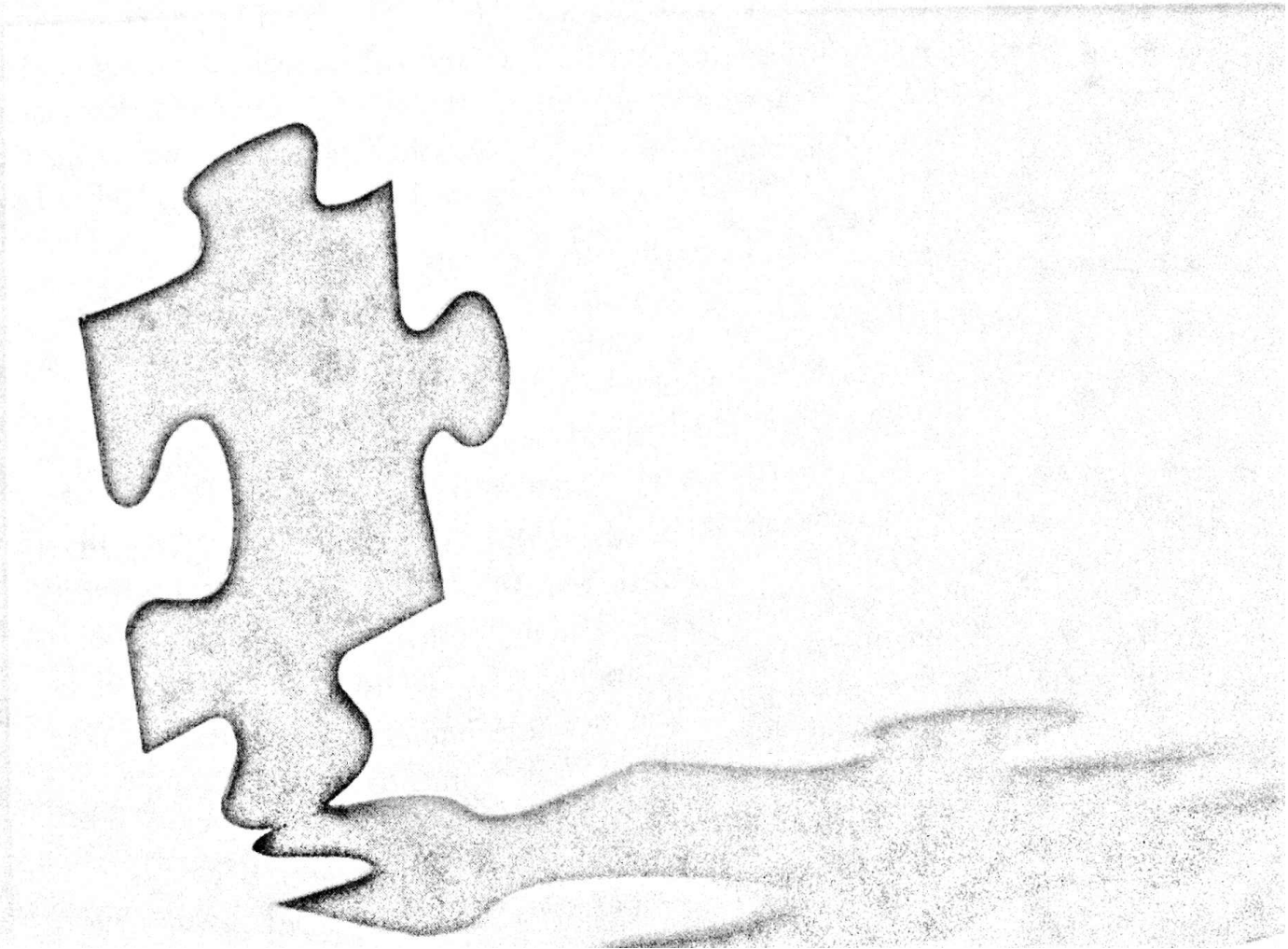
14

Teaching by Priming Students' Motivation to Learn

Chapter Outline

This chapter examines the straightforward idea that students work harder to understand and learn more deeply when they value what they are learning and expect their efforts to pay off. In short, this chapter examines how to foster motivation in learners as a means of teaching for meaningful learning. It explores four ways to affect a student's motivation to learn: motivation based on interest, motivation based on self-efficacy, motivation based on attributions, and motivation based on goal orientation.



Introduction

A MOTIVATIONAL QUESTIONNAIRE

Let's begin by asking you to evaluate some statements about your life as a student. Below is a list of statements concerning your beliefs, feelings, and expectations about this course. Each statement is accompanied by the numbers 1 through 7—with 1 indicating that the statement definitely is not true of you, 7 indicating that the statement definitely is true of you, and the other numbers representing shades in between. For each statement, please circle a number that best corresponds to your level of agreement (with 1 meaning that you strongly disagree and 7 meaning that you strongly agree).

