

increase word recognition automaticity? Samuels (1967) proposed the *focal attention hypothesis*, which holds that visual attention should be focused on the printed word rather than the context. Thus word recognition training that relies on context such as pictures and sentences is seen as distracting the reader from focusing on the printed word. For example, Ehri and Roberts (1979) asked first graders to learn to read 16 words using flash cards. For some students, each card contained just one word; for others, each card contained a target word within the context of a sentence. As expected, students in the word-only condition could sight-read the words faster (averaging 10.9 seconds) than could students in the context condition (averaging 15.7 seconds). Students in the word-only condition, as compared to the context condition, remembered more about the orthographic characteristics of the words, such as the correct spelling, but less of the semantic characteristics of the words needed to generate a sentence. Similarly, Nemko (1984) asked first graders to learn to read 16 words using flash cards, with each word presented either individually or in the context of a sentence. The test involved reading each word either individually or within a sentence. The best performance was for students who learned and were tested with individual words.

Samuels (1979) argued that as readers become more fluent, their comprehension improves, for "as less attention is required for decoding, more attention becomes available for comprehension" (p. 405). Unfortunately, the idea that training in decoding automaticity will improve reading comprehension is not universally supported. Fleisher, Jenkins, and Pany (1979) gave decoding training to poor readers in the fourth and fifth grades. First, students in the trained group practiced by rapidly reading single words from flash cards, whereas students in the control group received no training. Then, all students took a criterion test in which they were asked to read a randomly ordered list of the words that the trained group had practiced reading. Students in the trained group reached a level of automaticity in which they made nearly no errors and read at least 90 words per minute; in contrast, the control students read at half the rate and made many more errors. Next, all students read two passages containing the practice words and took a 12-item comprehension test. Although the trained group read the passage faster than the control group (91 words per minute versus 61 words per minute, respectively), there were no significant differences between the groups in comprehension test performance. A reasonable conclusion to draw from this study is that automatic decoding is a necessary but not sufficient condition for improved comprehension. Rapid decoding skill may help reduce the bottleneck (or demands on memory processes), but a skilled reader also needs to know how to use comprehension strategies.

In a review, Dowhower (1994) concluded that "because of the strong evidence of the effectiveness of repeated reading . . . this procedure should be integrated into the fabric of daily literacy instruction" (p. 343). Based on current research, Dowhower argued that students benefit from unassisted repeated-reading procedures in which they read and reread aloud on their own, and from assisted repeated-reading procedures in which they read and reread along with a teacher. If both methods are used, Dowhower suggests beginning with the assisted procedure and subsequently introducing the unassisted procedure for each passage. Koskinen and Blum (1986) developed a modified version of repeated reading in which children work in pairs as they take turns reading 50-word passages three times to each other. The ultimate goal of the method of repeated readings and other forms of automaticity training is for children to be able to decode words without having to pay conscious attention to the decoding process.

In the decades since Samuels (1979) popularized the method repeated reading, researchers have been busy testing its effectiveness. Kuhn and Stahl (2003) examined the results of 58 studies comparing fluency instruction aimed at practice in oral reading of words (such as repeated reading) with control groups who received no such practice. For example, fluency instruction can involve asking children to orally read a short passage repeatedly (nonassisted, repeated), orally read many different short passages (nonassisted, nonrepeated), or orally read along with an adult or other students (assisted, repeated, or nonrepeated). In most studies the learners were second graders who had begun to learn decoding skills but had not yet mastered them. The main findings were that fluency instruction was “generally effective” with (a) assisted methods more effective than nonassisted methods, (b) repetitive methods no more effective than nonrepetitive ones, and (c) the effects strongest for measures of reading comprehension and on oral reading with appropriate expression and rhythm (i.e., what linguists call “prosody”).

Overall, research on fluency training suggests ways of improving upon the method of repeated reading to foster automaticity in decoding. First, it is helpful for children to hear others read a passage before or while they read it (i.e., assisted practice). Second, it is helpful to practice reading passages—but children do not necessarily need to read the same passage over and over. Third, the improvements in oral reading fluency include improvements in prosody—speaking with appropriate expression and rhythm.



