
Chapter 6

Teaching Prefixes

Making Strong Instruction Even Stronger

Michael F. Graves
Melanie Ruda
Gregory C. Sales
James F. Baumann

In the first edition of *Vocabulary Instruction: Research to Practice*, one of us (Graves, 2004) authored a chapter titled “Teaching Prefixes: As Good as It Gets?” in which he provided a rationale for prefix instruction, reviewed prior research on prefix instruction, and described a specific method of teaching prefixes in some detail. He concluded by posing the question of whether the instruction described is as good as prefix instruction is likely to get and answered that question with a definite “no,” saying that there is always the potential for improving instruction.

As we write this chapter for the second edition of *Vocabulary Instruction*, the four of us are working on an Institute of Education Sciences/Small Business Innovation Research (IES/SBIR) grant from the U.S. Department of Education to develop an instructional program for teaching word-learning strategies. IES/SBIR grants provide funds to small businesses to produce educational materials and programs. Gregory Sales is the Principal Investigator on the project, Melanie Ruda is the lead instructional designer, and Michael Graves and James Baumann are consultants. The purpose of the grant is to develop and test a comprehensive program to teach fourth and fifth graders a set of practical, research-based, and theoretically sound strategies for inferring the meanings of unknown words they encounter while reading. The strategies to be taught include using context, word parts

(compound words, inflectional suffixes, prefixes, and derivational suffixes), and dictionaries. Additionally, Spanish-speaking English learners (ELs) will receive instruction in using cognates, and all ELs will receive instruction in recognizing idioms. The final product will be a comprehensive supplementary program to teach word-learning strategies.

We have been working on the project for about 2 years and still have about a year's work left. We have, however, completed most of the prefix instruction and tested a partial version of that instruction. In this chapter, we describe the instruction detailed in the original chapter, note the major changes we have made to that instruction in the present project, and comment on the extent to which we believe we have strengthened it.

THE 2004 APPROACH TO TEACHING PREFIXES

Space does not allow us to present our rationale for prefix instruction or review the research on prefix instruction. For that information, we recommend reading the original chapter (Graves, 2004). What we do include here, however, is a description of our general approach to instruction, other influences on the instruction, and a fairly detailed description of 5 days of instruction.

A General Approach to Instruction

The general approach used is explicit instruction (Pearson & Gallagher, 1983; Duke & Pearson, 2002), which includes these components:

- An explicit description of the strategy and when and how it should be used.
- Teacher and/or student modeling of the strategy in action.
- Collaborative use of the strategy in action.
- Guided practice using the strategy with gradual release of responsibility.
- Independent use of the strategy (Duke & Pearson, 2002, pp. 208–210).

Other Influences on the Instruction

Overhead transparencies have played a major part in several studies of strategy instruction, and they are used in the instruction described here. They serve two particular functions: They focus students' attention, and they free teachers from the task of writing on the board and in doing so let them better attend to students and their presentation.

A good deal of strategy instruction has included what Rosenshine and Meister (1994) refer to as “concrete prompts,” brief summaries of the actions students undertake in using the strategies. In the approach suggested here, students are given a set of concrete prompts that are prominently displayed on a poster that is frequently referred to during the instruction and that remains up after the instruction.

The instruction described here includes elements from four studies (Baumann et al., 2002; Ess, 1979; Graves & Hammond, 1980; Nicol, 1980; White, Sowell, & Yanagihara, 1989) that have a good deal in common. However, because the information on Nicol’s approach is the most detailed (a 150-page master’s thesis), we rely primarily on her approach. The instruction also follows the three-part framework employed by Baumann and his colleagues: an introduction and examples of the lesson content; verbal explanations, modeling, and guided practice; and independent practice. Additionally, the approach includes one component that has not been a part of previous studies: deliberate and systematic review.

Day 1: Introduction, Clarification, Motivation, and Overview

On day 1, the teacher introduces the concept of prefixes and the strategy of using prefixes to unlock the meanings of unknown words, attempts to motivate students by stressing the value of prefixes, and gives students an overview of the unit. As Stotsky (1977) has shown, there has been a good deal of confusion about prefixes and prefix instruction, and thus it is particularly important to be sure that students understand just what prefixes and prefixed words are.

To alert students to what they will be studying and as a continuing reminder throughout the prefix unit, on the first day of instruction, the teacher displays a poster advertising the instruction, perhaps something like: “Prefixes—One Key to Building Your Vocabularies.” Then, the teacher might say something like this:

“Over the next few days, we’re going to be looking at how you can use prefixes to help you figure out the meanings of words you don’t know. If you learn some common prefixes and how to use your knowledge of these prefixes to understand words that contain those prefixes, you’re going to be able to figure out the meanings of a lot of new words. And, as you know, figuring out the meanings of words you don’t know in a passage is an important step in understanding the passage.”

Next, the teacher asks students what they already know about prefixes, reinforcing correct information students provide and gently suggesting that any incorrect information they give is not quite on target.