1	2	3	4	5	6	7	I am interested in the material taught in this course.
1	2	3	4	5	6	7	I find the content of this course to be useful to me.
1	2	3	4	5	6	7	I know that I will be able to learn the material for this class.
1	2	3	4	5	6	7	I am sure I can do an excellent job on the problems and tasks assigned for this class.
1	2	3	4	5	6	7	If I perform poorly on a test in this class, it is because I did not try hard enough to learn the material.
1	2	3	4	5	6	7	Doing well in this class depends on how much effort I give.
1	2	3	4	5	6	7	In this class, I like problems and materials the best that really make me think.
1	2	3	4	5	6	7	I like problems and tasks that I can learn from in this class, even if I make a lot of mistakes.

These items are inspired by the Motivated Strategies for Learning Questionnaire (MSLQ) described by Pintrich and De Groot (1990), the Patterns of Adaptive Learning Survey (Roeser, Midgley, & Urdan, 1996), and by measures of students' beliefs about learning (Borkowski, Weyhing, & Carr, 1988; Graham, 1984, 1991). The first two items are examples for a scale that measures *interest*—how interested you are in learning about a particular topic. If the sum of your ratings to the first two questions is high, for example greater than 10, you seem to be interested in this course. The next two questions come from a scale intended to measure *self-efficacy*—the degree to which you see yourself as competent to accomplish a particular task. Add up the two ratings you gave to these questions; again, if your score is more than 10, you seem to have high efficacy for learning in this course. The next two questions are designed to measure *effort-based attributions*—the degree to which you attribute your academic successes and failures to effort rather than other causes. Add up the total number of points on the these two questions to see whether or not you score high (e.g., 10 or more) in your beliefs about the importance of effort. Finally, the last two questions tap the degree to which you have mastery achievement goals—that is, the degree to which your academic goal is to understand the material. Again a combined score of 10 or greater indicates that your goal is academic understanding. Because these questions represent just a small sampling of much larger questionnaires, we cannot expect them to give an exact account of your interest, self-efficacy, attributional beliefs, and achievement goal orientation. Recent advances in motivational theory and research encourage the idea that academic achievement is related to motivational variables such as interest, self-efficacy, attributional beliefs, and achievement goal orientation.

THE ROOTS OF MOTIVATION

Why do some students, when faced with a challenging assignment, work hard to complete every aspect of the task, whereas other students quit early without devoting much effort? Why do some students persist on tasks while others give up? What motivates students to want to learn? What are the roots of students' motivation to learn? These are the kinds of questions that we explore in this chapter. In particular, we examine four possible answers to questions about what motivates students to work hard:

Motivation is based on interest: Students work hard when they value what they are learning; that is, when what they are learning is important to them.

Motivation is based on self-efficacy: Students work hard when they perceive themselves as capable of doing well; that is, when they have confidence in their capabilities for a learning task.

Motivation is based on attribution: Students work hard when they believe that their efforts will pay off; that is, when they attribute their successes and failures to personal effort.

Motivation is based on achievement goals: Students work hard when their goal is to understand the material, which can be called having a mastery goal orientation.

These four views of motivation are summarized in Table 14–1, along with instructional implications. As you can see, each answer assumes that a student's motivation to learn in school is based on how the student interprets the learning situation. The motivation to learn may depend on how the student thinks about the personal relevance of the material, about his or her own competence, about whether hard work leads to success, and about whether his or her goal is to understand the material.

In a recent review Pintrich (2003a, p. 671) asked, "What motivates students in classrooms?" Fortunately for us, this question has been the focus of extensive scientific research (Pintrich, 2003a, 2003b), and in this chapter we are able to lay out four answers, each of which has substantial research support. As you can see in Table 14–1, the four answers are not mutually exclusive; that is, they tend to complement one another. Pintrich (2003b) argues that the four views in Table 14–1 form an expectancy-value model in which motivation depends on the learner's expectancies (e.g., efficacy beliefs and attributional beliefs) and on the learner's values (e.g., interest and goal orientation). Values get you started (such as liking the material) and expectancies keep you going (such as expecting that hard work will help you learn).

If you are interested in promoting meaningful learning, you must also be interested in priming the learner's motivation to learn. When students are motivated to learn, they try harder to understand the material and thereby learn more deeply, resulting in better ability

TABLE 14–1 Four views of motivation for learning

Theory	Prediction	Example	Instructional Implications
Interest theory	Students learn better when they are interested in the material.	I work hard because I value this; it is important to me.	Embed lessons within the context of larger projects that personally interest students. Display and model interest in the material.
Self-efficacy theory	Students learn better when they see themselves as competent for the task.	I work hard because I am good at this; I am capable of doing this.	Ask peers to model appropriate learning, along with positive efficacy cues such as "I can do this." Provide feedback designed to build competence and self-efficacy; design challenging tasks that offer opportunities for success.
Attribution theory	Students learn better when they attribute academic successes and failures to effort during learning.	I work hard because I know my effort will pay off. If I fail, it's because I didn't try hard enough.	Avoid condescending cues, such as pity and sympathy when a student fails. Allow the learner to have some control during learning. Provide feedback that emphasizes effort.
Goal orientation theory	Students learn better when they want to understand the material.	I work hard because my goal is to learn as well as I can.	Discuss the value of understanding the material; reward progress toward understanding the material.