Accessing Word Meaning

WHAT IS MEANING ACCESS?

The preceding sections highlight three cognitive processes involved in being able to read a printed word: *phonological awareness*—being able to recognize the sound units that make up words (e.g., when hearing the word “cat,” being able to recognize that it is composed of the three sounds /k/, /a/, and /t/); *decoding*—knowing which sounds go with the printed letters that make up words (e.g., knowing that in the printed word “cat,” the letter “c” goes with the sound /k/); and *decoding fluently*—being able to decode without paying heavy attention. These three cognitive skills are essential for reading, but they are not enough. As an example, please read the following sentence aloud: “Ismam stog kopob amjut metula ildat.” This sentence is not a secret message, but rather a collection of pronounceable nonwords. Although you might be able to say each of the words aloud, this exercise is not very meaningful. What is missing from this exercise? The words you read had no meaning to you. When you read a familiar English word, you engage in an important cognitive process that can be called *meaning access*, or finding in your memory a mental representation of the meaning of the word. Thus, meaning access is the fourth essential cognitive process involved in reading a word.

Meaning access depends on the reader knowing the meanings of many words—what educators call having a *vocabulary* and what linguists call knowing a *lexicon*. For example, when you see the printed word “cat” you not only can pronounce the word aloud but you also can think of a small furry four-legged animal that purrs. In thinking of what “cat” means you are engaging in meaning access. In short, the search for word meaning can be called meaning access.

Nagy and Scott (2000) estimate that young readers need to add at least 2,000 new words to their vocabulary each year. If building a vocabulary is a prerequisite for learning to read, it is useful to ask where children's vocabularies come from and how best to foster this vocabulary growth. Two approaches to fostering growth are immersion and direct instruction. In immersion, the child is encouraged to engage in literacy activities such as reading, writing, listening, and speaking. Reading books to young children is an example of an immersion approach. In short, the child is placed in an environment that is rich with words. In direct instruction, the child is asked to learn the definitions of specific words as a learning activity. Giving a student a list of words and asking them to learn the definition of each word is an example of the direct instruction approach. A related approach is to teach students skills for how to analyze word meaning, such as understanding of prefixes, suffixes, and root words.

How can we tell how many words a student knows? We could begin with a list of 4,000 common words and ask thousands of children at various grade levels to select their meaning on a three-choice multiple-choice test. Then, we could categorize the words into six levels based on the lowest grade level where more than two thirds of the students gave the right answer. This is the approach taken by Dale and O'Rourke (1981) in their creation of the *Frequency Word Vocabulary*. For example, words like "voice" and "fish" were in the lowest level and words like "omnious" and "discord" were in the highest level.

The next step is to select 100 root words from each level. A root word does not contain grammatical variations (e.g., "change" rather than "changed"), is not a literal compound (e.g., "tax" and "payer" rather than "taxpayer"), and does not have an affix (e.g., "well" rather than "wellness"). In addition, let's eliminate words that are idioms or archaic. Of the 100 root words at each level, let's ask students to define 10 of them, by saying,

I'm going to read you a sentence and then ask you what a word means in that sentence. You can use words, pointing, or acting to explain the meaning of that word.
Johnny caught a fish. In this sentence what does "fish" mean?

By the way, the correct answer is to say that a fish is a water animal. We can compute the percentage correct for each of the six levels, multiply that percentage by the total number of root words in each level, and then add them up. For example, if a student scored 50% correct on the lowest level and there are 2,500 root words at that level, we can estimate that the student knows 1,250 of the words at the lowest level, and so on for each of the six levels. This is the approach taken by Biemiller and Slonim (2001), which led to their conclusion that the second graders they tested knew about 5,200 root words and the fifth graders they tested knew about 8,400 root words. This means that students gain about 1,000 root words per year during elementary school, or about 3 new words a day. This number is less than Nagy and Scott's (2000) estimate of students adding 2,000 words per year, and represents the lower end of such estimates.