The purpose here is to get students thinking about prefixes and to get them actively involved in the session. However, it is critical that students have a clear understanding of prefixes, and for this reason, the teacher follows the discussion with a presentation supported by an overhead transparency. Below is the transparency, which the teacher reads aloud to students.

A prefix is a group of letters that goes in front of a word. *Un-* is one prefix you have probably seen. It often means “not.”

- Although you can list prefixes by themselves, in stories or other things that we read, prefixes are always attached to words. They don't appear by themselves. In *unhappy*, for example, the prefix *un-* is attached to the word *happy*.
- When a prefix is attached to a word, it changes the meaning of the word. For example, when the prefix *un-* is attached to the word *happy*, it makes the word *unhappy*, which means “not happy.”
- It's important to remember that, for a group of letters to really be a prefix, when you remove them from the word, you still have a real word left. Removing the prefix *un-* from the word *unhappy* still leaves the word *happy*. That means that *un-* in the word *unhappy* is a prefix. But if you remove the letters *un* from the word *uncle*, you are left with *cle*, which is not a word. This means that the *un* in *uncle* is not a prefix.

This is a lot for students to remember, too much, in fact. For this reason, the teacher constructs a shortened version of these points on a “Basic Facts about Prefixes” poster, puts that up next to the poster on the unit, and tells students that the poster will stay up for them to refer to throughout the unit and even after that.

At this point, the teacher asks students if they know any additional prefixes, being generally accepting of their answers, but (assuming that some responses are incorrect) noting afterward that some of the elements given are not actually prefixes and that the class will continue to work on what is and what is not a prefix as the unit progresses.

Finally, the teacher introduces the three prefixes for study the next day: *un-* (not), *re-* (again), and *in-* (not)—putting them on an overhead, asking students to copy them down and asking students to each bring in a word beginning with one of the prefixes the next day. These three prefixes are taught at the beginning of the program because they are used in large numbers of words.

Day 2: Instruction on the First Three Prefixes

At the beginning of the session, the teacher refers to the “Basic Facts” posters and briefly reminds students of what prefixes are, where they appear, and why it is important to know about them. Then, the teacher calls on some students to give the prefixed words they have located, jotting down those that are indeed prefixed words on the board and gently noting that the others are not actually prefixed words and that they will discuss words of this sort later.

After this, the teacher begins the standard instructional routine for teaching prefixes and prefix removal. This standardized routine is used for three reasons. First, there is experimental evidence that it works. It is basically the one validated in Nicol’s (1980) study, with some additions from the Baumann et al. (2002) study. Second, using the same routine for teaching all the prefixes to be taught means that students can soon learn the procedure itself and then concentrate on learning the prefixes and how to work with them. Third, this routine can serve as a model for teachers to use in creating a complete set of materials for teaching prefixes and the strategy of prefix removal and replacement.

Next, the teacher tells students that today they will be working with the three prefixes introduced the day before and how to use them in unlocking the meanings of unknown words. Again, the three prefixes are *un-* meaning “not,” *re-* meaning “again,” and *in-* also meaning “not.” In teaching these three prefixes, the teacher will use several types of materials: transparencies introducing each prefix, worksheets with brief exercises requiring use of the prefix just taught, transparencies of these worksheets, exercise sheets requiring additional use and manipulation of each prefix, and review sheets on which students manipulate the three prefixes and the words that were used in illustrating the prefixes for the day. On the back of the worksheets, exercise sheets, and review sheets are check sheets (answer keys) so that students can immediately check their efforts.

Each introductory transparency presents one prefix, illustrates its use with two familiar words and two unfamiliar words, and uses each of the four words in a context-rich sentence. Below each sentence, the word and its definition are shown, and below these sample sentences is a fifth sentence that gives students a root word and requires them to generate the prefixed form of the word.

Instruction begins with the teacher displaying the first sentence on the introductory transparency and leading students from the meaning of the familiar prefixed word to the meaning of the prefix itself, as illustrated below:

TEACHER: If Tom were asked to *retake* a test, what must he do?

STUDENTS: He has to take it over. He has to take it again.

TEACHER: That's correct. Using your understanding of the word *retake*, what is the meaning of the prefix *re-*?

STUDENTS: Again. Over again.

The process is repeated with the next three sentences on the transparency. With some prefixes, students are likely to be able to volunteer the response without difficulty. With other prefixes, students may need further prompting, in which case the teacher rephrases the sentence to add more clues. If students are still unable to respond after the prompting, the teacher gives the definition. After going through the first four sentences on the *re-* introductory overhead, the teacher presents the fifth sentence, which defines the unknown root word and asks students to define the prefixed word.

After completing introductory instruction on the first prefix, students individually complete their check sheets, while a student volunteer completes the check sheet on a transparency. As soon as students complete their check sheets, the volunteer puts the transparency on the overhead so that all students receive immediate feedback on their work. If the volunteer has made an error, the teacher corrects it at this time.