Adapted from Pintrich (2003b).

to transfer what they have learned to new situations. In particular, I focus on intrinsic rather than extrinsic motivation. When the learner's motivation is intrinsic, it comes from within the learner. This chapter reviews techniques for priming *intrinsic motivation*. When motivation is extrinsic, it is imposed on the learner from the outside, such as through external rewards and punishments. The perils of *extrinsic motivation*, such as the negative effects of reward, are examined in Chapter 7.

DEFINITION AND BACKGROUND

Before we begin, it is useful to define motivation and briefly review the history of research on motivation. Motivation is an internal state that initiates and maintains goal-directed behavior. This definition has four components:

Motivation is personal. It occurs within the student.
Motivation is directed. It is aimed at accomplishing some goal.

Motivation is activating. It instigates action.
Motivation is energizing. It provides for persistence and intensity.

In short, motivation is "what gets people going, keeps them going, and helps them finish tasks" (Pintrich, 2003b, p. 104). For example, when a student studies until late at night for a week to master material for a test, we would say that the student is motivated.

Why is motivation an important topic for educational psychology? Pintrich (2003b, p. 103) has shown that recognizing the role of motivation in learning "has provided a much more accurate and ecologically valid description of classroom learning." Furthermore, Pintrich (2003b) noted that "Cognitive researchers now recognize the importance of motivational constructs in shaping . . . learning in academic settings, and motivational researchers have become interested in how motivational beliefs relate to student . . . classroom learning" (p. 103). In short, a complete understanding of how academic learning works has to include an understanding of what motivates students to learn.

The history of research on motivation over the past 50 years reflects a shift in the way theorists view the nature of the internal state underlying motivation—from drives to cognitions (Weiner, 1990). Fifty years ago, drive theories dominated the field of motivation. Drive theories maintain that motivation results from a situation in which a biological need is not being met—that is, the motivation to act is an automatic consequence of a discrepancy between the current state and a needed state (Hull, 1943). For example, if a rat is deprived of food for a certain period of time, it will be motivated to speedily learn how to get food. When a need is not being met, a drive increases that automatically instigates behavior; when appropriate action is taken, the drive is reduced to an acceptable level so that the behavior can be terminated. According to Hull (1943), some of the primary biological needs include food, water, air, pain avoidance, optimal temperature, sleep, and activity. This view of motivation as drive reduction was based largely on animal research in contrived laboratory situations and for many educational psychologists did "not provide the needed conceptual tools to explain classroom motivation" (Weiner, 1984, p. 15). In contrast, cognitive theories of student motivation are based on "observations in classrooms as opposed to . . . the behavior of hungry rats" (Weiner, 1984, p. 16).

During the past 30 years, cognitive theories have come to dominate motivational research (Pintrich 2003a, 2003b). This chapter explores four of the most active and relevant cognitive approaches to motivation—interest theory, self-efficacy theory, attribution theory, and goal orientation theory. Unlike drive theories in which motivation is an automatic consequence of biological needs, cognitive theories of motivation view the learner as a decision maker who bases actions on interpretations of incoming information. Unlike drive theories that are based largely on animal research in laboratory settings, cognitive theories are based on research on humans often in natural settings.

As Weiner (1992) pointed out in a review, "for motivational psychologists there have been fundamental shifts in theory and research focus" (p. 860), and the basic metaphor for motivated humans has shifted from a robotic machine to a decision maker. "The grand formal theories . . . have for the most part faded away . . . What remains are varieties of cognitive approaches to motivation" (Weiner, 1990, p. 620). Four important cognitive approaches to motivation are presented in the following four sections of this chapter.

Motivation Based on Interest

INTEREST VERSUS EFFORT

Maria's teacher assigns a chapter on the human digestive system from a biology book. The material is difficult and, for Maria, boring. Maria particularly dislikes memorizing the many technical terms in the chapter. In spite of her boredom, Maria works hard. Each day she sits diligently in class and fills out worksheets covering the material in the book, and each evening she studies the chapter so that she will pass the test she will have to take.

In contrast, Yukari is working on a project she developed herself out of her personal interest in dieting and nutrition. She is curious about why some people are overweight and others are slim. She wants to know how the human digestive system works so that she can figure out how what one eats affects one's weight. In her search for relevant information, she consults many sources, including a chapter on the human digestive system from a biology book. Like Maria, she reads the chapter about how the human digestive system works, but her learning is motivated by an interest in understanding dieting and nutrition. She seeks out information that is relevant to her project, as if she were on some sort of treasure hunt. In short, Maria learns through effort, whereas Yukari learns through interest.

Who will learn more effectively and more deeply? Which form of learning is better—learning based on effort or learning based on interest? Nearly a century ago, the great educational philosopher John Dewey addressed this issue in his little classic, *Interest and Effort in Education* (Dewey, 1913). According to Dewey, the interest-based learning of Yukari is more beneficial than the effort-based learning of Maria. Dewey argues that "the great fallacy of the so-called effort theory is that" it equates "certain external activities" with "the exercise and training of mind" (p. 7). Thus, although Maria engages in learning-like behaviors, such behavior does not guarantee that she is actually learning much.

