, it is in the teacher's interest to understand what each assessment does and then select the one that best fits the needs of the students, teacher, and curriculum. Having a collection of good, all-purpose assessments is preferable to administering overlapping assessments that do little to shed new light on a student's progress.

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Types of Informal Assessments

There are a number of types of informal assessments commonly used in middle and high school classrooms to assess students' progress. They include observations, portfolios, inventories, rubrics, conferences, self-assessments, and surveys. These are the bread-and-butter assessments that pair so well with the content area literacy strategies in this book, as they are easy to collect and analyze.



Video 1.2

In this video, we highlight several teachers' learning goals. Note that these goals directly influence how they check for understanding.



Struggling Readers

Show What They Know in Diverse Ways

Observations. Observations are perhaps the assessment tool most commonly used by teachers and identified by them as the most useful. There are several advantages to using observation as a tool for assessment:

- It focuses on student work in authentic learning situations.
- It mitigates some of the problems associated with formal testing, especially learner stress, because it occurs in the daily learning environment.
- It allows the teacher to obtain and analyze the information immediately, providing flexibility in instructional plans.

Observational notes can be difficult to collect if you don't have a system. Begin by identifying specific students you want to observe during a particular day, perhaps one to three students. If you select two or three students per day for targeted observation, you can collect notes on all of your students in under two weeks. Having said that, we also know that opportunities of observation sometimes arise serendipitously. Regardless, make sure you maintain the notes you write about students either in a notebook or on a digital device. A simple observation form can assist a busy teacher in documenting meaningful observation data (see Figure 1.1).

Portfolios. The term *portfolio* is used to describe a collection of student work that represents progress made over time. Like an artist's portfolio, it is developed by the learner in partnership with the teacher. Students are often invited to select a range of work, not just the most exemplary pieces, in order to represent their learning. The assembled portfolio is then used as a conference tool between parent, teacher, and student. Wilcox (1997) suggests that a portfolio of student work can be organized around the following topics:

- *Reading artifacts* like reading journals and book reviews.
- *Thinking artifacts* that demonstrate the learner's process of understanding. Examples include notes, concept maps, and self-assessments.
- *Writing artifacts* like finished pieces and works in progress.
- *Interacting artifacts* that reflect work accomplished with peers. These might include reciprocal teaching sheets and written summaries of readings that have been collaboratively read through a jigsaw process.
- *Demonstrating artifacts* that represent public performance by the student, including oral reports, demonstrations, and lab experiments. (p. 35)

Inventories. An inventory of a store lists the items contained within the store. Likewise, skills inventories are lists of observable behaviors that can be easily identified and recorded by the teacher—for instance, a record of the types of soccer kicks mastered in a physical education class or the ability to convert fractions, decimals, and percentages in pre-algebra. These inventories most often come in the form of a checklist for easy transcription. An inventory can be commercially prepared, or it may be constructed by the teacher. A checklist of observable behaviors is especially useful when meeting with parents to discuss their child's progress.

Rubrics. Students often have difficulty predicting precisely what the teacher wants to see in an assignment or project. This is due in part to the difficulty teachers sometimes have in defining what they want. Rubrics are designed to clear up such confusions. These scoring guides are distributed and discussed in advance

Video 1.3

In this video, a teacher and a student discuss the learning that has occurred. Note the way the teacher guides the conversation and how the student assumes responsibility for completing future tasks.

so that students are clear on what is expected. Rubrics are usually designed by the teacher, although many teachers choose to develop rubrics with the students in order to prompt discussion about the characteristics of a good performance.

Conferences. Effective teachers routinely meet individually with students to discuss learning. These conferences are valuable because they are an opportunity to collect informal assessment information about a student. The information gathered during a conference on a student’s learning provides authentic assessment data for use in planning future instruction and to assist the student in setting goals.

Self-assessments. The ability to self-assess is an essential skill for developing metacognitive awareness. Metacognitive awareness is the ability of a learner to describe how he or she best learns. In addition, it refers to a learner’s ability to develop a plan for learning and then monitor and evaluate that plan. For example, a student of ours wrote, “I just wanted to let you know some of the skills I would like to work on. One of them is ‘inference’ or ‘reading between the lines.’ For example, I am very bad at answering questions in someone else’s shoes, such as ‘What would this author say?’ or ‘Why was this piece written?’” One of the ways students develop metacognitive awareness is through the use of self-assessments. There are a number self-assessments available on the Internet. See Figure 1.2 for one example.

FIGURE 1.2 Self-assessment of group work

Name: _____	Date: _____
Project: _____	Members of my group: _____ _____ _____
<p>Please rank yourself based on your contributions to the group. Circle the one that best describes your work. 5 = always 4 = almost always 3 = sometimes 2 = once or twice 1 = never</p>	
<i>I completed my tasks on time.</i>	5 4 3 2 1
<i>I contributed ideas to the group.</i>	5 4 3 2 1
<i>I listened respectfully to the ideas of others.</i>	5 4 3 2 1
<i>I used other people’s ideas in my work for the project.</i>	5 4 3 2 1
<i>When I was stuck, I sought help from my group.</i>	5 4 3 2 1
Additional comments:	

Surveys. Assessment tools such as surveys can be an efficient way for a teacher to collect information about a large number of students in a short period of time. Surveys can be developed on any topic and can measure student background knowledge or interest. Information collected from surveys can then be compiled to make instructional decisions. A search of the Internet will reveal a wide number of surveys useful in different content areas. Textbook publishers often include surveys that teachers can use to assess students' understanding.

An effective teacher uses a variety of assessments, including observations, portfolios of student work, inventories, rubrics, conferences, and self-assessments to monitor the progress of students and plan future instruction. Using a variety of assessment instruments provides the student with opportunities to more fully demonstrate his or her strengths and reveal areas of continued need. When paired with informal assessments, the formal testing necessary for accountability purposes becomes more useful. It is not, however, without controversy.

Using the Results of Informal Assessments

Whereas the reported results of many formal assessments may lag several months after students have taken them, informal assessment results do not. Many of these informal assessments, especially teacher-constructed tests, essays, and observations, can be utilized to foster conversation among teachers. The collective results of a group of students can be used to inform a group of teachers about what should be taught next, or retaught. This “feed forward” system complements feedback (providing students with information about their work) as it allows teachers to plan next steps in their instruction.

The use of informal assessment data in a feed forward system usually involves teachers in course-alike groups who plan, administer, and analyze the results every four to six weeks. In many cases, these teachers also assemble to score these assessments together, especially when they involve a written task. Through consensus scoring, the teachers calibrate their expectations with one another and discuss what the results tell them about what was taught effectively, and what was not.

At the classroom level, the results of informal assessments need to work for you. How do you decide when a particular content area instructional strategy is right for you, right now? It's more than looking at the clock and figuring out whether you have enough time before the class ends. It's also about being *strategic* (that's why they're called strategies). These approaches are designed to result in learning and to expose student misunderstandings or partial understandings so you can respond to them.

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Types of Formal Assessments

Like informal assessments, formal assessments are further distinguished by their purpose. One major type is the standardized assessment, sometimes called a norm-referenced assessment. These are constructed using a large sample of participants who are carefully selected to reflect a larger population. Therefore, the sample is based on a host of demographic characteristics, including age, gender,

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socioeconomic status, and geographical location. The chief purpose of standardized tests is to evaluate programs and compare schools and districts. Many standardized tests are applied throughout the country, as they are not tied to the state content standards. An example of a standardized test used in all 50 states is the National Assessment for Educational Progress (NAEP), which is used by the federal government to analyze broad trends in education.

Criterion-referenced tests measure students against an expectation, most often the content standards for the course. Sometimes called standards tests, these vary by state because they are derived from a common set of expectations. As with standardized assessments, they are also used to compare schools and districts within the state. Another example of a criterion-referenced test is the Gates-MacGinitie Reading Test (GMRT), which provides building-level data to make decisions about programs.

Formal assessments have been developed to be administered to students using a prescribed format concerning time, directions, and level of assistance. Most often, these assessments are given in conditions that do not reflect the ways in which students learned the tested skills. Most formal assessments include a lengthy testing protocol and student test booklets for collecting data. Protocols are the detailed directions for administering the test. Most formal assessment scoring is completed by the test publisher, and the results are then reported back to the school and district, often several months later.

Using the Results of Formal Assessments

Conclusions can be drawn about a school's successes or failures by examining the assessment and test results and reviewing the wide variety of demographic and other data that accompany the results. These data-based decisions allow the school to confront directly the issues that matter. If low scores point to a weakness in a specific content area or signal a need for a change in instruction, steps can be taken to provide training in that area. If certain groups of students consistently score poorly, steps can be taken to provide them with additional intervention and support. Without an awareness of what the tests indicate, the school will not likely address the needs of its faculty or students. For example, a group of faculty may meet to discuss test results. Their analysis may lead to an understanding that vocabulary was the most depressed area on the test. Upon further analysis, they may learn that multiple-meaning words were the lowest score within the vocabulary domain. This finding could lead to changes in the curriculum across the school. The results from the next assessment could be used to determine whether the curriculum change was effective.