These same procedures are then completed with the two remaining prefixes for the day: *un-* and *in-*. Following initial instruction on the three prefixes, the students complete a review sheet and immediately receive feedback by checking the answers on the back of the sheet. While students are completing the review sheet, the teacher monitors their work and provides assistance when requested. This concludes the second day of the unit.

Day 3: Review, the Prefix Strategy, and the Remaining Three Prefixes

Day 3 begins with the teacher reviewing the basic facts about prefixes. Then students complete a review sheet on the three prefixes taught the previous day and immediately correct their work.

Next comes another crucial part of the instruction—instruction in the prefix strategy. The teacher introduces the strategy by telling students that now that they have worked some with the strategy and understand how useful prefixes can be in figuring out the meanings of unknown words, she is going to teach a specific strategy for working with unknown words. The teacher titles the procedure “Prefix Removal and Replacement,” emphasizing that they are using a big name for an important idea.

The teacher then puts up the following transparency, which is reproduced on a prominently displayed “Prefix Removal and Replacement Strategy” poster, which is shown below, and talks students through the procedure with one or two sample prefixed words.

THE PREFIX REMOVAL AND REPLACEMENT STRATEGY

When you come to an unknown word that may contain a prefix:

- Remove the “prefix.”
- Check that you have a real word remaining. If you do, you’ve found a prefix.
- Think about the meaning of the prefix and the meaning of the root word.
- Combine the meanings of the prefix and the root word and infer the meaning of the unknown word.
- Try out the meaning of the “unknown” word in the sentence and see if it makes sense. If it does, read on. If it doesn’t, you’ll need to use another strategy for discovering the unknown word’s meaning.

Following this explicit description of the strategy and modeling of its use, the teacher tells students that they will continue to work on learning the meanings of prefixes and learning to use the strategy today, tomorrow, and in future review sessions. Finally, the teacher teaches and reviews the remaining three prefixes (*dis-*, *en-*, and *non-*) using procedures and materials that exactly parallel those used on day 2. This concludes the third day of the unit.

Day 4: Review of the Information about Prefixes, the Prefix Strategy, and the Prefixes Taught

Day 4 begins with the teacher reviewing the four facts about prefixes, again using the “Basic Facts” poster in doing so. As part of the review, the teacher asks students a few questions about these facts to be sure that they understand them and answers any of their questions.

Next, the teacher reviews the prefix removal and replacement strategy. After this, the teacher continues with the explicit instruction model, first modeling use of the strategy with two of the six prefixes taught and then collaboratively using the strategy in a whole-class session with two more of the six prefixes. Then, the teacher divides students into small groups and provides guided practice by having the groups use the strategy with the final pair of six prefixes. The teacher also has some of the groups share their work and their findings.

As the final activity of the initial instruction, small groups of students work together on a quiz that requires them to state the four facts about prefixes, state the steps of the prefix removal and replacement strategy, and

give the meanings of the six prefixes taught. As soon as students complete the quiz, they correct it in class so that they get immediate feedback on their performance and hand the corrected quizzes in so that the teacher has this information to plan reviews.

Reviewing, Prompting, and Guiding Students to Independence

At this point, the instruction is far from complete. If we really want students to remember what a prefix is, recognize and know the meanings of some prefixes, and use the prefix removal and replacement strategy when they come to unknown words in their reading, reviewing what has been taught, prompting students to use the strategy in materials they are reading, and generally continuing to nudge them toward independence are crucial.

By *reviewing*, we mean formal reviews. It seems reasonable to have the first review about a month after the initial instruction, a second review something like 2 months after that, and a third review, if necessary, several months after that. Each review might last 30–45 minutes. Two somewhat conflicting considerations are important in undertaking these reviews. The first is that it does no good, and in all probability does some harm, to spend time “teaching” students things they already know. Thus, if at the beginning of a review it is apparent that students already know the material well, then the review should be kept very brief. The second consideration is that we need to do our best to ensure that all students understand prefixes and the prefix removal and replacement strategy. It is not enough if only average and better readers get it.

Prompting refers to briefly reminding students about prefixes and the prefix strategy at appropriate points. Thus, when students are about to read a selection that contains some unknown prefixed words, the teacher might say something like, “In looking through today’s reading, I noticed some pretty hard words that begin with prefixes. Be on the lookout for these, and if you don’t know them, try using the prefix strategy to figure out their meanings.” This sort of prompting should be fairly frequent, for it can do a lot to move students toward independent use of the strategy.

Instruction in Additional Prefixes and Additional Review and Prompting

During this week, students have been taught six prefixes. It seems reasonable to teach the 20 most frequent prefixes (see White et al., 1989, for a list of them) over a 3-year period. Thus, six or so additional prefixes might be taught in fifth grade and another six or so in sixth grade. Such instruction would be similar to that used with the initial six prefixes, with one very important exception. Students will have already been taught the basic facts

about prefixes and the prefix removal and replacement strategy; thus, the instruction can be briefer than the initial instruction.