Dewey (1913) clearly distinguished between two litigants in what he called "the educational lawsuit of interest versus effort" (p. 1). The justification for an effort-based approach to schooling is that "life is full of things not interesting that have to be faced" (p. 3), so teachers should not spoil the student by creating a situation in which "everything is made play, amusement . . . everything is sugar coated for the child" (p. 4). "Life is not merely . . . a continual satisfaction of personal interests," so students need "training in devoting [themselves] to uninteresting work" (pp. 3–4). To do otherwise "eats out the fiber of character" and creates a "spoiled child who does only what he likes" (pp. 4–5).

In contrast, the case for interest is that willing attention is more effective for learning than forced effort. Interest causes students to pay attention and actively learn: "If we can secure interest in a given set of facts or ideas we may be perfectly sure that the pupil will direct his energies toward mastering them" (Dewey, 1913, p. 1). Dewey argues that "it is absurd to suppose that a child gets more intellectual or mental discipline when he goes at a matter unwillingly than when he goes out of the fullness of his heart" (pp. 1–2). The effort-based approach to school results in a "character dull, mechanical, unalert, because the vital juice of spontaneous interest has been squeezed out" (p. 3). The educational implications are clear:

> The debate about effort versus interest has important educational implications: Our whole policy of compulsory education rises or falls with our ability to make school life an interesting and

absorbing experience to the child. In one sense there is no such thing as compulsory education. We can have compulsory physical attendance at school; but education comes only through willing attention to and participation in school activities. It follows that the teacher must select these activities with reference to the child's interests, powers, and capabilities. (p. ix)

In short, Dewey emphasizes the need to ensure that the student is cognitively active—rather than only physically active—during learning.

Regrettably, Dewey's essay, although emphasizing the importance of interest in learning, is based solely on logical arguments rather than psychological theory and empirical research. What is interest, and how does it motivate students to learn? Although researchers have begun to make modest progress since Dewey's day, there is still a lack of agreement on how to answer these questions (Renninger, Hidi, & Krapp, 1992). An important first step involves a distinction between two types of interest—*individual interest* and *situational interest*. Individual interest is a characteristic of the person and is based on a person's dispositions or preferred activities; situational interest is a characteristic of the environment such as the task's interestingness. In both cases, however, interest arises out of the interaction between the person and the situation.

INDIVIDUAL INTEREST

Students learn in a qualitatively better way when they work on material that interests them rather than when the material bores them. The results of interest-based learning are qualitatively better than the results of learning based solely on effort, because interested learners process material more deeply. This is a cornerstone of Dewey's (1913) classic treatise on interest and a working hypothesis in much of the recent research on individual interest. In this section, let's explore two straightforward predictions of Dewey's theory of interest:

School subject hypothesis: Student performance in learning a school subject is related to student interest in the subject.

Lesson topic hypothesis: Student performance in learning a lesson is better when the student is interested rather than uninterested in the topic.

The first way of testing Dewey's theory of interest is to ask whether students tend to perform better in subjects they like than in subjects they do not like. For example, in Figure 14–1, please rate your feelings about mathematics, natural science, social science, foreign language, and so on, with 0 indicating that the subject is very uninteresting to you and 4 indicating that it is very interesting. Then, for each subject write down the grade you received the last time you took a class in that subject. If you received good grades in subjects you rated as interesting and poor grades in subjects you rated as uninteresting, then there is a positive correlation between interest and achievement.

In a review covering 25 years of interest research, Schiefele, Krapp, and Winteler (1992) searched for studies that measured both *interest* (i.e., how much a student liked a certain school subject, generally measured via a self-rating of interest) and *achievement* (i.e., how well the student performed in a certain school subject, generally measured by grades or an achievement test). In all, Schiefele et al. identified 121 studies from 18 different countries. The results were similar for all subjects that were investigated—mathematics, natural science, social science, foreign language, and literature. There was a moderate but persistent correlation (i.e., approximately $r = .30$) between a student's preference for a school subject

FIGURE 14–1
How much do you like each subject? How well did you perform in each subject?

	Please rate your interest (4 = high, 0 = low)	*Please indicate your grade in the last course you took (A = 4, F = 0)*
Mathematics		
Natural science		
Social science		
Literature		
Foreign language		
Art or music		

and academic achievement in that subject. In other words, on average, the more a student liked a particular academic subject, the better the student performed in that subject.

These results might give pause to anyone who believes that ability is the overwhelmingly most important factor in promoting academic achievement in a given subject. The relation between interest and achievement is roughly as strong as the relation between ability and achievement, so anyone interested in predicting school success in a given subject area would be wise to examine both ability and interest.

Regrettably, these correlational results do not tell us about the causal relation between interest and achievement. We cannot tell whether interest causes achievement, in which students perform well in a subject because they like it; or whether achievement causes interest, in which students like a subject because they perform well in it; or both are caused by a third factor, such as ability in which students like and perform well in subjects they are good at. Future research is needed to untangle these issues.

The second way to test Dewey's theory of interest is to compare how students learn from text about a topic that interests them with how they learn from text about a topic that does not interest them. For example, suppose that you were assigned a passage on the psychology of emotion. Please indicate your expectations by answering the questions in Figure 14–2. According to interest theory, you will read more deeply and thereby learn more from the passage if you rated it as interesting rather than boring and as useful rather than worthless.