Determining which approach—immersion or direct instruction—is better constitutes a central issue in research on vocabulary learning. The case for immersion is based on the sheer magnitude of the vocabulary learning task. If a child attends school for 180 days per year, he or she must learn more than 10 new words a day in school to sufficiently build a vocabulary. It is doubtful that there is enough instructional time in the school day to achieve this goal. For this reason, Nagy and Scott (2000) conclude that "the high rates of vocabulary growth seen in many children occur

only through immersion in massive amounts of rich written and oral language" (p. 280). Pressley and Woloshyn (1995) observe that "the evidence is simply overwhelming (and continues to increase) that children learn new vocabulary by hearing and rehearing stories and other content that are rich in vocabulary, as well as talking about and retelling what they have heard" (p. 102).

The case for direct instruction is that some words need to be explained because students may not be able to master them simply from context. Pressley and Woloshyn (1995) summarize evidence that "students learn quite a bit from simply processing a word and its definition" (p. 103). For example, in Chapter 13, I describe the keyword method, which has been shown to be effective in helping students memorize definitions for vocabulary words. However, students may also benefit from semantically based techniques such as learning to use new words in sentences (Blachowicz & Fisher, 2000) or from learning word analysis skills based on prefixes, suffixes, and core words (Pressley & Woloshyn, 1995).

This section explores basic research relevant to meaning access (including context) and instructional studies aimed at improving the process.

RESEARCH ON MEANING ACCESS: CONTEXT EFFECTS

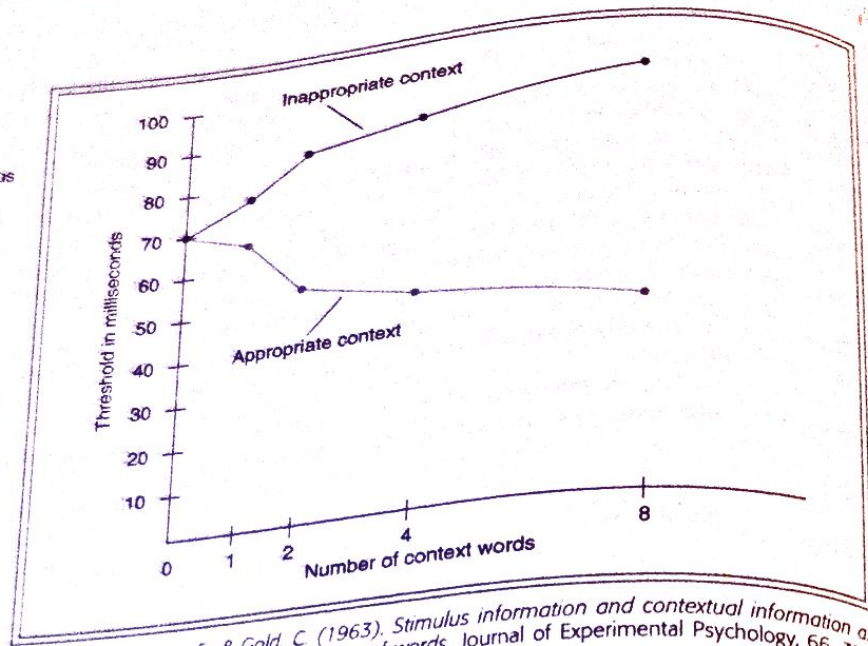
Context effects are the impact of the context of a word within a sentence on the speed and accuracy of word recognition. Tulving and Gold (1963) reported a landmark study concerning the role of sentence context on word meaning. In the experiment, a word was flashed on the screen and the subjects were asked to read the word aloud. Before the word was flashed, subjects were given a cue such as, "The actress received praise for being an outstanding _____." As you can see, this cue provides what Tulving and Gold called an *appropriate context* for the target word "performer," but an *inappropriate context* for the target word "potato." The length of the cue given before the target word was either zero (i.e., no cue), one, two, four, or eight words. Longer cues, presumably, provide a stronger context for the target word.