Finally, reviewing and prompting are still important during fifth and sixth grades. Again, two reviews—cumulative reviews of all the prefixes taught as well as the basic facts about prefixes and the prefix strategy—seem likely to be sufficient. And again, it is important to keep in mind that the goal is to ensure that all students know the prefixes and can use the strategy without boring them by teaching them what they already know.

CHANGES IN THE CURRENT INSTRUCTION

In this section of the chapter, we describe a number of changes to the 2004 instruction that we have made in the current instruction in the hope of making it stronger. We first note a change to the instructional approach and a change in the authors of the instruction. After that, we describe a number of enhancements to the instruction, some major and some minor. Finally, we describe what we see as the biggest difference between the final product of the 2004 chapter and the final product of the IES/SBIR work.

A General Approach to Instruction 2011

As we have noted, the general approach underlying the 2004 work was explicit instruction as defined by Pearson and Gallagher (1983) and Duke and Pearson (2002). We still believe that explicit instruction can be a very powerful approach. However, we also believe that, used by itself, explicit instruction can be a rather sterile and uninteresting approach, the sort of teaching that does not grab kids' attention, and the sort that does not lead as much as it should to transfer. We have, therefore, adopted some elements of constructivist instruction, drawing particularly from the position advanced by Pressley, Harris, and Marks (1992), who suggest the following constructivist elements:

- Give students opportunities to construct knowledge rather than explicitly teaching them everything.
- Make motivation a prime concern.
- Explain and discuss the value of strategies.
- Provide lots of collaborative discussion of the thinking behind the strategies.
- Extend practice, encouragement, and feedback over considerable time.
- Continually work on transfer.
- Encourage student reflection and planning.

Taken together, the instructional principles we derive from these two lines of thinking—explicit instruction and constructivist elements—that we follow in our current prefix instruction are these:

- Provide a description of the strategy and information on when, where, and how it should be used.
- Model use of the strategy for students on a text the class can share.
- Work with students in using the strategy on a text the class can share.
- Discuss with students how the strategy is working for them, what they think of it thus far, and when and how they can use it in the future.
- Guide and support students as they use the strategy over time. At first, provide a lot of support; later, provide less and less.
- Give students opportunities to construct knowledge.
- Motivate students to use the strategy by explaining and discussing its value.
- Work over time to help students use the newly learned strategy in various authentic in-school and out-of-school tasks.
- Review the strategy and further discuss students' understanding of it and responses to it from time to time.

Our Author Team 2011

The author “team” for the instruction described in the 2004 chapter was Michael Graves. All four of us writing the current chapter, as well as several others on the development team, have had a hand in the development of the instruction. Michael Graves (a former secondary English teacher and retired professor of literacy education) does the general planning of the instruction. Melanie Ruda (a former elementary teacher with a master’s in instructional design, who now works as a full-time instructional designer) creates the day-to-day instruction. Gregory Sales (a former elementary teacher and university professor with a doctorate in instructional design and currently the CEO of an instructional design and development company) sets general parameters such as how many weeks of instruction we can create and what sort of nonprint materials we can create. And James Baumann (a former elementary teacher who currently holds an endowed chair in reading education) both provides advice as we plan instruction and critiques the instruction we create. Several other people have also had a hand in the effort. These include an editorial and content strategist, who is producing the teacher’s guide; a graphic artist, who develops characters and produces posters, manual covers, and interface graphics; a videographer, who is producing video

to be used in teacher training; and programmers, who are producing supplementary online lessons.

Literature on Prefix Instruction Available in 2010

In designing the instruction described in the 2004 chapter, we considered seven sources on teaching prefixes: Otterman (1955), Thompson (1958), Ess (1978), Graves and Hammond (1980), Nicol (1980), White et al. (1989), and Baumann et al. (2002). In designing and analyzing the 2010 instruction, we had five additional sources available: Baumann, Edwards, Boland, Ojejnuk, and Kame'enui's (2003) instruction in morphology and context, used with fifth-grade students; Baumann, Font, Edmonds, and Boland's (2005) summary and teaching suggestions based on the Baumann et al. 2002 and 2003 studies; Carlisle's (2010) review of morphological awareness instruction; Kieffer and Lesaux's (2007, 2010) suggestions for morphology instruction, based on their research with urban classrooms and ELs; and Baumann, Blachowicz, Graves, Olejnik, and Manyak's (2008) ongoing IES-funded research on a multifaceted vocabulary program for the upper elementary grades. We have also profited from our experience developing an IES-sponsored program to teach reading comprehension strategies (Graves, Sales, Lawrenz, Robellia, & Richardson, 2010) and have found that much of what we learned about teaching comprehension strategies is also relevant to teaching word-learning strategies.

Motivation: A Central Thought Underlying Everything We Do

If you asked a group of fourth- or fifth-grade students what really interested and excited them and they said instruction in how to use prefixes to infer the meanings of unknown words, you'd almost certainly be speechless. Yet again and again we see educational materials that are dull and make no attempt to motivate young learners. In designing the 2011 instruction, we made motivation a number-one priority.