To investigate this prediction, Schiefele (1992) asked some college students to read a passage on an unfamiliar topic such as "the psychology of emotion" or "the psychology of communication." Before they read the passage, students rated their potential level of interest in the topic, using a questionnaire such as in Figure 14–2. Based on their ratings, half of the students were classified as "high-interest" and half were classified as "low-interest." After reading the passage, the students answered *surface questions* that required recall of individual facts and *deep questions* that required combining information from the text and applying it in a novel situation. Then students rated how deeply they had processed the text—including ratings about activation ("I was completely caught up in what I was reading") and elaboration ("I paraphrased the text in my own words").

FIGURE 14–2
...are your ...estions about ...sage on the ...chology of ...otion?

While reading the text on emotion I expect to feel bored.

☐ not at all ☐ somewhat ☐ quite ☐ completely

While reading the text on emotion I expect to feel interested.

☐ not at all ☐ somewhat ☐ quite ☐ completely

I expect the material in a text on emotion to be worthless.

☐ not at all ☐ somewhat ☐ quite ☐ completely

I expect the material in a text on emotion to be useful.

☐ not at all ☐ somewhat ☐ quite ☐ completely

Source: Based on Schiefele, U. (1992). Topic interest and levels of text comprehension. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), The role of interest in learning and development (pp. 151–182). Hillsdale, NJ: Erlbaum.

If interest leads to deeper processing of the information, as Dewey claimed, high-interest students should perform better than low-interest learners, especially on deep questions. As predicted, the high-interest group performed much better than the low-interest group on deep questions but not on surface questions. In addition, if high-interest students process the material more deeply than low-interest students, level of interest should be related to amount of activation and elaboration during reading. As predicted, there was a strong, positive correlation (approximately $r = .60$) between interest in the topic and measures of activation and elaboration.

As another example of individual interest, suppose we ask some third graders to find answers to questions in an "I Wonder Why" book. For example, if a child is reading *I Wonder Why Camels Have Humps and Other Questions About Animals* we could ask, "How many ants can an anteater scoop up with one flick of its tongue?" If a child is reading *I Wonder Why Castles Have Moats and Other Questions About Long Ago* we could ask, "When did the dark ages end?" For some students (choice group) we let them choose which book they want to use—such as one on animals, castles, or space. For other students (no-choice group) we choose the book for them. When Reynolds and Symons (2001) conducted this study, they found that students in the choice group performed better on the search task than did students in the no-choice group. These results suggest that motivation can be improved by allowing students to have some choice of the topics they study. Choice may allow students to work with topics that are more personally interesting to them and also may enhance their sense of self-determination, which may lead to increased effort.

In summary, emerging evidence indicates that individual interest is related to academic learning (Hidi, 2001; Hidi & Harachkiewicz, 2000). In a review of research on situational interest, Hidi (2001) concluded:

> The literature has shown that individual interest is an important if not a critical factor of academic motivation and learning. Children as well as adults who have individual interests in activities or topics focus their attention, persist for longer periods of time, and enjoy their engagements more, are more likely to use strategic processing and tend to learn and write better than those without such interests (p. 202).

Similarly, in a recent review, Pintrich (2003a, p. 674) concluded that higher levels of interest are associated with "more cognitive engagement, more learning, and higher levels of achievement." Hidi and Baird (1986) distinguished between two views of how individual interest may motivate learning—by producing general arousal that automatically facilitates learning and by instigating a process based on the significance of specific material to the reader:

> Thinking of interest as a general arousal experience is inadequate. This notion leads us to believe that all that is needed is to induce a general state of arousal which will automatically facilitate learning the material at hand. What is lost in this notion is the idea of interest as a process responding to the significance of the information (p. 191).

In short, individual interest in a subject or topic depends on the specific significance of the material to the learner.

SITUATIONAL INTEREST

In contrast to individual interest, situational interest occurs when a learning situation is somehow made more interesting. Dewey (1913) warned that interest should not be viewed as some sort of flavoring that can be sprinkled on an otherwise boring task: "When things have to be made interesting, it is because interest itself is wanting. Moreover, the phrase is a misnomer. The thing, the object, is no more interesting than it was before" (pp. 11–12). Dewey's admonition provides an important working hypothesis for modern research on situational interest. It leads to a straightforward prediction, which can be called the *seductive details hypothesis*—adding interesting, but irrelevant, details to an otherwise boring text will not improve learning of the text.

Is there any difference in what students learn from a text that contains or does not contain *seductive details*—that is, highly interesting and vivid material that is not closely related to the important information in the text? If we take a somewhat boring text and spice it up by adding an interesting detail to each paragraph, will students learn more from the text? Consider, for example, the passage about insects in Figure 14–3. First read the passage; then close the book and write down all that you can remember.

If you are like students in a study by Garner, Gillingham, and White (1989), you did well in remembering the three seductive details ("When a Click Beetle is on its back, it flips itself into the air and lands right side up while it makes a clicking noise." "When a fly moves its wings about 200 times in a second, you hear a buzzing sound." "Insects have to protect themselves from snakes, which eat live animals such as insects, worms, frogs, mice, rats, rabbits, and fish.") but not so well in remembering the three most important pieces of information (i.e., the first sentence in each paragraph). However, if you had read the same passage without the seductive details, how do you think you would have done in learning the important information?