Link the Results of Assessment to Instruction

Assessments, both informal and formal, should always drive instruction. The day-to-day assessment opportunities presented in the classroom can and should be tied to informal approaches, especially in observing, using rubrics, reviewing student notes, and listening closely to the replies you get when you ask questions during discussions. The act of viewing these results and making next step instructional decisions is called formative assessment, and it is the backbone of your classroom



Video 1.4

In this video, Doug discusses the link between assessment and instruction.

practices. The remainder of this book profiles many transparent and transportable content area instructional strategies that can serve your students well. But we also want to make sure they serve you well, too. As you read and discuss this book, note where the opportunities for assessment lie.

 **Check Your Understanding 1.5**

Conclusion

Strategies are only useful if they are implemented with intention, and that intention is always about discovering what, and to what extent, students are learning. Good instruction requires that we shift the cognitive responsibility to students over time in order to develop their knowledge. Ongoing assessment allows us to know when it is time to shift this responsibility, because we are better able to gauge when mastery occurs. These assessments take the form of formal assessments, such as standards-based tests, and informal assessments, such as inventories and observations. The type of assessment used (formal or informal) dictates how the results are best applied. The results of formal assessments are best used for making programmatic decisions and better understanding the composition of the school. But the results of these assessments come too late to make classroom instruction decisions. This is where informal assessments become so valuable, as they provide an immediate view of a student's progress. This practice, called formative assessment, links instruction to assessment.

The remainder of this book focuses on instructional strategies and planning tools that you will find useful in ensuring that your students can read, write, speak, listen, and view for the purpose of acquiring content knowledge. Note that specific instructional strategies are highlighted in different grade levels and in different content areas. That does not mean that the strategy would fail to work in another content area or grade level. For example, word sorts are highlighted in a biology class while studying molecules of life. Of course, word sorts can be used to teach vocabulary in other grades and with other content areas. This holds true for all of the major strategy chapters—the specific examples in this book are not tied to a specific content area or grade level.

We provide examples across the content areas and grade levels for the following strategies:

- Discussion and questioning techniques (Chapter 2)
- Read alouds, shared reading, and close reading (Chapter 3)
- Vocabulary instruction (Chapter 4)
- Graphic organizers (Chapter 5)
- Notetaking and note making (Chapter 6)
- Writing to learn (Chapter 7)

Engaging Questions and Discussions



Doreen Tabaris has been teaching her family and consumer sciences class about food-related illnesses. Students have learned about salmonella, botulism, and food safety practices for the home and commercial operations. Today she is introducing food-related illnesses that are behavioral in origin—anorexia and bulimia. After opening her class with a series of questions designed to activate background knowledge, she discusses attributes about these two disorders and illustrates the similarities and differences. Next, she asks a series of questions to check for understanding.

“We’ve talked for a bit about these two disorders. What are some of the similarities between the two?” she asks.

“It happens a lot to teenagers,” says Laura.

“Correct, although not only to teenagers. Adults are vulnerable, too. What other ways?” she asks the class.

“People who have anorexia or bulimia might stop hanging around with friends,” offers Roberta.

“Yes, that’s a good warning sign for either eating disorder. Others?”

“It’s a girl thing,” replies Antonio.

Ms. Tabaris notes that the answer is incorrect, but she also knows that this is a common misconception, as the incidence of both disorders is rising among males. She wants her students to process this with one

LEARNING OBJECTIVES

1. Identify the teaching behaviors associated with developing quality questions for students.
2. Describe research-based structures useful for fostering discussion in secondary classrooms.
3. Utilize Bloom’s taxonomy and Webb’s Depth of Knowledge for the purpose of formative assessment.
4. Explain how questions that generate discussions are beneficial in different content area classrooms.

another, rather than giving them the answer. “Everyone turn to your table group to identify a reason why that answer cannot be correct,” she says.

Signaled by their teacher that this is an error, students begin reviewing what they know. After a few minutes, she collects information from the groups.

“Most illnesses happen to both men and women,” suggests one group.

“Guys in sports like wrestling have to watch their weight. That might cause some of them to become bulimic,” offers another group.

The groups offer several possible answers to refute the statement. By taking a few minutes to let students analyze what they know, she has deepened their understanding well beyond what a simple correction from her would have done.

Why is Ms. Tabaris teaching this way? What theory or research supports her instruction? How does this activity contribute to her students’ literacy? How does she know whether her students are learning? The answer lies in the queries themselves: Ms. Tabaris is using questioning and discussion as a means for instruction. If she doesn’t ask questions, students’ expected application to meaningful context will be limited.

Traditionally, teachers use questioning more than any other method for developing comprehension. Questions help the teacher assess whether students understand the text. Accordingly, teachers should have a lot of questions ready so that they can check students’ understanding and identify instructional needs. But teachers should not be the only ones answering questions. Ideally, students learn to generate their own questions. In doing so, they remain very engaged in the task or text and build their learning habits.

An important series of studies on the questioning habits of teachers was conducted by Cazden (1988). Like others before her, she found that classroom instruction is dominated by a particular cycle of questioning known as IRE: initiate, respond, and evaluate (Mehan, 1979). The IRE pattern of questioning is familiar to all—the teacher initiates a question, students respond, and then the teacher evaluates the quality and accuracy of the responses. Here’s an example of IRE:

Teacher: Why was the Battle of Gettysburg important? (Initiate)

Student: The Union army defeated the Confederate army. (Respond)

Teacher: Good. (Evaluate) Why else was it important? (Initiate)

Here’s the difficulty with that question—the student could have also answered that it was the northernmost battle of the Civil War, or that 54,000 people died, or that Abraham Lincoln delivered a famous speech at a memorial service on the site. Instead, the question is low level and consists of a teacher-directed query that excludes any discussion or debate among students. A classroom where IRE is the dominant form of discourse quickly becomes a passive learning environment dependent on the teacher for any kind of discussion. The danger, of course, in the overuse of an IRE pattern of questioning is that the teacher alone becomes the mediator of who will speak and who will not. The students learn that the only questions worth considering are those formulated by the teacher. Ironically, the teachers in Cazden’s study (1988) reported that they wanted a student-centered, constructivist classroom, yet they clung to IRE as their dominant instructional method for inquiry. If you doubt the pervasiveness of this questioning pattern, eavesdrop on kindergartners “playing school.”

 **Struggling Readers**
Have Questions about the
World Around Them

Invariably, the 5-year-old “teacher” will engage in this questioning pattern with his or her “students.”

✓ Check Your Understanding 2.1

Creating Quality Questions

Unfortunately many students have little practice in answering implicit questions and may be ill equipped to formulate and respond to questions requiring critical thinking. In secondary schools, it is imperative to create a classroom culture of inquiry. However, these same adolescents are likely to require teacher modeling to engage in inquiry. One way teachers can accomplish this is through effective questioning strategies. The goal of these restructured questions should be to monitor and guide the ways that students construct and examine meaning in reading, writing, talking, listening, and reflecting. There are a number of ways to create better questions such that student discussion is more productive.

Peter Johnston invites educators to think about questioning techniques as a way of inviting (or discouraging) our students to engage. He reminds us that the language we use in the classroom is “constitutive . . . it actually creates realities and invites identities” (Johnston, 2004, p. 9). Therefore, the way we word our questions and our responses can shape students’ beliefs about themselves and their place in the world. In other words, we can use our interactions with students to build their self-esteem and identity. The questions we ask may include those that foster:

- *Noticing and naming*: “Are there patterns or things that surprise you?” (p. 17)
- *Identity*: “What have you learned most recently as a (reader, writer, etc.)?” (p. 26)
- *Agency*: “How did you figure that out?” (p. 31)
- *Flexibility and transfer*: “How else . . . ?” (p. 45)
- *Knowing*: “Let’s see if I got this right” (then summarizes students’ extended comments) (p. 54)

Notice that these are not only initial questions; they are also effective follow-up probes to elicit student responses. Unlike the IRE discourse so commonly used, these serve as examples of genuine inquiry on the part of the teacher and not just another round of “guess what’s in the teacher’s brain.” Some additional ways to create effective questions are described in the sections that follow.

Questioning the Author (QtA). Questioning the Author (QtA) is a text-based strategy that invites the reader to interact with the information and build meaning from the content by analyzing the author’s purpose (Beck, McKeown, Hamilton, & Kucan, 1997). These questions are meant to serve as discussion prompts that invite students to develop ideas rather than restate information directly from the text because they require students to take responsibility for thinking and for constructing understanding. As students wrestle with ideas and concepts while reading, their inquiry moves into deeper levels of meaning in narrative and expository

 English Language Learner (ELL)
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texts by becoming involved with issues raised. The students realize that the author is challenging them to build their ideas and concepts. As a result, collaborative discussion follows the open-ended and author-oriented queries. Table 2.1 contains a table of QtA queries designed by these researchers.

The goals of QtA are always the same: to construct meaning of text, to help the student go beyond the words on the page, and to relate outside experiences from other texts. The way to achieve these goals is discussion enriched by the student's world and his or her own personal history. QtA involves the teacher as well as the whole class as they collaboratively build understanding during the reading. During this process, the teacher participates in the discussion as a facilitator, guide, initiator, and responder. The role of the teacher is not to dominate the conversation but to lead the students into dialogue with open-ended questions. The teacher strives to elicit the readers' thinking while keeping them focused in their discussion (McKeown & Beck, 1999). The students' answers are not evaluated in this procedure because QtA is designed to engage the readers with the text, not to rate the accuracy of their responses. Later in this chapter, we will see how Melanie Scott used QtA queries in her English class as she introduced the poem "Annabel Lee" by Edgar Allan Poe (1849/1966).