As one motivational element, we emphasize the notion of student empowerment, using as the subtitle of the Word-Learning Strategies program "Power to Unlock Word Meanings." Playing off the notion of power, we have designed a superhero theme and superheroes with a science fiction flavor. The science fiction flavor has allowed us to create superheroes with a sophisticated look that we think will make them appealing to fourth and fifth graders. Each word-learning strategy—including using prefixes—is represented by a superhero avatar, a colorful figure that represents the strategy and assists students in learning to use it. The avatar for the prefix strategy is Enfracta, whose image is shown in Figure 6.1. Students read a story about Enfracta and learn of her exploits on the planet Barrage—a story filled with

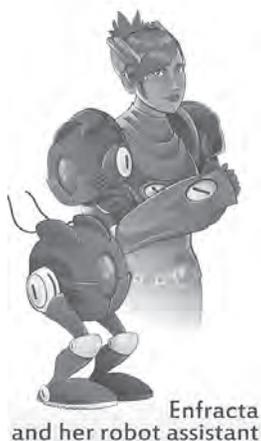


FIGURE 6.1. Enfracta, the prefix avatar who breaks words into parts. Reprinted with permission from Seward Incorporated.

prefixed words. Enfracta relies on her strength, the use of gadgets, and the assistance of robotic characters in breaking words into parts.

Other motivational elements include the use of posters, games, contests, and group work. The prefix power poster shown in Figure 6.2, for example, is displayed a week before instruction begins to stimulate students' interest and anticipation of the unit, and it stays up throughout the prefix instruction as a constant and colorful reminder of what the class is studying. The prefix matching game is another example of a motivational element. In this game—played with the game cards shown in Figure 6.3—a pair of students compete to gain the largest number of cards as they try to match the white cards, which contain prompts, with the gray ones, which contain the correct responses to each prompt.

Constructivist Elements

Constructivist instruction has many tenets, but certainly one of the most basic tenets is that learners need to create their own information rather than being given information by the teacher. One constructivist element comes near the beginning of the prefix unit when students learn the meaning of several prefixes. Students are not directly told the meanings of the prefixes. Rather, the instruction follows a process that leads them to infer the meanings on their own. Whether students are working as a class or in small groups, the instruction follows the same sequence:



FIGURE 6.2. The prefix power poster to stimulate interest and anticipation. Reprinted with permission from Seward Incorporated.

1. Students answer multiple-choice questions about the meanings of familiar prefixed words.
2. They analyze the answers to look for common meaning.
3. They make an inference about the prefix meaning.
4. They apply their inference to an unfamiliar prefixed word.

The activity sheet students use in inferring the meaning of the prefix *un-* is shown in Figure 6.4. *Un-* is the first prefix to be learned, and in this lesson

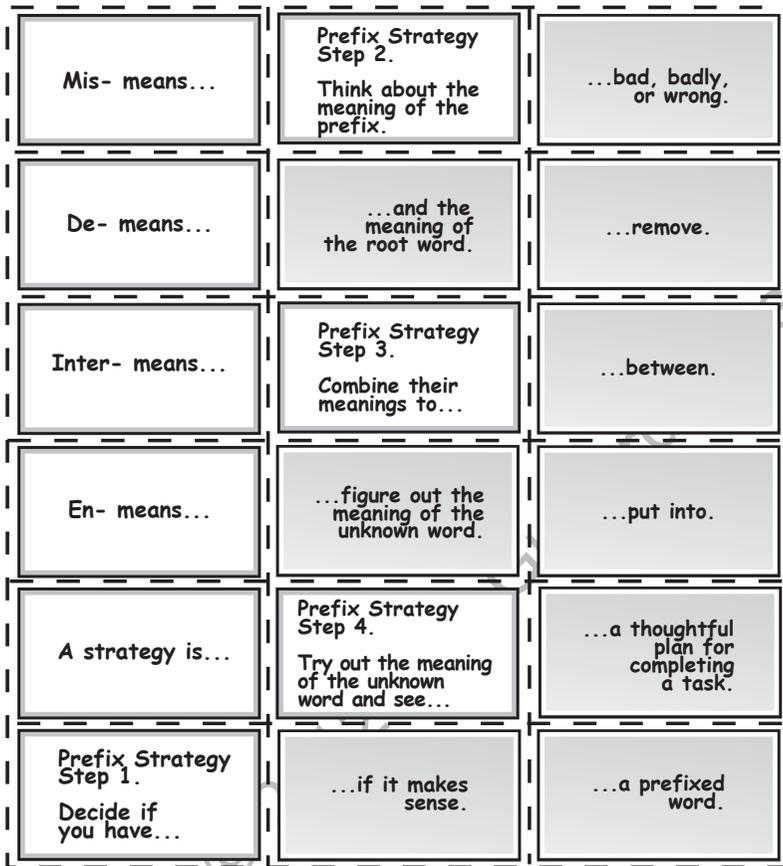


FIGURE 6.3. Prefix matching game cards in which the white cards contain prompts and the gray cards contain correct responses. Reprinted with permission from Seward Incorporated.

the teacher guides students through the questions; in later lessons on prefix meanings, students work in small groups.