Figure 2-13 summarizes the results of the experiment. The researchers measured the amount of time that a word had to be presented for a subject to be able to read it. When the target word was presented after an appropriate context, subjects were able to read it even when the duration of the flash was short. But when the target word was presented after an inappropriate context, it had to be presented for a longer time. As shown in Figure 2-13, the time needed to read a word that followed a long, appropriate cue was about half as much as the time needed to read a word that followed a long, inappropriate cue. Compared to having no cue, inappropriate contexts tended to inhibit the subject's ability to read a word, whereas appropriate contexts tended to facilitate that ability.

These results demonstrate the role of the reader's knowledge of meaning and syntax in word reading. One explanation is that the context provides syntactic cues (i.e., cues about what part of speech should occur) and semantic cues (i.e., cues about the possible meanings of the word). These cues allow the reader to generate specific hypotheses even before the target word is presented. If the hypotheses are correct, less reading time will be required; if the hypotheses are incorrect, more time will be required to generate and test new hypotheses.

FIGURE 2-13

Time to read
a word in an
appropriate versus
inappropriate
sentence context



Source: From Tulving, E., & Gold, C. (1963). Stimulus information and contextual information as determinants of tachistoscopic recognition of words. *Journal of Experimental Psychology*, 66, 322. Copyright 1963 by the American Psychological Association.

West and Stanovich (1978) extended the Tulving and Gold research method to younger readers. For example, fourth graders, sixth graders, and adults were asked to read words that were presented on a screen. Some target words were preceded by a sentence context that was not congruent with the word, some target words were preceded by a sentence context that was congruent, and others were preceded only by "the." West and Stanovich measured the amount of time between presentation of the target word and the subject's pronunciation of the word. Figure 2-14 shows that for all age groups, performance was better for words in congruous sentences; however, the effects of context appear to weaken for older subjects. Apparently, adults are less reliant on context than children. One possibility is that adults search for word meaning in an automatic way, whereas children are more conscious of the context.

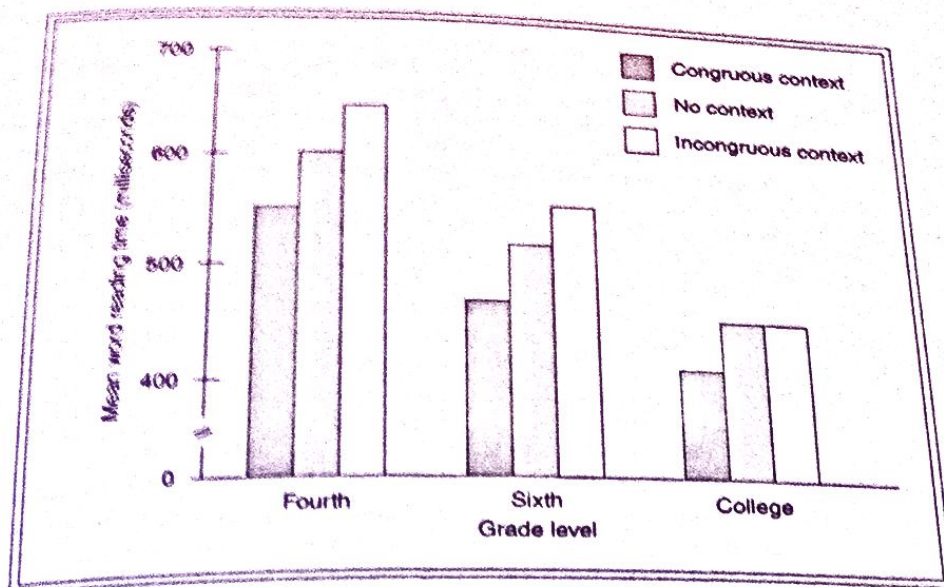
In a review of research comparing good and poor readers, Spoehr and Schubert (1981) found that poor readers were more influenced by context cues than were good readers. For example, in the West and Stanovich study, poorer readers showed a greater context effect than did good readers. Schvaneveldt, Ackerman, and Semlear (1977) found a developmental trend similar to that obtained by West and Stanovich in which younger readers showed a greater context effect than did older readers. These results are consistent with the idea that meaning access becomes automatic in good readers, whereas the use of context cues is more time-consuming and conscious in poorer or younger readers.