Check Your Understanding 2.2

ReQuest. ReQuest (Manzo, 1969) is another useful questioning technique designed to assist students in formulating questions and answers based on a text passage. Student partners read a passage together and write two to three questions

TABLE 2.1 Questioning the Author Prompts

Goal	Query
Initiate discussion	What is the author trying to say? What is the author's message? What is the author talking about?
Focus on author's message Link information	That's what the author says, but what does it mean? How does that connect with what the author already told us? What information has the author added here that connects or fits in with _____?
Identify difficulties with the way the author has presented information or ideas	Does that make sense? Is that said in a clear way? Did the author explain that clearly? Why or why not? What do we need to figure out or find out?
Encourage students to refer to the text because they have misinterpreted or to help them recognize that they have made an inference	Did the author tell us that? Did the author give us the answer to that?

Source: "Questioning the Author: A Yearlong Classroom Implementation to Engage Students With Text," by I. L. Beck, M. G. McKeown, R. L. Hamilton, L. Kucan, and J. Worthy, 1996, *Elementary School Journal*, 96, pp. 385–414. Used with permission of the University of Chicago Press.

and answers to quiz one another. This procedure builds prior knowledge and vocabulary through discussions. Designed first for one-to-one instruction, ReQuest has been used as a group activity as well.

The ReQuest process is a simple one to implement in the secondary classroom. The teacher chooses a passage of text, then designates short segments within the passage. When ReQuest is introduced, it is advisable to conduct the first round so that the teacher is the one to answer questions generated by the students. The teacher/respondent keeps the book closed during the questioning, and students may be asked to rephrase questions if necessary. Manzo cautions that the teacher must answer to the best of his or her ability. The student/questioners have their books open and check the teacher's answers against the text. Once this phase is complete, the roles are reversed. After reading the next segment of text, the teacher, with book open, becomes the questioner while the students answer. As before, those who are answering the questions can ask to have the question restated or clarified. Once students are familiar with ReQuest, the sequence can be used in small groups to support student understanding of the text. ReQuest can also be tailored to suit the specific needs of students. For instance, questions can include those related to specific vocabulary featured in the reading. Respondents can also be asked to validate their answers with evidence from the text. Task cards for a student-led small-group ReQuest procedure appear in Figure 2.1. Later in this chapter we will see Rita Peña's history class engage in ReQuest.



Video 2.1

In this video, we see a group of students engaged in ReQuest.

Question–Answer Relationship (QAR). The question–answer relationship (QAR) strategy describes four types of questions: *Right There*, *Think and Search*, *Author and You*, and *On Your Own* (Raphael, 1986). It is based on the three categories of question classification described by Pearson and Johnson (1978): *text explicit* (the answer is directly quoted in the text); *text implicit* (the answer must be implied

Questioner Task Card

1. Read the first passage silently. Pay attention to the information it contains.
2. Think of questions to ask. Try to use your own words, not exact phrases from the passage.
3. Keep your book open while you ask your question. Listen to the answer, then check to see if it is accurate. If it is not, ask another question to help the person arrive at the correct answer.
4. When finished, change roles. Repeat 2–3 times.

Respondent Task Card

1. Read the first passage silently. Pay attention to the information it contains.
2. Think of questions you might be asked. Check the passage you just read for possible answers.
3. Close your book and answer each question you are asked. You can ask the questioner to rephrase or clarify a question you do not understand.
4. When finished, change roles. Repeat 2–3 times.

FIGURE 2.1
ReQuest task cards

from several passages in the book); and *script implicit* (requires both the text and prior knowledge and experiences).

In addition to serving as a tool for teachers to develop questions, QAR is also a framework for students to apply in answering questions and asking their own questions. QAR is a student-centered approach to questioning because it “clarifies how students can approach the task of reading texts and answering questions” (Raphael, 1986, p. 517). A classroom poster on question–answer relationships appears in Figure 2.2.

It is advisable to pair both Right There and Think and Search questions to encourage the learner to self-assess for uncertainties. This inquiry interaction promotes more personal involvement than using questions with separate phrases of isolated facts. In contrast, Author and You and On Your Own questions invite the reader to integrate personal experiences and prior knowledge into their responses. These inferential and evaluative questions require the reader to make connections between text, self, and world. During this time, the reader must deduce, infer, connect, and evaluate.

The instructional power of QAR lies in the explicit instruction of identifying what type of question is being asked and, therefore, what resources are required to answer the question. Less effective readers are often puzzled by where to locate answers to questions based on a reading. Some students rely only on the text,

<p>In the text . . .</p> <p>RIGHT THERE</p> <p><i>When was the Declaration signed?</i></p> <p>The Declaration of Independence was adopted on <u>July 4, 1776</u>.</p> <p>Answers to Right There questions are in the text. The words in the question usually match a sentence in the text.</p>	<p>In the text . . .</p> <p>THINK AND SEARCH</p> <p><i>What are some of Thomas Jefferson's notable accomplishments?</i></p> <p><u>The Declaration of Independence</u> was adopted on July 4, 1776. John Hancock signed first, and <u>Thomas Jefferson, the author</u>, signed as a delegate of Virginia. He later became <u>the third president</u> of the United States.</p> <p>Answers to Think and Search questions are in the text. The answer is compiled through segments of several sentences.</p>
<p>In your head . . .</p> <p>AUTHOR AND YOU</p> <p><i>What influence did participation in the development of the Declaration have on the signers?</i></p> <p>Answers to Author and You questions are not in the text. You need to consider both what the author has told you and what you already know about the topic.</p>	<p>In your head . . .</p> <p>ON YOUR OWN</p> <p><i>If you were a delegate of the Second Continental Congress, would you sign?</i></p> <p>Answers to On Your Own questions are not in the text. You need to consider your personal experiences to answer.</p>

FIGURE 2.2
Question–answer relationship chart

sometimes fruitlessly searching for an answer that is just not there. Conversely, other students rarely return to the text for any answers, believing that they can only depend on information they can recall from memory. By teaching the relationship between questions and answers, students can apply the framework to answer more efficiently and accurately. This ensures that they become better readers and thinkers, and along the way, they perform better on tests and assessments. Figure 2.3 contains a summary of the QAR strategy. To see students in action, we will read about Robert North’s science class later in this chapter.

 **Check Your Understanding 2.3**

Text-Dependent Questions (TDQs). Every content area relies on texts to convey knowledge about the discipline, but their usefulness is decreased when the conversation moves too quickly away from the content of the reading. It’s easy for this to happen. A student makes a personal connection to an experience, and before you know it, the discussion has migrated from the Tet Offensive in Vietnam in 1968 to a student’s recollections of stories told to him by his grandfather who participated in antiwar protests during the era. Careful preparation of text-dependent questions in advance of the lesson provide you with a tool for getting the discussion refocused on the content of the reading.

Text-dependent questions move students systematically through an examination of the reading at the literal, structural, and interpretive levels. The first questions focus on what the text says and are concerned with the key details and general understanding of the text, including the definitions of unknown words or phrases. Once students have developed a strong foundation about the literal level of the text, the teacher poses questions about the structure, namely how the text works. These structural questions include vocabulary word choice, author’s craft, and text structures (see Chapter 3 for more details on text structures). The third phase of text-dependent questions centers on what the text means, as students

 **Video 2.2**
In this video, we see a group of students engaged with a text based on the text-dependent questions they have been asked.

QAR STRATEGY	CATEGORY	DESCRIPTION
Right There	Text explicit	The question is asked using words from the text, and the answer is directly stated in the reading.
Think and Search	Text implicit	The questions are derived from the text and require the reader to look for the answer in several places and to combine the information.
Author and You	Script and text implicit	The question has the language of the text, but in order to answer it, the reader must use what he/she understands about the topic. The answer cannot be found directly in the text, but the text can provide some information for formulating an answer. The information is implied, and the reader infers what the author meant by examining clues in the text.
On Your Own	Script implicit	The question elicits an answer that comes from the reader’s own prior knowledge and experiences. The text may or may not be needed to answer the question.

FIGURE 2.3
Question–answer relationship comparison

are invited to interpret and infer. These questions ask students to speculate on the writer's purpose, to engage in formal reasoning and argumentation, and to link these to other texts. Figure 2.4 lists these types of questions and accompanying examples.

Kayla Detrick's middle school Physical Education students are engaged in an interdisciplinary unit on promoting lifelong healthy behaviors. Ms. Detrick begins each of her classes with a short reading on the positive effects of regular physical activity. "Adults like to talk about how activity is good across your whole life, but that's not what interests most kids this age," she says. She adds, "I look for readings that focus on what will impact their life right now." In one lesson, Ms. Detrick distributes a reading on the positive effects of physical activity on acne. Using text-dependent questions, she asks students to detail the benefits (increased blood flow and reduced stress levels) and asks about the phrase "exercise-induced acne."