Other constructivist activities students engage in include discussing why prefixes and the prefix strategy are important, working on stories rather than isolated sentences as a step toward working with prefixes in authentic situations, and searching for prefixes in materials they are reading in other subjects.

*Purpose*

When you're finished with this page, you should be able to:

- Give the meaning for the prefix **un-**
- Use the meaning of the prefix to infer the meaning of an unknown word

For Questions 1-2, circle the answer that best completes the sentence.

1. If a pie is cut into **unequal** pieces, _____.
 - a. the pieces are the same size
 - b. the pieces are not the same size
2. If the knight is **unafraid**, that means _____.
 - a. the knight is scared
 - b. the knight is not scared

Write the answer to Question 3.

3. What does **un-** mean? not, do the opposite of

Use your knowledge of the prefix **un-** to infer the meaning of the word in bold. Write the answer to Question 4.

The girl made an **unwise** choice.

4. If wise means smart, **unwise** means not wise, not smart



FIGURE 6.4. Activity sheet for learning the prefix *un-*. Reprinted with permission from Seward Incorporated.

Embedding Prefix Instruction in a Program That Teaches Other Word-Learning Strategies

Of course, when students come to unknown words as they are reading, making use of prefixes to unlock their meaning is just one of a set of word-learning strategies they need at their disposal. Consequently, the Word-Learning Strategies program provides instruction in several strategies for inferring the meaning of unknown words and includes work with compound words, various word parts (prefixes, inflectional suffixes, and derivational suffixes), context clues, the dictionary, cognates (for Spanish-speaking students), and idioms (for all ELs). Importantly, once a strategy is taught, work with that strategy is embedded in work with each additional strategy taught, so that by the end of the program students have had many experiences in working with multiple strategies.

Supplementary Online Remedial Instruction

Certainly, no educator believes that all students learn at the same rate. Yet much of school operates as if they do. All too often, teachers are forced to present a concept or skill to be learned, spend a certain amount of time with it, and then go on to the next topic or skill. As Bloom (1981) argued so cogently, most students can learn much of what we need to teach them, *but they will learn it at very different rates*. To quote Eisner (2000) in his UNESCO tribute to Bloom and his accomplishments:

The variable that needed to be addressed, as Bloom saw it, was time. It made no pedagogical sense to expect all students to take the same amount of time to achieve the same objectives. There were individual differences among students, and the important thing was to accommodate those differences in order to promote learning rather than to hold time constant and to expect some students to fail. (p. 4)

The problem, of course, is that teachers have classes of 30 or so students and only so much time. Although it is not impossible to give those students who have learned what has been taught some independent work and provide additional instruction for those who have not learned, doing so is difficult; and often no instructional differentiation or remediation is provided. In the Word-Learning Strategies program, we provide individualized, web-based remedial instruction on the prefix strategy (as well as on the other strategies taught). The remediation on prefixes will contain six lessons, each of which a learner should be able to complete independently in 15–30 minutes. Each lesson will be self-paced and will consist of three parts: Strategy Steps (SS, where the strategy is explained), Strategy Training (ST, where the student practices using the strategy with short stories),



FIGURE 6.5. Online remediation on prefixes. Reprinted with permission from Seward Incorporated.

and Strategy Power (SP, where the student tests his or her skills and knowledge in a game-like setting). We have tried to make each lesson as enticing and motivating as possible by including colorful graphics, animation, the Enfracta avatar, text, audio, and learner control features. In the ST example shown in Figure 6.5, the story is read to a student, he or she clicks on the “yes” button to get questions on whether *overgrown* and *refuge* are prefixed words and their meanings, and he or she gets immediate feedback.

Supplementary Online Instruction for English Learners

Two additional strategies that are useful for ELs but not for English-only students are the use of cognates (for Spanish-speaking ELs) and recognizing and dealing with idioms (for all ELs). We have yet to complete this instruction, but our plan is to make it much like the online remedial work, including, of course, more actual instruction because this is initial instruction rather than review. Like the remediation, this will be individualized. The work on cognates will include 12 lessons and the work on idioms 6 lessons, with each lesson taking a learner 15–30 minutes to complete. Each of the lessons will be self-paced and will consist of the same three parts as the remediation lessons: In the SS section, the steps we plan to present for cognates include (1) decide if the unknown word might have a Spanish cognate, (2) think about the meaning of the Spanish word, and (3) try the meaning in the sentence to see if it makes sense. The steps we plan to present for idioms include (1) decide if you have found an idiom, (2) ask a native speaker what it means, and (3) try the meaning in the sentence to see if it makes sense.