FIGURE 2-14

Average time
to pronounce
a word in
a congruous
incongruous
context or
preceded only
by "the"

FIGURE 2-14

Average time to pronounce a word in a congruous or incongruous context or preceded only by "the"



Source: From West, R. F., & Stanovich, K. E. (1978). Automatic contextual facilitation in readers of three ages. *Child Development*, 49, 721. © Society for Research in Child Development, Inc. Reprinted by permission.

IMPLICATIONS FOR INSTRUCTION: VOCABULARY TRAINING

The foregoing results show that good readers are more efficient than less skilled readers in finding a word's meaning from memory. Let's suppose that improvement in the speed of meaning access (i.e., the time needed to retrieve a word's meaning from long-term memory) is a skill that can be taught. Vocabulary training is a popular technique for increasing the efficiency of readers' meaning-access processes (Pressley, 1990).

Not surprisingly, children who have better vocabularies (i.e., knowledge of the meanings of more words) perform better on reading comprehension tests (Anderson & Freebody, 1981). Similarly, changing unfamiliar words in a passage to more familiar synonyms increases children's reading comprehension (Marks, Doctorow, & Wittrock, 1974), and word recognition is easier when words are embedded in a familiar rather than unfamiliar context (Wittrock, Marks, & Doctorow, 1975). The explanation for these results is that when the words in a passage are unfamiliar, students must focus their attention on the process of meaning access; in contrast, when the words are familiar, students can access their meaning automatically and use their attention to comprehend the passage.

A straightforward implication of these findings is that reading comprehension will be enhanced if students are given vocabulary training. However, analyses of school reading materials in Grades 3 to 9 found that as many as 88,000 distinct word meanings are

required, and the average school student acquires as many as 2,000 to 5,000 word meanings per year (Nagy & Anderson, 1984; Nagy & Herman, 1987; Nagy, Herman, Anderson, 1985; Nagy & Scott, 2000). By the way, this number differs so greatly from the estimate of 1,000 root words because it may include multiple meanings of the same word. According to Nagy and his colleagues, the direct instruction of vocabulary words would not be able to produce such large vocabulary growth in students. Instead, the bulk of new vocabulary words must be learned from context, that is, from reading or listening to or producing prose. Thus, exercises such as silent reading, in which students read books for a certain period of time on a regular basis, can serve as vocabulary training exercises.

In spite of these warnings concerning the limitations of direct vocabulary instruction, there have been numerous studies aimed at teaching vocabulary to young readers. Many of these studies are successful in teaching vocabulary as measured by multiple-choice tests, but not in greatly influencing readers' comprehension (Nagy & Herman, 1987; Pearson & Gallagher, 1983). One reason for the failure of some vocabulary training programs is that much printed material in schools can be understood with a vocabulary of only 4,000 words. Training in new words reaches a point of diminishing returns, because most words outside this basic core of 4,000 words occur very rarely in school materials. For example, Nagy and Anderson (1984) found that most of the words in school materials occur less than one per million. Learning the meaning of words that occur with such low frequency is unlikely to have a substantial effect on comprehension.

Vocabulary training programs that successfully enhance comprehension tend to be those that help the reader embed each word within a rich set of experiences and knowledge and that involve test passages containing the just-learned vocabulary words (Kameenui, Carnine, & Freschi, 1982). For example, in a series of studies, fourth, fifth, and sixth graders read a passage and then answered test questions about the passage. Some of the students received a passage that contained difficult vocabulary words, whereas others received a passage where easier synonyms were substituted. The following example is a portion of the passage with the difficult words in italics and the easier synonyms in parentheses:

Joe and Ann went to school in Portland. They were antagonists (enemies). They saw each other often. They had lots of altercations (fights). At the end of high school, Ann maligned (said bad things about) Joe. Then Ann moved away. Joe stayed in Portland. He got a job as a bailiff (worked for a judge). One day Joe was working, and he saw Ann. Ann did not see Joe. Ann looked apprehensive (afraid). She was being incarcerated (under arrest). (p. 373)

The test included literal questions such as:

Joe and Ann saw each other _____ in school.