Next, she moves into structural-level questions. "Where did the author compare and contrast the benefits and risks of activity levels on acne?" she asks. "There's a sentence in there that says, 'An athlete who wears tight equipment might have some local acne, but her skin overall is healthier because she exerts herself,'" says Andrea. After a few minutes of discussion about this sentence, Ms. Detrick moves into the interpretative level, asking students, "Why do you suppose the writer wants to address this issue of exercise-induced acne? Wouldn't it have been better to not bring up the topic at all?" The students in her class discuss this with partners, then Yazmin answers, "My partner and I think there's too many kids

FIGURE 2.4 Text-dependent questions

Purpose of Questioning	Types of Questions	Examples
Literal-level questioning: What does the text say?	Key details General understanding of the text	What are the six phases of mitosis described in this passage? What does "amble" mean? Who is the narrator in this article, and what is her main conflict?
Structural-level questioning: How does the text work?	Vocabulary word choice Author's craft Text structures	Why is "stately" a more powerful word than "impressive" when describing Nelson Mandela? Where does the author introduce an opposing viewpoint? What is the denouement in this short story? The writer identifies a problem, but does she propose a solution?
Interpretative-level questioning: What does the text mean?	Inferencing across the entire passage Argumentation and formal reasoning Intertextual connections	What commentary on contemporary life is the author suggesting? In what ways are the counterclaims of this argument addressed and then refuted? Do you agree with the writer's thesis that access to social media should be restricted for middle school students, and what is your evidence? In what ways does this study challenge the claims put forth in the text we read last week?

who think sweating makes your skin break out. If the writer didn't say anything, people would read this and just think, 'Yeah, sure, but you're wrong.'" Ms. Detrick says, "That's a great conclusion! Now let's go sweat!"

Essential Questions. Unlike the types of questions discussed thus far, essential questions extend through an entire unit. These are thought-provoking questions that can't be answered with a simple yes or no, and are designed to provide students with several options for responding. When curriculum units are organized around these thought-provoking questions, they provide the teacher with a means for establishing relevance. Learning is enhanced when the relevance of the material is made clear. In fact, information that is not attached to any larger meaning is likely to be quickly forgotten (Donovan & Bransford, 2005). And remember that relevance is in the mind of the learner, not just the teacher. We know from our own teaching experience that we believe everything we teach is relevant, otherwise we wouldn't bother to talk about it. However, we can also appreciate the importance of relevance from our students' viewpoint. Therefore, it is up to us as instructors to make the relevance explicit. When a curriculum unit is organized around an essential question, and that question is then connected to the assessments and culminating projects of the unit, students can begin to make meaning of the information. After all, when students understand that the information they are reading and writing about will ultimately be used to answer the question, they can then appreciate the value of their inquiry.

Some essential questions might be more specific to a particular unit, while others may spark interdisciplinary study. A question like "What is a hero?" is far more interesting than a unit titled "Heroes of the 20th Century" and is likely to promote greater student interest. Other essential questions used by educators include:

- What is the human need to celebrate?
- Is there an art to science? Is there a science to art?
- Mark Twain said, "History is lies agreed upon." Was he right?
- Does an apple a day keep the doctor away?
- Probability and Pop Culture: Are you more likely to hit the lottery or get hit by lightning?

Discussions: Structures for Students to Discuss Questions

A number of studies and research reviews have confirmed that when teachers and students have opportunities to collaborate with their peers, learning occurs (e.g., Marzano, Pickering, & Pollock, 2001). Learning is a social endeavor, not an isolated one, and the conversations that occur between learners foster growth for all involved (Vygotsky, 1978). As such, students should be provided time to collaborate, interact, and discuss ideas with their peers every day in every class. When students are provided time in collaborative learning situations, they consolidate their understanding and improve their understanding of the content (Frey, Fisher, & Everlove, 2009). There are a number of ways to facilitate collaborative, student-to-student interactions. In this section, we will share a few of the more common ways. The remainder of this book contains additional ideas for encouraging students to interact with each other and the content they are learning.



Video 2.3

In this video, we see a class discussion based on an essential question.



English Language Learner (ELL)

The Benefits for English Language Learners

Think-Pair-Share. One of the most transportable teaching strategies is *think-pair-share* (Lyman, 1981). Think-pair-share introduces an intermediate stage between when the question is asked and when the answer is delivered, and serves as an important strategy for developing student interaction. After asking the question, the teacher invites the students to think about the possible answers. When a short amount of time has elapsed (30 seconds or so), the teacher then instructs students to turn to a partner and discuss their answers. After allowing a few moments for discussion, the teacher then invites students to offer answers. Invariably, more hands go up because they have had some time to consider their answer, listen to someone else, and refine their response. In addition, the answers are likely to be rich and detailed because of this intermediate step. Figure 2.5 shows a classroom poster for think-pair-share.

Learning Stations. An optimal time for students to work collaboratively is during *learning stations*. Students work in small heterogeneous groups (three to four students) on tasks designed to consolidate concepts and skills previously taught. These stations are usually related to one another in content and are designed to create a cohesive learning experience. For example, Soto (2005) described the use of stations to introduce concepts about the Human Genome Project to students. A learning station arrangement is ideal for WebQuests, which are Internet-based inquiry projects, because small groups of students can work collaboratively on a single computer. Learning stations offers another advantage, namely that they allow the teacher to provide direct instruction to small, homogeneous groups of students who have been chosen according to similar instructional needs while other students are working at stations.

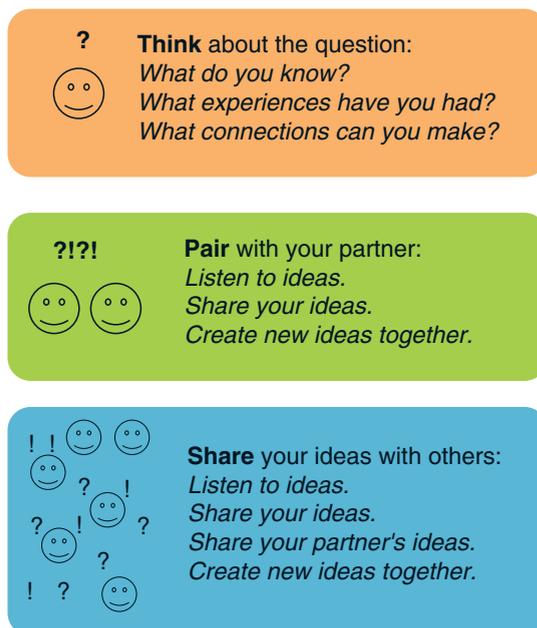


FIGURE 2.5
Think-pair-share

Jigsaw. In many content area classrooms, all of the students need to read the same text, as could be the case when the teacher reads an article during a shared reading (see Chapter 3). However, there are occasions when students need to analyze multiple texts at the same time. When a group of readers is presented with information from several texts, the readers are more likely to make connections between those readings, a phenomenon referred to as intertextuality. However, it can be difficult to organize multiple readings for use in a discussion. One instructional arrangement for doing so is a *jigsaw* (Aronson, 1978).

The readings used in a jigsaw may be chosen because they each offer similar perspectives of the same concept or event (*complementary*) or because they present very different views (*conflicting*). A third arrangement divides a concept or idea into smaller elements so that the topic is fully understood only after all the readings have been discussed (Aronson, 1978). Examples of these types of text sets appear in Figure 2.6.

The jigsaw is accomplished through two types of groups—the home group and the expert group. First, members of a home group divide the task of reading multiple texts among themselves. Each reader is responsible for identifying the important elements of the text to report to the home group. Students then meet in an expert group of students reading the same text to discuss the reading and take notes for use in the home group. Finally, students reconvene in their home group

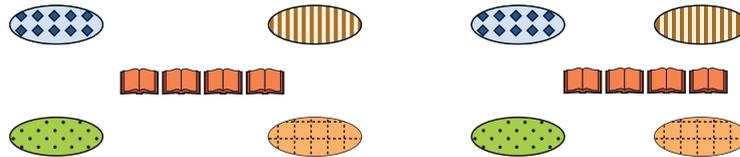
FIGURE 2.6 Text sets for jigsaw

TYPE	PURPOSE
<i>Complementary</i>	Texts focus on a single concept
Example: Who was Vincent van Gogh and why did he have a significant impact on the art world?	A & E Biography. (1997). <i>Vincent van Gogh: A stroke of genius</i> [VHS]. Greenberg, J., & Gordon, S. (2003). <i>Vincent van Gogh: Portrait of an artist</i> . New York: Yearling. Metropolitan Museum of Art. (2005). <i>Vincent's colors</i> . New York: Chronicle. <i>Vincent van Gogh Museum</i> , www3.vangoghmuseum.nl/vgm/index.jsp
<i>Conflicting</i>	Texts focus on divergent perspectives of a concept
Example: What were the benefits and costs to exploration of the New World?	Maestro, B. (1997). <i>Exploration and conquest: The Americas after Columbus: 1500–1620</i> . New York: HarperTrophy. Prescott, J. (1996). <i>100 explorers who shaped world history</i> . San Mateo, CA: Bluewood. <i>Visions of the Caribbean: Exploration and Colonization</i> , www.historical-museum.org/exhibits/visions/ec.htm Yolen, J. (1996). <i>Encounter</i> . New York: Viking.
<i>Divided</i>	Concept is divided among texts
Example: Why are the planets in our solar system so different from one another?	Cooper, H., & Henbest, N. (1997). <i>Big bang: The story of the universe</i> . New York: Dorling Kindersley. Redfern, M. (1999). <i>The Kingfisher young people's book of planet Earth</i> . New York: Kingfisher. Ride, S., & O'Shaughnessy, T. (2003). <i>Exploring our solar system</i> . New York: Crown. <i>The Online Planetarium Show</i> , http://library.thinkquest.org/3461/

to learn and share information from each of the readings. A procedural map for jigsaw is illustrated in Figure 2.7.