In the ST section, the student will practice using the strategy following a gradual release-of-responsibility model in which he or she receives less and less support in using the strategy as he or she proceeds through the

lessons. As part of this gradual release, each student will initially work with cognates or idioms at the individual word or phrase level, advance to the working with them in sentences, and in the end work with them in paragraphs and brief stories or articles. And in the SP section, the student will test his or her knowledge and skills. Finally, as with the remedial online work, we will strive to make each lesson as enticing as possible, including animation, an avatar for each strategy, text, audio, and learner control.

Final Product of Our 2011 Work

The final product of our 2004 work—what we could provide teachers to assist them in teaching prefixes—was the 2004 chapter, 25 pages on how to create prefix instruction. The final product of our 2011 work will be something quite different, a complete set of procedures and materials for teaching prefixes and other word-learning strategies. Student materials will include student activity books, pretests, and posttests. Teacher materials will include online tutorials with videos modeling best teaching practices, a detailed teacher manual, and presentation materials such as slides and posters. To provide extra assistance for students, the final product will also include web-based remedial instruction on each of the strategies, web-based instruction on using cognates for Spanish-speaking ELs, and web-based instruction on recognizing idioms for all ELs. For up-to-date information on the Word-Learning Strategies program, see *sewardreadingresources.com*.

CONCLUDING COMMENTS

Forty years ago, Richard Shutes, then chairperson of the Department of Educational Psychology at Arizona State University, offered an insight into what he saw as a huge chasm in the U.S. educational enterprise. In most fields—medicine, business, industry, and the like—Shutes observed that there is a relatively small research arm, a much larger development arm, and an even larger production arm. In education, however, Shutes saw a relatively small research arm, a much larger production arm, and virtually no development arm. In education, we most frequently go—or at least expect to go—directly from research to production. It doesn't work. The end product of research is knowledge, not a product; and without the development phase, production cannot really be research based; it is disconnected from the research.

IES/SBIR grants such as the one that is funding our work on Word-Learning Strategies represent an attempt to build a development arm in education. IES Goal Two Development grants, which put the emphasis on

developing an educational innovation rather than on testing its efficacy, represent another attempt. Both, we strongly believe, are very fortunate funding for education and have the potential to create much better instruction for students.

As we noted, our development team includes eight or nine individuals. Thus far, this team has put about 1,500 hours into the design and development of our prefix instruction, and we anticipate another 300 hours of additional work. Clearly, a teacher who sets out to develop prefix instruction can put in only a very small fraction of that time, probably only a handful of hours; and a handful of hours is highly unlikely to produce instruction as strong as that produced in 1,800 hours. Equally clearly, very few teachers have the expertise and experience of our author team.

The 2004 version of this chapter concluded by posing the question of whether the instruction described is as good as prefix instruction is likely to get and answered that question with a definite “no,” saying that there is always the potential for improving instruction. The same is undoubtedly true of the present instruction; there will always be room for improvement in our instruction. Still, we believe that we have created some very strong instruction.

Although we have yet to complete our testing of the efficacy of this instruction, preliminary results appear promising. As part of the development process, we evaluated the effect of 1 week of our prefix instruction on teachers and students. Three teachers completed a pretest of their knowledge about prefixes and prefix instruction, taught three 30-minute classes on prefixes and the prefix strategy, and took a posttest similar to the pretest. The teacher test included eight multiple-choice questions and four matching questions for a total of 12 items. Questions focused on the nature of word-learning strategies, how to use the prefix teaching strategy, and the meanings of the selected prefixes. In addition to the three teachers, 71 students in these teachers’ classrooms were pre- and posttested on their knowledge and skills related to prefixes. The 17-item student test included four true–false items about prefixes, one multiple-choice item about what a strategy is, four fill-in-the-blank items about the meanings of prefixes, four items in which students read a sentence containing a target word and were asked if that word contained a prefix and to write the meaning of the word, and four fill-in-the-blank items about the prefix strategy.

As would be expected, teachers knew a good deal about prefixes and teaching prefixes prior to the training and consequently did very well on the pretest, averaging 9.7 on the 12-item pretest. However, the training still improved teachers’ knowledge, and all three teachers scored a perfect 12 on the posttest. This difference was statistically significant at $p < .05$. Examination of the items show that most of the teachers’ gains were in increased knowledge about word-learning strategies. The results with students were

TABLE 6.1. *t*-Test Results and Student Pretest and Posttest Mean Scores

Class	Pretest mean (<i>SD</i>)	Posttest mean (<i>SD</i>)	<i>t</i>	<i>p</i>
All three classes	6.08 (2.10)	14.60 (5.52)	13.19	< .001
Class 1	5.72 (1.86)	14.08 (4.82)	7.95	< .001
Class 2	6.08 (2.02)	14.85 (5.35)	7.82	< .001
Class 3	6.46 (2.40)	14.90 (5.14)	6.91	< .001

also very positive. As shown in Table 6.1, students overall showed a statistically significant gain, more than doubling their scores from pretest to posttest; and each class also showed a statistically significant gain, again more than doubling their scores from pretest to posttest. Although there is, as we have said, undoubtedly room for improvement, the effects of our current approach are certainly positive.