FIGURE 14–3
A passage about insects

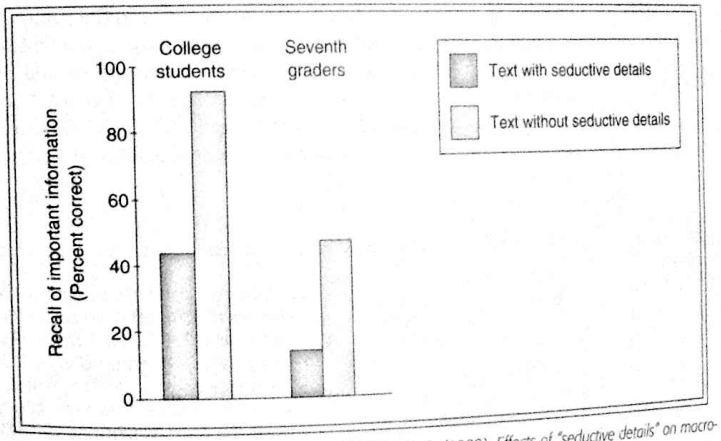
Some insects live alone, and some live in large families. Wasps that live alone are called solitary wasps. A Mud Dauber Wasp is a solitary wasp. Click Beetles live alone. When a Click Beetle is on its back, it flips itself into the air and lands right side up while it makes a clicking noise. Ants live in large families. There are many kinds of ants. Some ants live in trees. Black ants live in the ground.

Some insects are fast runners, and others are fast fliers. Cockroaches are very fast runners. It is hard to catch them. They run and hide. Dragonflies are very fast fliers. Flies are about the fastest flying insects. When a fly moves its wings about 200 times in a second, you hear a buzzing sound.

Some insects protect themselves by looking like other animals, and others protect themselves by looking like plants. Insects have to protect themselves from snakes, which eat live animals such as insects, worms, frogs, mice, rats, rabbits, and fish. Birds do not often eat Viceroy Butterflies because they look so much like Monarch Butterflies. Birds seem to know that Monarch Butterflies taste bad. When a Walking Stick sits very still on a twig, it looks like a twig. It is hard for an enemy to find it.

Source: From Garner, R., Gillingham, M.G., & White, C. S. (1989). Effects of "seductive details" on macroprocessing and microprocessing in adults and children. Cognition and Instruction, 6, 41–57.

FIGURE 14–4
Students learn less from text with seductive details



Source: From Garner, R., Gillingham, M.G., & White, C. S. (1989). Effects of "seductive details" on macroprocessing and microprocessing in adults and children. Cognition and Instruction, 6, 41–57.

Figure 14–4 shows the average amount of important information recalled by college students and by seventh graders who read the insect passage with and without seductive details (i.e., facts about beetles that flip, flies that buzz, and snakes that eat live animals). As you can see, for both age groups, students who read the insect passage without seductive details actually recalled more important information than students who read the insect

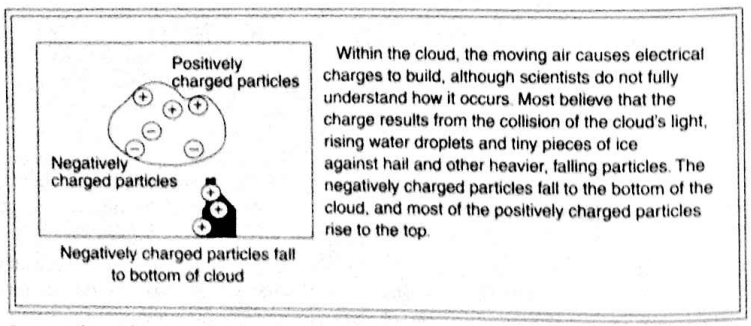
passage with seductive details. In related studies, adding seductive details did not improve learning of the important information in science text (Hidi & Baird, 1988) or in history text (Duffy et al., 1989), although the details themselves were well recalled. Apparently, seductive details draw the reader's attention away from important information.

In a review of research on seductive details, Wade (1992) concluded that "adding seductive details . . . does not facilitate and often has a detrimental effect on learning of important information" (p. 272). According to Wade, the use of seductive details results in "texts that are longer and contain more irrelevant detail" so "students could be reading more but learning less" (p. 274). These results support Dewey's warnings against viewing interest as some sort of spice that can be added to an otherwise boring lesson.

If seductive details disrupt the process of constructing a coherent understanding of the presented material, they should also have a negative impact on transfer performance. To test this idea, Harp and Mayer (1997, 1998) asked students to read an illustrated passage that explained the cause-and-effect steps involved in lightning formation. The passage contained 550 words broken into six paragraphs, along with an illustration for each paragraph. Figure 14–5 shows one of the paragraphs describing how negatively charged particles fall to the bottom of the cloud and positively charged particles rise to the top. It also shows a corresponding illustration depicting the same process of negatively charged particles on the bottom of the cloud and positively charged particles on the top. What is the main point of this paragraph? If you focus on building a cause-and-effect chain, the main step is the separation of charges in the cloud, with negatives going to the bottom and positives going to the top.