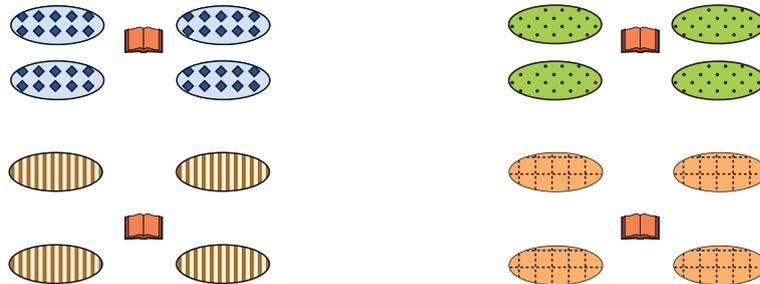
Reciprocal Teaching. Teachers wishing to move instruction from delivery to discovery are wise to consider reciprocal teaching in their repertoire. Reciprocal teaching is used in student-directed groups of four to jointly understand a common piece of text (Palincsar & Brown, 1986). The text is segmented into smaller chunks, allowing students to check their understanding periodically throughout the reading. This is accomplished using a structured discussion format and is performed several times until the piece is complete. The teacher may create the stop-

Phase One: Home Groups



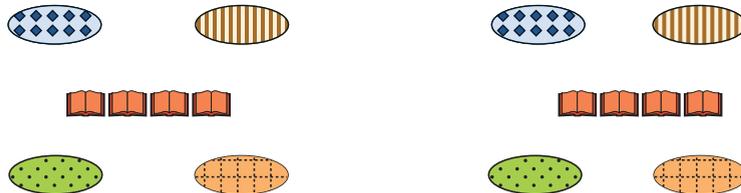
Students meet in home groups to divide the readings among themselves.

Phase Two: Expert Groups



Students meet in expert groups to discuss one of the readings.

Phase Three: Home Groups



Students reconvene in home groups to discuss all of the readings.

FIGURE 2.7
Jigsaw Process

ping points for discussion in advance, or the group may decide how best to break up the text. At each stopping point, students use four kinds of comprehension strategies to understand the text:

- *Questioning* the text by asking literal and inferential questions of one another
- *Clarifying* understanding through discussion of how a confusing point might be cleared up (for example, using a dictionary, checking the glossary, asking the teacher)
- *Summarizing* the main ideas of the passage
- *Predicting* what the author will discuss next, based on prior knowledge

The strength of this approach is in the consolidation of sound comprehension practices used during the reading process. These four steps do not need to be performed in a fixed order but can be discussed in the order the group decides.

As with the other peer strategies, the techniques used in reciprocal teaching must first be taught so that students are comfortable using them in collaborative groups. Each role is modeled until all have been introduced. We advise practicing each role separately until students are ready to use all the strategies together in a group meeting. This means that there is a series of lessons where everyone in the group uses prediction, followed by a series on summarizing, and so forth.

Many teachers use role sheets in the beginning of the year to support student dialogue within the group. Because the text is not read in advance but rather is chunked, read, and discussed in the same sitting, these question stems can be useful when group members are at a loss for what to say next. These role sheets are shown in Figure 2.8.

Ultimately, students become proficient at reciprocal teaching by doing it. An example from a high school English and mathematics class later in the chapter illustrates the level of comfort students can reach after several opportunities to engage in this strategy.

Check Your Understanding 2.4

Using Questions and Discussion for Assessment

If you have read the previous pages, you have probably inferred that some questions are better than others. You have likely heard phrases like “low-level” and “higher-order” questions. But what distinguishes types of questions? How do you determine what sorts of questions are appropriate? A review of the work of Benjamin Bloom is helpful to understand questioning.

In 1956, Benjamin Bloom, an educational psychologist at the University of Chicago, published a series of handbooks on the domains of learning—psychomotor, affective, and cognitive. The handbook devoted to the cognitive domain outlined a classification system that described six levels of competence. This classification system, referred to commonly as Bloom’s taxonomy, has become a cornerstone in the description of questions used in the classroom and on tests (Bloom, 1956).

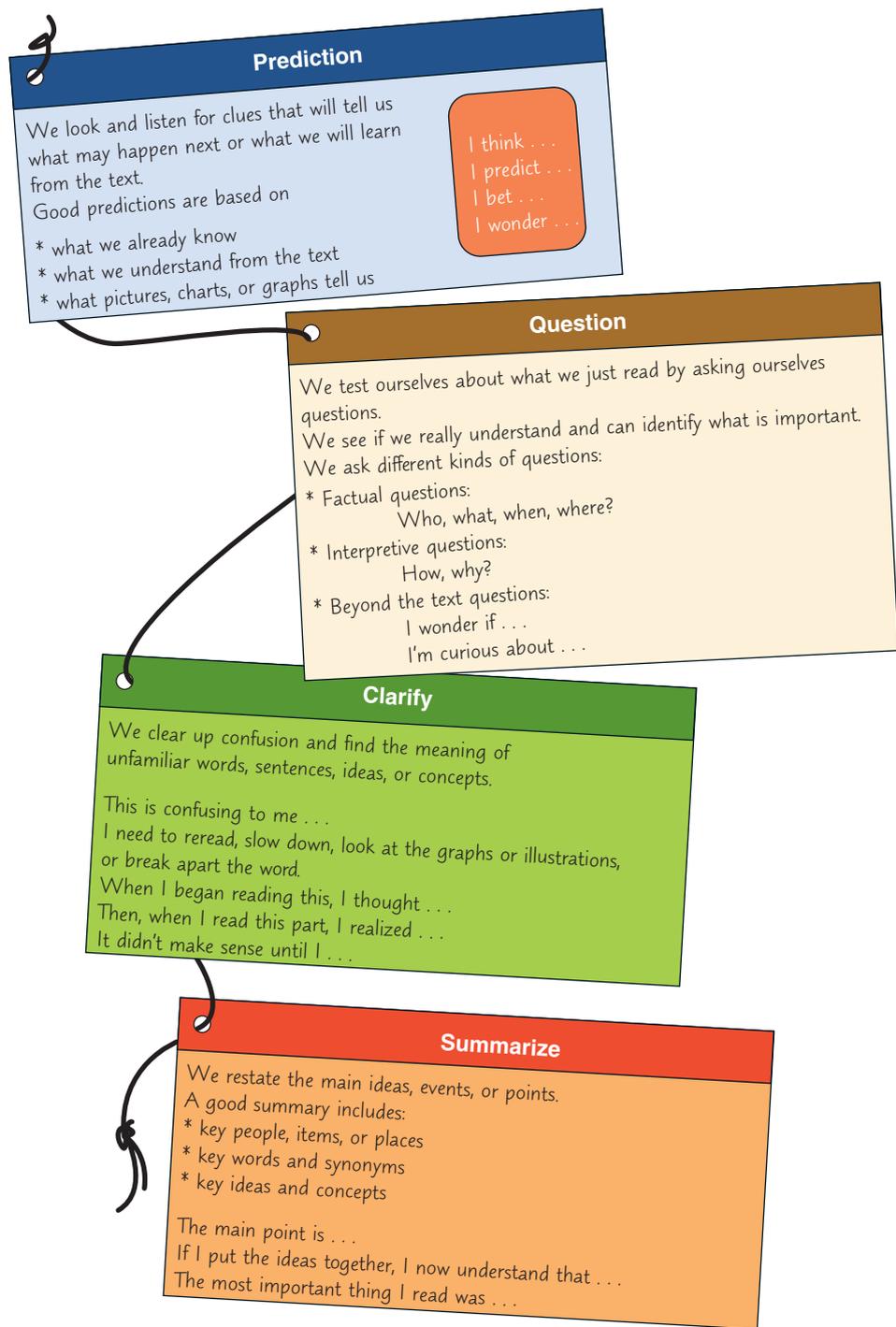


FIGURE 2.8
 Role sheet for reciprocal teaching

Bloom described these competencies; we've included a sample question to illustrate each one:

- Level 1—*Knowledge*:** States facts, terms, and definitions.
Sample question: What is the capital of California?
- Level 2—*Comprehension*:** Changes the information to compare to another form.
Sample question: Explain why Sacramento was selected as the state capital.
- Level 3—*Application*:** Solves a new problem using information.
Sample question: What city in California would you choose as the state capital today?
- Level 4—*Analysis*:** Identifies components and infers causes or motives.
Sample question: Why do you believe that the legislature chose to move the state capital from San Jose to Sacramento?
- Level 5—*Synthesis*:** Creates a new product using information in a novel way.
Sample question: Design a state capital for California that will be useful throughout the 21st century.
- Level 6—*Evaluation*:** Makes judgments and defends opinions.
Sample question: Assess the suitability of the present state capital and make recommendations for future development.

The questions got more difficult, didn't they? This is where the terminology of higher- and lower-order questions originates.

Knowledge and comprehension questions are sometimes referred to as literal questions because they require the student to draw upon memorization or location of facts. In other words, the answers to these types of questions are usually located verbatim in a text. They are also the easiest questions to compose and test. Guszak (1967) estimated that 70 percent of the questions asked in a typical classroom are knowledge or comprehension questions. That means that only 30 percent of the queries required students to apply knowledge in unique ways or to construct understanding by assembling disparate information. It is the imbalance between literal and nonliteral questions that is problematic, not the questions themselves. Brophy and Good (1986) noted that students who have experience with lower-order questions do well on tests of basic skills because these tests mirror this type of question.