ACKNOWLEDGMENTS

The research reported in this chapter was supported by a contract titled Word-Learning Strategies, awarded to Seward Incorporated through the Small Business Innovation Research program of the Institute of Education Sciences, U.S. Department of Education, under Contract No. ED-IES-09-C-0013. The opinions expressed are those of the authors and do not necessarily represent the views of the Institute or the U.S. Department of Education.

REFERENCES

- Baumann, J. F., Blachowicz, C. L. Z., Graves, M. F., Olejnik, S., & Manyak, P. C. (2008). *Development of a multi-faceted, comprehensive vocabulary instructional program for the upper-elementary grades*. Project funded by the Institute of Education Sciences, Washington, DC.
- Baumann, J. F., Edwards, E. C., Boland E., Olejnik, S., & Kame'enui, E. J. (2003). Vocabulary tricks. Effects of instruction in morphology and context on fifth grade students' ability to derive and infer word meaning. *American Educational Research Journal*, 40, 447–494.
- Baumann, J. F., Edwards, E. C., Font, G., Tereshinski, C. A., Kame'enui, E. J., & Olejnik, S. (2002). Teaching morphemic and contextual analysis to fifth-grade students. *Reading Research Quarterly*, 37, 150–176.
- Baumann, J. F., Font, G., Edwards, E. C., & Boland, E. (2005). Strategies for teaching middle-grade students to use word-part and context clues to expand reading vocabulary. In E. Hiebert & M. L. Kamil (Eds.), *Bringing scientific research to practice: Vocabulary* (pp. 179–205). Mahwah, NJ: Erlbaum.
- Bloom, B. (1981). *All our children learning*. New York: McGraw-Hill.

- Carlisle, J. F. (2010). Effects of instruction in morphological awareness on literacy achievement: An integrative review. *Reading Research Quarterly*, 45, 464–487.
- Duke, N. K., & Pearson, P. D. (2002). Effective practices for developing reading comprehension. In S. J. Samuels & A. E. Farstrup (Eds.), *What research has to say about reading instruction* (3rd ed., pp. 203–242). Newark, DE: International Reading Association.
- Eisner, E. W. (2000). Benjamin Bloom 1913–99. *Prospects: The Quarterly Review of Comparative Education*, 30(3). Retrieved October 2010, from www.ibe.unesco.org/publications/ThinkersPdf/bloome.pdf
- Ess, H. K. (1978). *The transfer value of teaching prefixes to increase vocabulary*. Unpublished master's thesis, University of Minnesota, Minneapolis.
- Graves, M. F. (2004). Teaching prefixes: As good as it gets? In J. F. Baumann & E. B. Kame'enui (Eds.), *Vocabulary instruction: Research to practice* (pp. 81–99). New York: Guilford Press.
- Graves, M. F., & Hammond, H. K. (1980). A validated procedure for teaching prefixes and its effect on students' ability to assign meaning to novel words. In M. L. Kamil & A. J. Moe (Eds.), *Perspectives on reading research and instruction*. Washington, DC: National Reading Conference.
- Graves, M. F., Sales, G. C., Lawrenz, F., Robellia, B., & Richardson, J. W. (2010). Effects of technology-based teacher training and teacher-led classroom implementation on learning reading comprehension strategies. *Contemporary Educational Technology*, 1(2), 160–174. Available at cedtech.net
- Kieffer, M. J., & Lesaux, N. K. (2007). Breaking down words to build meaning: Morphology, vocabulary, and reading comprehension in the urban classroom. *The Reading Teacher*, 61, 134–144.
- Kieffer, M. J., & Lesaux, N. K. (2010). Morphing into adolescents: Active word learning for English-language learners and their classmates in middle school. *Journal of Adolescent and Adult Literacy*, 54, 47–56.
- Nicol, J. E. (1980). *Effects of prefix instruction on students' vocabulary size*. Unpublished master's thesis, University of Minnesota, Minneapolis.
- Otterman, L. M. (1955). The value of teaching prefixes and root words. *Journal of Educational Research*, 48, 611–616.
- Pearson, P. D., & Gallagher, M. C. (1983). The instruction of reading comprehension. *Contemporary Educational Psychology*, 8, 317–344.
- Pressley, M., Harris, K. R., & Marks, M. G. (1992). But good strategy instructors are constructivists! *Educational Psychology Review*, 4, 3–31.
- Rosenshine, B., & Meister, C. (1994). Reciprocal teaching: A review of the research. *Review of Educational Research*, 64, 479–531.
- Stotsky, S. L. (1977). Teaching prefixes: Facts and fallacies. *Language Arts*, 54, 887–890.
- Thompson, E. (1958). The “Master Word” approach to vocabulary training. *Journal of Developmental Reading*, 2, 62–66.
- White, T. G., Sowell, J., & Yanagihara, A. (1989). Teaching elementary students to use word-part clues. *The Reading Teacher*, 42, 302–308.