- (a) never
- (b) not much
- (c) frequently
- (d) often

FIGURE 2-1

Percentage correct on literal and inferential questions for three vocabulary treatment groups

In addition, the test included inference questions such as:

- Joe works in a _____
- (a) school
 - (b) hospital
 - (c) courthouse
 - (d) university

Figure 2-15 shows the percentage of correct answers given by students reading the difficult and easy vocabulary versions of the passage on literal and inferential questions. Those who read the easy version performed slightly better on literal questions and much better on inference questions. Apparently, a reader who understands the words has more opportunity to make meaningful inferences about the story. The most interesting aspect of the study, however, involved an attempt to train some readers in the meanings of the six difficult vocabulary words before they read the passage. The training involved extensive discussions about each word, such as the following dialogue for altercations.

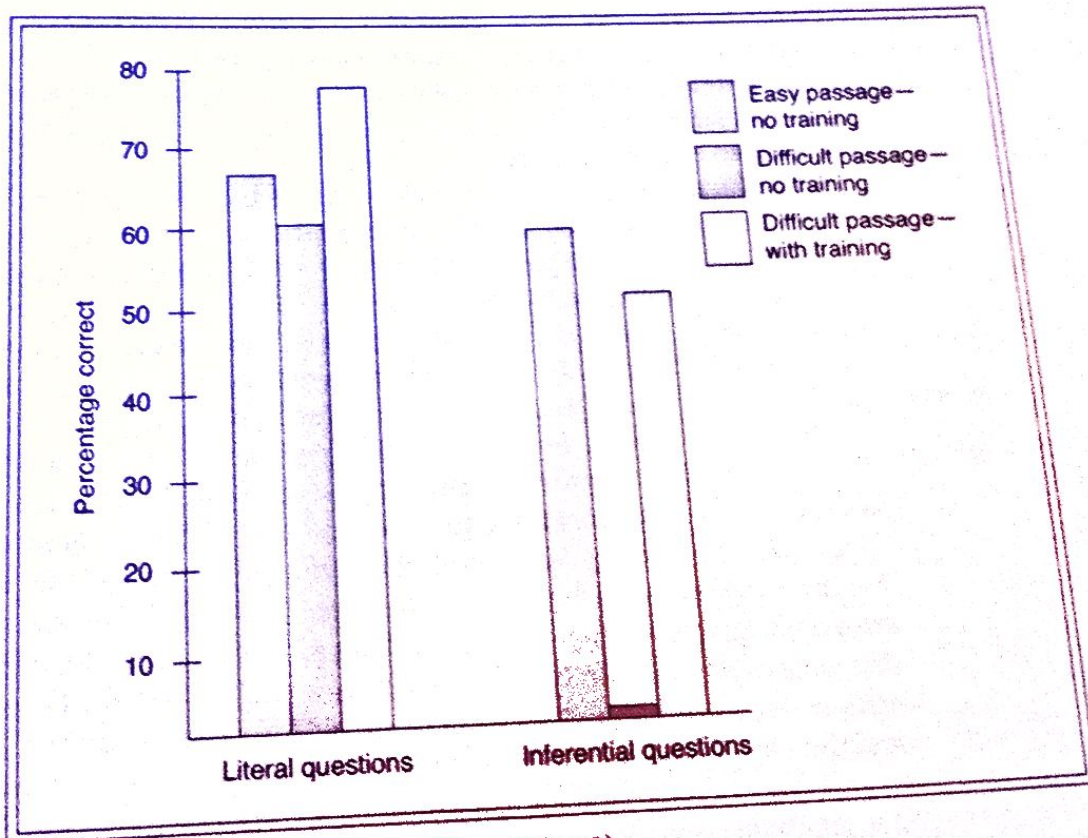
The experimenter placed an index card containing one vocabulary word and its meaning on the desk in front of the subject.

EXPERIMENTER: This word is "altercations." What word is this?