Suppose, however, we add seductive details to each paragraph consisting of a sentence and a photograph. For example, after the first sentence of the paragraph we add: "In trying to understand these processes, scientists sometimes create lightning by launching tiny rockets into overhead clouds." To the right of the paragraph we add a photograph of scientists in an open field launching a small rocket into a storm cloud. The seductive details are intended to be interesting and related to the general topic of lightning, but they are irrelevant to the cause-and-effect explanation of how lightning forms.

FIGURE 14–5
Excerpt from lightning passage



Source: Adapted from Harp, S.F., & Mayer, R. E. (1997). The role of interest in learning from scientific text and illustrations: On the distinction between emotional interest and cognitive interest. Journal of Educational Psychology, 89, 82–102. Copyright © 1997 by the American Psychological Association. Adapted with permission.

To assess what students learned, Harp and Mayer (1997) asked them to write an explanation of how lightning forms (i.e., recall test), and to write answers to problem-solving transfer questions, such as "Suppose you saw clouds in the sky but no lightning. Why not?" (i.e., transfer test). Harp and Mayer counted the number of steps in the cause-and-effect chain students produced on the recall test, and counted the number of clever answers they gave on the transfer test. Figure 14–6 shows the recall and transfer performance of students who read the passage with or without seductive details. As you can see, adding seductive details severely hurt both recall of the explanation and transfer. In follow-up studies, Harp and Mayer (1998) concluded that seductive details do their damage by encouraging students to impose an inappropriate theme on the passage—such as seeing it as a story about the dangers of lightning rather than as an explanation of how lightning storms form. In this way, seductive-details students are encouraged to integrate the material around inappropriate prior knowledge about the dangers of lightning, select irrelevant material based on this theme, and organize their learning around the theme.

More recently, Mayer, Hieser, and Lonn (2001) asked students to view a multimedia explanation of lighting formation consisting of animation and narration. To spice up the presentation they added six short video clips, each with one sentence of narration. For example, one narrated video clip contained the same seductive-details sentence as above, along with a 10-second video clip showing scientists setting up rockets in an open field, buttons being pressed on a control box, and small rockets soaring into overhead storm clouds. As with the text-based study, adding seductive details to a multimedia explanation resulted in moderate detriments to recall of the explanation (a decline of 15% on the recall test) and large detriments to the production of clever answers to transfer problems (a decline of 30% on the transfer test). It appears that adding interesting but conceptually irrelevant material to an explanation is not a useful way to teach for transfer.

URE 14–6
ductive details
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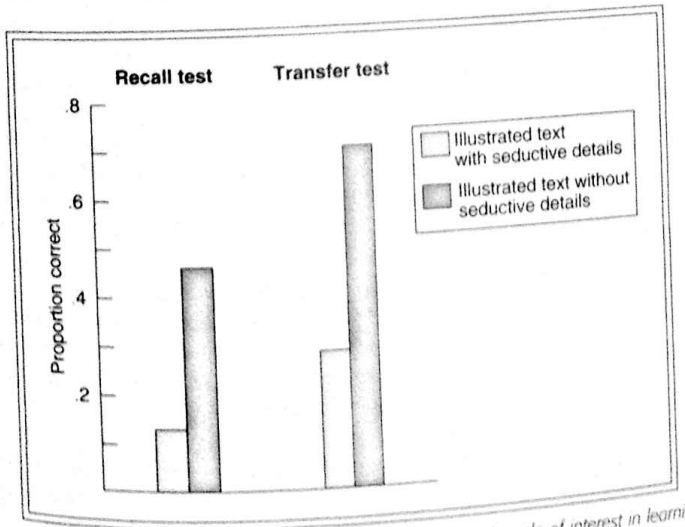

Source: Adapted from Harp, S.F., & Mayer, R. E. (1997). The role of interest in learning from scientific text and illustrations: On the distinction between emotional interest and cognitive interest. Journal of Educational Psychology, 89, 82–102. Copyright © 1997 by the American Psychological Association. Adapted with permission.

passage with seductive details. In related studies, adding seductive details did not improve learning of the important information in science text (Hidi & Baird, 1988) or in history text (Duffy et al., 1989), although the details themselves were well recalled. Apparently, seductive details draw the reader's attention away from important information.

In a review of research on seductive details, Wade (1992) concluded that "adding seductive details . . . does not facilitate and often has a detrimental effect on learning of important information" (p. 272). According to Wade, the use of seductive details results in "texts that are longer and contain more irrelevant detail" so "students could be reading more but learning less" (p. 274). These results support Dewey's warnings against viewing interest as some sort of spice that can be added to an otherwise boring lesson.