Tests do not consist only of basic skills; they also demand that students can draw inferences, justify answers, and defend opinions. These same higher-order skills are also widely recognized as critical for adult success. Therefore, classrooms should include ample experiences in responding to questions that require students to analyze information, identify problems, develop original solutions, and formulate opinions. These are also the more difficult questions for teachers to develop.

Since Bloom's original work on the taxonomy, there have been several other frameworks developed to guide teachers in considering the complexity of the information they are requesting from students. For example, in 2001, Anderson and Krathwohl revised the taxonomy, changing the competencies from nouns to verbs. Their new system also has six levels:

1. *Remembering*: Recognizing or recalling knowledge from memory. Remembering is when memory is used to produce definitions, facts, or lists, or recite or retrieve material.

2. *Understanding*: Constructing meaning from different types of written or graphic messages activities like interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.
3. *Applying*: Carrying out or using a procedure through executing or implementing. Applying refers to situations where learned material is used through products like models, presentations, interviews, or simulations.
4. *Analyzing*: Breaking material or concepts into parts, determining how the parts relate or interrelate to one another or to an overall structure or purpose. Mental actions included in this function are differentiating, organizing, and attributing as well as being able to distinguish between the components or parts. When one is analyzing he or she can illustrate this mental function by creating spreadsheets, surveys, charts, diagrams, or graphic representations.
5. *Evaluating*: Making judgments based on criteria and standards through checking and critiquing. Critiques, recommendations, and reports are some of the products that can be created to demonstrate the processes of evaluation. In the newer taxonomy, evaluation comes before creating, as it is often a necessary part of the precursory behavior before creating something.
6. *Creating*: Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing. Creating requires users to put parts together in a new way or synthesize parts into a new form or product. This process is the most difficult mental function in the new taxonomy.

Check Your Understanding 2.5

In addition, Anderson and Krathwohl (2001) identified four levels of knowledge:

- *Factual Knowledge*—The basic elements students must know to be acquainted with a discipline or solve problems.
- *Conceptual Knowledge*—The interrelationships among the basic elements within a larger structure that enable them to function together.
- *Procedural Knowledge*—How to do something, methods of inquiry, and criteria for using skills, algorithms, techniques, and methods.
- *Metacognitive Knowledge*—Knowledge of cognition in general, as well as awareness and knowledge of one's own cognition.

In essence, they have created a three-dimensional model in which teachers consider the cognitive processes as well as the level of knowledge that is expected. As such, the questions that are developed based on this framework are more robust and require an analysis of students' thinking. This allows teachers to determine students' understanding of the content and make decisions about what still needs to be taught.

Another system that teachers can use to create questions, facilitate discussions, and check for understanding is also based on the depth of knowledge expected from students. Developed by Norman Webb (1997), the Depth of Knowledge framework has four levels:

- Recall and reproduction
- Skills and concepts

- Short-term strategic thinking
- Extended thinking

Each of these levels can be used to create questions that allow teachers to assess students' understanding. Figure 2.9 contains a list of question stems for each of the levels.

This is more than a questioning system. In addition to guiding the types of questions teachers and students can ask, Webb's Depth of Knowledge framework can inform teachers' and students' roles and suggest a range of tasks and products. For example, at level 1, students might be expected to develop a concept map showing a process or describing a topic, make a time line, or write a brief outline and explain the event, process, or story. At level 2, they might write an explanation about this topic for others, construct a model to demonstrate how something looks or works, or

FIGURE 2.9 Question stems for Webb's Depth of Knowledge

DOK 1	DOK 2
<ul style="list-style-type: none"> • Can you recall ____? • When did ____ happen? • Who was ____? • How can you recognize ____? • What is ____? • How can you find the meaning of ____? • Can you recall ____? • Can you select ____? • How would you write ____? • What might you include on a list about ____? • Who discovered ____? • What is the formula for ____? • Can you identify ____? • How would you describe ____? 	<ul style="list-style-type: none"> • Can you explain how ____ affected ____? • How would you apply what you learned to develop ____? • How would you compare ____? • Contrast ____? • How would you classify ____? • How are ____ alike? Different? • How would you classify the type of ____? • What can you say about ____? • How would you summarize ____? • What steps are needed to edit ____? • When would you use an outline to ____? • How would you estimate ____? • How could you organize ____? • What would you use to classify ____? • What do you notice about ____?
DOK 3	DOK 4
<ul style="list-style-type: none"> • How is ____ related to ____? • What conclusions can you draw? • How would you adapt ____ to create a different ____? • How would you test ____? • Can you predict the outcome if ____? • What is the best answer? Why? • What conclusion can be drawn from these three texts? • What is your interpretation of this text? <p>Support your rationale.</p> <ul style="list-style-type: none"> • How would you describe the sequence of ____? • What facts would you select to support ____? • Can you elaborate on the reason ____? • What would happen if ____? • Can you formulate a theory for ____? • How would you test ____? • Can you elaborate on the reason? 	<ul style="list-style-type: none"> • Write a thesis, drawing conclusions from multiple sources. • Design and conduct an experiment. <p>Gather information to develop alternative explanations for the results of an experiment.</p> <ul style="list-style-type: none"> • Write a research paper on a topic. • Apply information from one text to another text to develop a persuasive argument. • What information can you gather to support your idea about ____? • DOK 4 would most likely be the writing of a research paper or applying information from one text to another text to develop a persuasive argument. • DOK 4 requires time for extended thinking.

Source: Myra Collins mcollins@truman.edu

explain the meaning of a concept and/or explain how to perform a particular task. At level 3, students might classify the actions of the characters in a book, conduct an investigation to produce information to support a view, or prepare and conduct a debate. And finally, at level 4, students might create graphs, tables, and charts where they must reason through and organize the information without instructor prompts or they might complete an internship in industry where they are faced with real-world, unpredictable problems.

Strategies at Work

Reciprocal Teaching in English

Groups of four students band together across Lisa Douglas's American literature classroom. Each student in the groups has a role to play. Brightly colored cards of different hues sit on desks, each indicating a distinct role for its student owner. Today, Audrey will be the predictor, José the questioner, Beth the clarifier, and Ben the summarizer. Students' roles change regularly, either daily or with the introduction of a new text. Before Ms. Douglas has finished moving through the room, Audrey starts her group.

"Do you guys remember where we were?"

"Look at the wall, Audrey. We've already summarized three parts." Beth refers the group leader to the wall behind her where the class has posted summaries from yesterday.

"Yeah. Okay. So we are here on page 6. Right? So, Ben, could you please read for us?"

Ben reads a passage from *"The Yellow Wallpaper" and Other Stories* by Charlotte Perkins Gilman (1997). The short story tells of a woman in the late 1800s who has a mental illness and becomes more obsessed each day with her bedroom wallpaper.

As Ben concludes his passage, Audrey quickly inserts her opening remark. "Boy, I feel so sorry for that woman. No one seems to be able to help her. I predict that she is going to get worse and worse. They may even have to move her away somewhere to a hospital or mental person's home."

"No. I think she is going to get better. All she has to do is get rid of that ugly wallpaper."

"You've gotta be kidding, José. No way. I agree with Audrey."

"Me, too. Except maybe she will attack her husband or do some other crazy thing before they take her away." Each of the group members contributes a prediction to the discussion. Audrey moves her group along.

"Okay. I'm the predictor, so I want you to write down my prediction."

"And, that is?" remarks Ben.

"She is going to get worse," Audrey states with authority. She continues, "Let's see, José, you are the questioner. So what question do you have?"

"What's her problem? I mean, is she suffering from depression or what?" José asks.

The discussion continues around different questions posed by the group members. In the end, José determines the question to be used. The group work in Ms. Douglas's room continues through the next step of reciprocal teaching, clarification, in much the same way as predicting and questioning steps were accomplished. However, when Ms. Douglas's students reach the summarizing stage, each is asked to write a summary sentence that is shortened several times when the

students pass their statements around the group. Then, the shortened versions are discussed and compared, and a final product is produced using the best from all the versions. This is especially useful because students are often required to write summaries for standardized tests. After the group writes this final summary, students rotate their role-indicator cards. Each group member has a new role to play in the reciprocal teaching process, they read a new passage of text, and the cycle continues.

Ms. Douglas uses assigned roles when her students are learning about the reciprocal teaching process. As students become more proficient, the roles will become facilitator roles rather than requiring one student to serve as the sole individual responsible for the assigned component. For example, the student assigned to questioning will not have to contribute all the questions but will facilitate a discussion in which questions are generated.

Questioning the Author in English

Edgar Allan Poe is a new author for Melanie Scott's students, who do not yet have prior knowledge of his life or works. The students will work with ideas they generate during a shared reading of "Annabel Lee" to gain understanding of his poetic narration. After reading aloud the first stanza, Ms. Scott draws her students' attention to Poe's message and listens to their responses.

"What is Poe talking about in this poem? Is he the speaker in 'Annabel Lee'? Let's look for clues in the poem about this. What is Poe's message?"

Voices overlap, "Death. Love. Sorrow. Marriage."

With a smile and a nod, Ms. Scott alerts the class to listen to the rhyme, rhythm, and sounds of the words as she continues to read aloud. During her reading, she pauses and asks, "Do you feel that Poe really loves Annabel Lee?"

The class shouts, "Yes!" One student confirms, "Of course he does."

Ms. Scott keeps probing. "How do you know that he loves her?"

Eric immediately replies, "Because he talks about how angels in heaven were jealous of Poe's and Annabel's love. But, I don't get it when he talks about him being a child, and her, a child."