CHILD: "Altercations."

FIGURE 2-15

Percentage correct on literal and inferential questions for three vocabulary treatment groups



Adapted from Kameenui, Camine, and Freschi (1982).

EXPERIMENTER: Correct, "altercations." What does "altercations" mean? [The experimenter points to the meaning given on card.]

CHILD: "Fights."

EXPERIMENTER: Yes, "altercations" means "fights." Listen, do you have altercations with your teacher? [Child responds.] Do you have altercations with a tree? [Child responds.] So what does "altercations" mean?

CHILD: "Fights."

The new vocabulary word is then integrated with the next one. For example, after the experimenter has gone through the same process for "antagonists," the experimenter asks "Listen, do you have any antagonists? [Child responds.] Do you have any altercations with your antagonists? [Child responds.]"

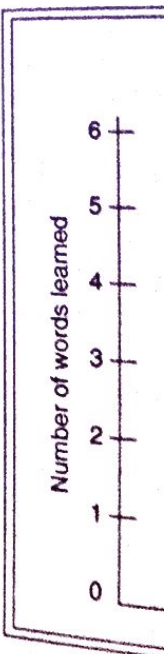
Does vocabulary training improve reading comprehension? As Figure 2-15 indicates, students who were given vocabulary training before reading the difficult vocabulary version of the passage tended to excel in answering both literal and inference questions. You should note, however, that the training was for words that were specifically required for the passage and that the training forced the reader to connect the vocabulary words with the reader's prior knowledge and experience.

Beck and her colleagues (Beck, Perfetti, & McKeown, 1982; McKeown, Beck, Omanson, & Perfetti, 1983) also developed techniques for helping readers embed words within their own experiences. Their extensive vocabulary training was successful in increasing readers' comprehension of texts that contain the just-learned words. Again, success seems to be tied to knowledge-based training and tests that involve the specifically taught words (Stahl & Fairbanks, 1986). More recently, Baumann, Edwards, Boland, Olejnik, and Kame'enui (2003) have shown that it is possible to teach specific vocabulary and specific contextual analysis strategies within the context of fifth-grade social studies reading.

Consider this scenario: A teacher sits in front of a group of first graders and reads an interesting children's storybook to the class. The goal is to improve the children's language skill, including their vocabulary. Brabham and Lynch-Brown (2002) note that "reading aloud has been a cornerstone of literacy development and classroom practice for over a century" (p. 465), and report evidence that 100% of elementary school teachers read aloud to their students at least several times a week.

How can this practice of reading aloud to students be designed to maximize the vocabulary growth of the students? To help answer this question, Brabham and Lynch-Brown (2002) asked teachers to read books to first- and third-grade students using three different reading-aloud methods. In the just-reading method, teachers read a book aloud (in about 10 minutes) without student interruption and then asked students to work silently at their seats on tasks such as answering questions and drawing. This was repeated for 3 more days to maximize vocabulary learning. In the performance method, the teacher began with a 5-minute discussion of the story with scripted comments and questions, then read the story without student interruption (in about 10 minutes), and then followed up with continued guided discussion based on scripted comments and questions. In the interactional method, the same scripted comments were included before, during, and after the teacher read the story. For example, after reading a portion of the story, the teacher asked questions to stimulate discussion, so the story-reading activity lasted about 20 minutes, with 5 minutes allocated to discussion before the reading and 5 minutes after. Thus, all students heard the same 10-minute story and spent another 20 minutes working on related

FIGURE 2-15



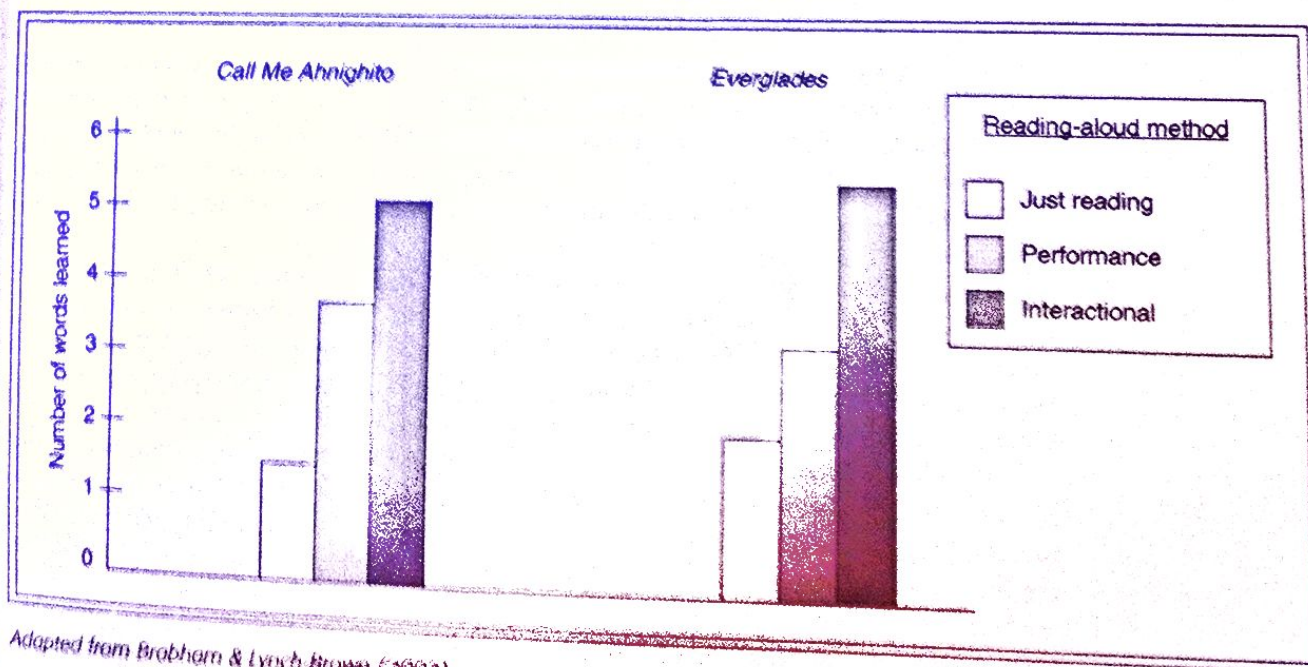
Adapted from E

activities, but students in the just-reading method never had a chance to discuss the story as a class. Afterward, students took a 20-word vocabulary test based on words from the story with items such as: Does “abandoned” mean “(a) left all alone,” “(b) put in a band,” or “(c) made off limits”? This procedure was carried out for two different books.

Figure 2-16 shows the effects of the three reading-aloud methods on vocabulary gains for the two books (*Call Me Ahnighito* and *Everglades*). As you can see, although reading aloud without discussion (i.e., just-reading group) resulted in vocabulary gains, students in the performance group gained more than twice as many words as those in the just-reading group, and students in the interactional group gained more than three times as many words as those in the just-reading group. Overall, students who received the interactional method gained significantly more words than students in either of the other two groups and students in the performance method gained more words than students in the just-reading group. These results show that all styles of reading aloud to students are not equally effective. The vocabulary gains fostered by reading aloud to students is greatly improved when the teacher carefully guides discussion before, during, and after the reading. This research suggests that learners in the primary grades can benefit from guidance in how to learn word meaning from context.

Overall, research on vocabulary training shows that certain forms of direct instruction can be effective in improving students’ vocabularies, but that immersion is essential to foster the amount of vocabulary growth that students need. For example, based on the most conservative estimates, students need to learn about 1,000 words a year in the primary grades, but no more than 300 words are learned from direct vocabulary instruction (Biemiller & Slonim, 2001; Joshi, 2005). Thus, instead of asking which approach is best, it makes more sense to craft a program of vocabulary instruction that builds on the best features of both approaches. Cunningham (2005) summarizes this point in a recent review: “Children are constantly learning the meaning of words through their encounters with

FIGURE 2-16 Number of words learned under three reading-aloud methods



Adapted from Brotham & Lynch Brown (2002).