Josh adds, "Yeah, on Valentine's Day, I see little angels with hearts, bows, and arrows on cards. Are Poe and Annabel Lee sweethearts? Are they grown-ups or are they kids?"

Carolina calls out, "I think that maybe they were teenage lovers, and the angels are symbols of their love."

As the students generate thoughts and questions, Ms. Scott is doing less and the students are doing more. She guides them through the next stanza, then stops and asks, "Have you ever loved someone? Think about how you felt at that time. How did you feel when that person left?" The class remains silent. Waiting, she encourages the students to think about Eric's and Carolina's ideas. "What is the 'reason' that Poe refers to in the following lines? What is Poe really saying in these lines?"

And this was the reason that, long ago,
In this kingdom by the sea,
A wind blew out of a cloud, chilling
My beautiful Annabel Lee . . .

"He blames the angels for Annabel Lee's death because maybe she got very sick and died. Poe can't really explain how she got sick, so he tells us the wind came from the angels, and it made her sick," offers Tanisha.

Shaking his head, Thomas interjects, “How can the wind come from the angels, and how can the wind make Annabel Lee sick?”

Instead of answering Thomas, Ms. Scott responds with a question to dig deeper. She asks, “Is the information about Annabel Lee’s death as important as the previous information about their love?”

Murmurs fill the room, and some student voices are heard above the rest.

“Maybe it isn’t important for us to know how she died, because Poe would have told us,” says Roberto.

“Or he really didn’t know,” Joelle interjects.

“I think it’s important that Poe and Annabel Lee loved each other, and when she died, he still thought that they were married,” offers Ting.

Engaging the students in the final segment of text, Ms. Scott reads aloud the last stanza. She then asks, “If you could, would you bring Annabel Lee back to Poe? Why do you think this way?”

Tanisha replies, “Definitely. I would bring her back to life because Poe’s in a lot of pain. He’s sleeping by her side in the tomb!”

Eric retorts, “I wouldn’t. Once you die, it’s never the same when you come back. People change all the time.”

To prevent this comment from leading the students away from the poem’s content, Ms. Scott reveals an important fact from Poe’s life that they had not known. “Mr. Poe died two days after he wrote this poem. If you could speak to Mr. Poe right now, what would you say to him? Take 10 minutes to write your response, and then you’ll share them with the class.”

With the stated prompt, Ms. Scott sparks the students’ thinking about Poe as both author and speaker and provides an opportunity for the students to write their thoughts. Using their written responses, the students then interact with each other and their teacher using class discussion practices including *marking*, *turning back*, *revoicing*, and *recapping*. Marking is repeating students’ comments in a manner that draws attention to certain ideas. Turning back occurs when the teacher turns the responsibility of the conversation back to the students. Revoicing involves restating student words to add clarity; it is the “in other words” approach. Recapping the discussion reviews key points and provides closure. These discussion techniques are taught at the beginning of the year. At this point in the course, students are able to use these skills during class discussions.

Concentrating on the quality and depth of meaning that students are constructing during the reading and discussion of “Annabel Lee,” Ms. Scott keeps the focus on the topic while guiding the discussion and helping clarify confusion. Her in-depth questioning allows the students to transform the author’s ideas into their ideas and to challenge the author’s words in order to make connections to the text based on their constructive thinking and curiosity.

ReQuest in Social Studies

The students in Claudia Peña’s sixth-grade social studies class are engaged in learning how to compose questions and apply questioning strategies that help in comprehending a passage from their textbook titled *The Rise of Chinese Civilization*. They have had previous experience with ReQuest, and the emphasis of this lesson is on using multiple sources for locating information to answer questions. Ms. Peña reminds the class of the words used in formulating questions, especially *who*, *what*, *when*, *where*, *why*, and *how*. “I’m going to show you how to

make questions that you will ask the author, your peers, the teacher, and yourself,” she says as she draws a circle on the board and divides it into quarters with the respective labels: author, peers, teacher, self. She then explains that she will use headings and captions in the text to formulate her questions.

Rather than reading silently, Ms. Peña invites her students to participate in a shared reading, “China—The Land and the People.” After reading three sentences, Ms. Peña pauses and invites a student to ask a question of the class. Henok asks the class, “Why is it that the Chinese are calling themselves the ‘Central Country’?”

Margarita replies, “Because it is the cultural center of the world.”

Ms. Peña reads the second paragraph and invites another student to pose a question. Flordia says, “Why would China want to change its name to the People’s Republic of China?”

When no one has an answer, Ms. Peña points to the quarter circle marked “questions for the teacher.”

Students then ask her about the history of the name change and the reasons. After she explains the political changes that swept China over the last century, the class returns to the text.

In paragraph three, the students are introduced to countries bordering China. Tran asks, “How did China get along with its neighbors who were hunters and herders?”

Anna responds, “I don’t understand the question.”

Ms. Peña asks Anna, “What do you need to do to understand the question? Would you like me to write it on the board so you can see it?” When Anna responds affirmatively, the teacher posts the question on the board and clarifies the *who*, *what*, and *how* information. Her explanation focuses on vocabulary and context clues within the text. Confidently, Gabriela answers, “They shared things like food, ideas, talk, and money.”

Ms. Peña repeats, “What did you need to do to understand the question?”

Gabriela replies, “Reread the text for who, what, and how.”

The teacher instructs the class to read the next paragraph silently and write questions for their peers on index cards. They read about the Hwang Ho River and its flood plains and record questions on their index cards. When they finish reading, she returns to the question circle on the board and directs the students to the quarter that reads “questions for peers.” She says, “Reread your questions and ask the person sitting next to you to answer some of them.”

A buzz immediately begins. One student is overheard saying, “I found out the Hwang Ho River is also called the Yellow River. It has two names.” Other pairs compare information, clarify understanding, and even return to the text.

In this classroom, ReQuest has become a valuable means for students to formulate questions and locate accurate answers. Perhaps more importantly, these students benefit from opportunities to use language in a precise fashion. These questioning events allow them to refine and restate their questions so that they will yield the information they are seeking, which supports the development of their metacognitive strategies.

Question–Answer Relationships in Science

The chemistry students follow Malcolm North’s voice and his pointer as it moves from line to line on the text displayed on a document camera. He is engaging his students in a shared reading that describes and explains the nature of solvents,

solutes, and solutions. Directing his attention to the students, he informs them that in order to learn the information, they will use the QAR strategy. Mr. North has modeled QAR and taught it to his students. Today, the students are using QAR in a whole-class activity. They will be answering questions and generating new questions for their classmates to answer.

Mr. North reads, "It is important to realize that agitation affects the rate at which a solute dissolves." He stops and asks, "What affects the rate at which a solute dissolves?"

The class unanimously answers, "Agitation."

He quizzes, "What kind of question did I ask?"

Together they respond, "Right there."

Mr. North continues reading. "Agitation cannot influence the amount of the solute to be dissolved in a solution. In the solution, the dissolving medium is the solvent." He deliberately repeats the last statement, and students raise their hands as if on cue.

Mr. North acknowledges Serina, and she asks, "What is the solvent?"

Mr. North nods and checks the class, "Are you ready? What kind of question is Serina asking?"

After answering "Right there!" they add, "The dissolving medium is the solvent."

Before he reads the remaining text, Mr. North skims the second paragraph. He notes the term *thermodynamics*. "Someone make my day and tell me what that word means. We've met the word before."

When no one responds, he continues, "Let's divide the word into two. *Thermo* means what? *Dynamics* means what?"

Rosario replies, "Thermo means temperature."

April adds, "I think dynamics means change." As the students answer, Mr. North writes their definitions on the board.

By clarifying vocabulary without using a dictionary, Mr. North taps into his students' prior knowledge and reminds them how to discover meaning by looking for context clues. "That's an On Your Own question, folks."

Mr. North returns to the passage of the text that explains the nature of a saturated solution. He poses the question, "What is sodium chloride?"

Phan calls out, "Salt."

Mr. North asks with a knock on the desk, "What kind of salt?"

Brian adds, "Table salt."

Mr. North then asks, "If I dissolved a box of salt in a beaker of water, can I dissolve two more boxes in the same beaker? Any educated guesses?"

Serina asks, "How big is the box and how big is the beaker?"

Jorge chimes in, "Serina's right, Mr. North, because the answer to your question depends on the amount of solute and solvent. We need to know more information. It's an Author and You question." At this point, the students must rely on their own understanding about solutions, as well as information in the text.

Mr. North encourages the students' responses with a compliment and another probing question. "What if we agitated the solution, would that influence the amount of salt that goes into the solution?" This is a Think and Search question because the answer can be constructed by linking information from several parts of the text.

Phan replies, "No. The agitation would increase the rate at which it dissolves, but not the amount that dissolves."

“Mr. Phan Nguyen, you made my day!”

Ahmed asks, “Mr. North, you were talking about thermodynamics. So what’s the temperature of the solution going to be?”

“Very good question, Ahmed. How would the temperature influence your answer to my question? That’s an On Your Own question, and a great segue.” Mr. North continues, “Today you covered all the points of our shared reading. Different variables like temperature, volume of solution, and quantity of solutes are crucial in answering our scientific questions. Tomorrow during lab, we will do experiments that change the respective variables. And we’ll answer Mr. Ahmed’s question at that time.”

Mr. North’s chemistry class knows that QAR is a useful strategy for locating answers, and his budding chemists recognize explicit and implicit text language. Mr. North’s learners also realize that their experiences and knowledge contribute to their questions and answers. As a result of these teaching and learning practices, he is strategically developing and improving these students’ literacy abilities in order to enhance their understanding of the content.



Video 2.4

In this video, a teacher discusses the importance of questions and discussion.

Reciprocal Teaching in Mathematics

Todd Kupras’s students are on their hands and knees. Yardsticks clap down the sides of the algebra classroom. Groups of students huddle together over graph paper strewn across the floor of their trapezoid-shaped classroom. Today, students are assigned the task of measuring the classroom and calculating the cost of new carpet.

“How many of these little graph squares equals a foot?” demands Nakita.

“One square. One foot.” David has answered the question before.

“How many feet long did you think this wall was going to be?”

“A lot more than 26 feet,” admits David.

Working in groups of three or four, Mr. Kupras’s students are completing the first of a four-step mathematics inquiry project. At each step, they use reciprocal teaching to help arrive at their solution. You’ll recall from earlier in this chapter that students predict, question, clarify, and summarize during reciprocal teaching. Of course, they also refer to mathematics formulas and their textbook. Finishing with their first step of putting the room’s layout on paper, the students are ready to start the next.

“So, we are supposed to come up with a possible answer first.” Nakita is eager to move on with the project.

“Well, the room looks like it’s got a lot of square feet,” Saram joins the discussion.

“And, what’s a lot?”

“I’ll say 200,” decides Saram.

“You’ve got to be kidding. This room is bigger than that,” Nakita argues.

“Okay, 400.”

“Try doubling that. I bet it’s 800 square feet,” informs David.

The debate continues as each member of the group makes or adjusts his or her estimate. Upon completion, the students continue the process using reciprocal teaching’s next question: How do you go about finding an answer to the question?

“How do you find out?” Nakita continues.

“I don’t know,” Saram replies, waiting for the others to help.

“Are you so sure? What was Mr. Kupras talking about? We gotta find squares and triangles on our grid paper.”

“Then what?” Saram continues.

“Are you saying you forgot already? Then we use the area formula to figure out the square foot of the shape,” concludes David.

The group continues their discussion using Mr. Kupras’s reciprocal teaching questions as their guide. Before moving to the next step of the process, they will arrive at an answer to the room’s square footage and clarify that answer by rechecking their calculations. In this algebra classroom, Mr. Kupras uses reciprocal teaching to foster questioning. The questioning helps students arrive at the problem’s solution by gathering information, completing computations, and sharing the entire process through a presentation.

FIGURE 2.10 Mathematical inquiry process: Using reciprocal teaching to arrive at a solution

Problem framing: Deciding on the steps to be taken

- Prediction: What would be a reasonable answer to the problem?
- Question: What is being asked and how might you go about finding the answer? (Note: If students are to demonstrate the practical ability to solve mathematical problems, the cultivation of such inquiry is essential. However, the development and employment of appropriate steps is required for the successful completion of this activity. Should groups of students not arrive at the correct strategy, assist as necessary.)

Data collection: Gathering information to use

- Prediction: What would be a reasonable answer to this step? What might the collection of data look like after you are done?
- Question: What is being asked in this first step? How do you go about finding the answer at this point?
- Summary: Have you recorded or charted the data?
- Clarification: Are your data correct? How can you check your data? What results do you get when you check or repeat the process?

Mathematical applications: Applying mathematics to the data

- Prediction: What would be a reasonable answer to the application of this formula?
- Question: What are the steps of the formula or application? How do you go about its application?
- Summary: What answers do your calculations provide?
- Clarification: How do you know your answer is right? What answer do you get upon checking or using another method? (Note: The mathematical applications part of this process may take several consecutive operations. Students may wish to refer to their textbooks, handouts, and other written materials to assist in arriving at the solution. Reciprocal teaching questions may be used more than once during this part of the process.)

Verification of solution: Reflecting on the process

- Prediction: Was your prediction accurate? How close was your approximation to the actual solution?
- Question: How successful were the steps you took to complete the problem? Did you choose the best ones?
- Summary: Is your answer the correct one?
- Clarification: Have you checked your math? Could the problem be answered a different way? If so, can you arrive at the same solution?

Presentation of problem’s solution: Sharing with your peers

- Prediction: Before you started any work, what did your group think the answer would be to the problem? Why did you think this answer was a reasonable one?
- Question: What steps did your group take to arrive at the solution to the problem?
- Summary: What answer did you arrive at? How does this answer compare to the predicted answer?
- Clarification: How do you know this answer is the correct one? How did you check your answer? Were you able to find other ways to arrive at the same answer during the process?

Based on the experiences in Mr. Kupras's class and those of other mathematics teachers, here are some recommendations for using reciprocal teaching in the secondary mathematics classroom in order to foster student-generated questions:

1. Review and discuss with students all mathematical principles, concepts, and formulas to be used in arriving at the solution to the problem.
2. Apply several sequential mathematical operations to solve the problem. The problem should be authentic and of importance to your students.
3. Place students into heterogeneous groups and share the mathematical inquiry process (see Figure 2.10).
4. Manage by walking around the classroom; answer student questions and provide individual and small-group instruction as needed.
5. Provide a forum for groups to share their answers and the ways in which they arrived at their answers. Groups not presenting should take notes and add them to their findings.

Student-Generated Questioning in Electives

Perhaps the ultimate sign that questioning strategies have been integrated into student learning can be seen in Dinah Nesbit's child development careers class. This course is an elective in the regional occupational program (ROP). Students enrolled in the class are pursuing a certificate in early childhood education for an eventual career in licensed day care and preschool programs. Course work includes planning and delivering instruction that is consistent with principles of child development. Ms. Nesbit's students are preparing to read aloud stories and question their listeners, all kindergartners at a local elementary school.

The ROP classroom is busy with activity. Ms. Nesbit has just announced to her class that they will read to their kindergarten charges tomorrow. The students are excited and anxious about their teaching visit. Sensing her students' motivation, Ms. Nesbit uses this opportunity to review questioning strategies that will help their "little buddies" understand the story *The Quest for One Big Thing* (Fancher, 1998). She stresses that asking questions is not the goal; understanding and learning from listening to the story is. Ms. Nesbit advises, "Sometimes it's helpful to have the children repeat a question before they attempt to answer it." She continues, "And if the child answers your questions, what follow-up questions will encourage him to think more deeply?"

Enrique responds, "I would ask, what makes you say that?"

Andre chimes in, "I'd say, how do you know that?"

Ms. Nesbit takes the lead and asks, "What do you do if the children ask you a question? How could their questions help you as the teacher of the story?"

"From their questions, we can see whether the kids understand the story or whether they are mixed up," offers Lila.

"What do you think about posing 'what if' questions?" asks Ms. Nesbit.

Carlos joins the discussion. "The kids like when I ask 'what if' questions because they can use their imagination and answer the way they like to."

"They think 'what if' questions are fun," Louisa agrees. "I've seen them asking each other that kind of question when they're playing."

“Can anyone give an example of a ‘what if’ question you could use with this story?” asks Ms. Nesbit.

Angel volunteers, “What if you were a circus bug that was helping with the harvest in the story? What would you do?”

“You did that so well, Angel. Let’s try posing an open-ended question to solve the harvest problem,” challenges Ms. Nesbit.

Angel hesitates, and Leslie jumps in and questions, “How would you get the One Big Thing back to the bug colony?”

Ms. Nesbit smiles with satisfaction as she records their questions on the board. She writes a list of the questions the students have identified during the review of QtA and QAR. Then Ms. Nesbit directs the students to write specific questions about the characters, setting, events, and message of the story.

After preparing their questions, the students share their inquiry choices and write them on small sticky notes to serve as reminders when they read the story aloud. Ms. Nesbit points out the importance of questioning as a teaching strategy as well as a strategic approach to learning. “When we elicit ideas through questions as teachers and learners, we gain information and valuable insight into our own thinking processes. When we demonstrate strategic ways of reading, we stimulate thinking for our peers and other learners, namely the kindergartners.”

Ms. Nesbit’s focus on questioning strategies has benefited her own students as well. Their awareness and practice of questioning strategies guides their own comprehension. As a result, the process of applying strategies to content area study becomes internalized as students use questioning techniques in the context of a group activity or independent reading.

Check Your Understanding 2.6

Conclusion

The range of questioning and discussion techniques discussed in this chapter provides teachers and learners with ways to monitor and guide their construction and examination of meaning in reading, writing, talking, listening, and reflecting. These begin with recognizing the indicators of quality questions and follow-ups, such as noticing and naming students’ intellectual moves, building a learner’s agency and identity, and promoting flexibility and transfer. The questions teachers ask should target a number of different purposes, including identifying the author’s point of view, understanding the relationship between questions and answers, fostering close attention to the text, and broadening students’ thinking using essential questions. These questions serve as the basis for moving to a classroom that features true dialogue and discussion, rather than simple question-and-answer routines that limit critical thinking.

Discussion is an essential tool in a teacher’s formative assessment toolbox, as it provides insight into how a learner’s knowledge is developing. It is especially important in being able to detect misconceptions and partial understandings, so that they can be addressed in a timely way. The frameworks developed by both Bloom and Webb provide teachers with means of determining knowledge development, as critical thinking occurs when understanding is both broadened and deepened. These frameworks are valuable tools for self-reflection, as effective teachers are pushing themselves to move beyond recall and recognition tasks.