If seductive details disrupt the process of constructing a coherent understanding of the presented material, they should also have a negative impact on transfer performance. To test this idea, Harp and Mayer (1997, 1998) asked students to read an illustrated passage that explained the cause-and-effect steps involved in lightning formation. The passage contained 550 words broken into six paragraphs, along with an illustration for each paragraph. Figure 14–5 shows one of the paragraphs describing how negatively charged particles fall to the bottom of the cloud and positively charged particles rise to the top. It also shows a corresponding illustration depicting the same process of negatively charged particles on the bottom of the cloud and positively charged particles on the top. What is the main point of this paragraph? If you focus on building a cause-and-effect chain, the main step is the separation of charges in the cloud, with negatives going to the bottom and positives going to the top.

Suppose, however, we add seductive details to each paragraph consisting of a sentence and a photograph. For example, after the first sentence of the paragraph we add: "In trying to understand these processes, scientists sometimes create lightning by launching tiny rockets into overhead clouds." To the right of the paragraph we add a photograph of scientists in an open field launching a small rocket into a storm cloud. The seductive details are intended to be interesting and related to the general topic of lightning, but they are irrelevant to the cause-and-effect explanation of how lightning forms.

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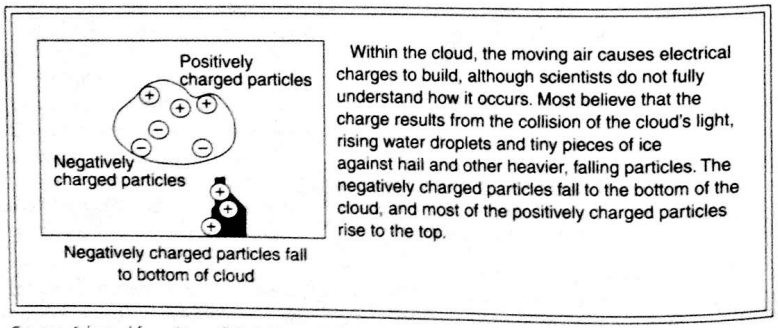

Source: Adapted from Harp, S.F., & Mayer, R. E. (1997). The role of interest in learning from scientific text and illustrations: On the distinction between emotional interest and cognitive interest. Journal of Educational Psychology, 89, 82–102. Copyright © 1997 by the American Psychological Association. Adapted with permission.

To assess what students learned, Harp and Mayer (1997) asked them to write an explanation of how lightning forms (i.e., recall test), and to write answers to problem-solving transfer questions, such as "Suppose you saw clouds in the sky but no lightning. Why not?" (i.e., transfer test). Harp and Mayer counted the number of steps in the cause-and-effect chain students produced on the recall test, and counted the number of clever answers they gave on the transfer test. Figure 14–6 shows the recall and transfer performance of students who read the passage with or without seductive details. As you can see, adding seductive details severely hurt both recall of the explanation and transfer. In follow-up studies, Harp and Mayer (1998) concluded that seductive details do their damage by encouraging students to impose an inappropriate theme on the passage—such as seeing it as a story about the dangers of lightning rather than as an explanation of how lightning storms form. In this way, seductive-details students are encouraged to integrate the material around inappropriate prior knowledge about the dangers of lightning, select irrelevant material based on this theme, and organize their learning around the theme.

More recently, Mayer, Hieser, and Lonn (2001) asked students to view a multimedia explanation of lighting formation consisting of animation and narration. To spice up the presentation they added six short video clips, each with one sentence of narration. For example, one narrated video clip contained the same seductive-details sentence as above, along with a 10-second video clip showing scientists setting up rockets in an open field, buttons being pressed on a control box, and small rockets soaring into overhead storm clouds. As with the text-based study, adding seductive details to a multimedia explanation resulted in moderate detriments to recall of the explanation (a decline of 15% on the recall test) and large detriments to the production of clever answers to transfer problems (a decline of 30% on the transfer test). It appears that adding interesting but conceptually irrelevant material to an explanation is not a useful way to teach for transfer.

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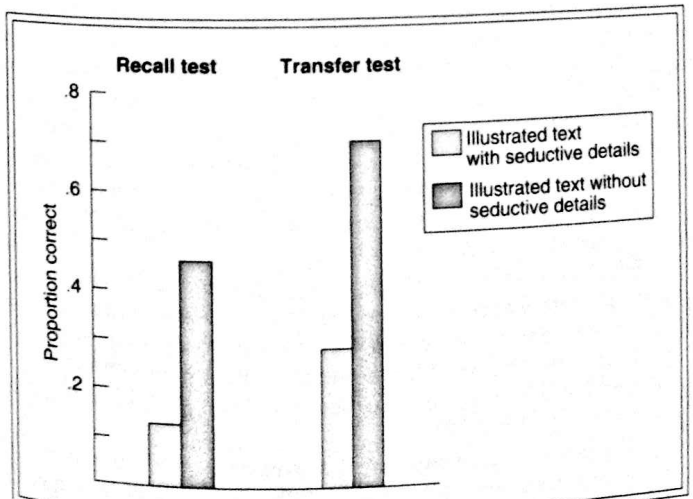


Source: Adapted from Harp, S.F., & Mayer, R. E. (1997). The role of interest in learning from scientific text and illustrations: On the distinction between emotional interest and cognitive interest. Journal of Educational Psychology, 89, 82–102. Copyright © 1997 by the American Psychological Association. Adapted with permission.

In contrast, Schraw and Lehman (2001) have noted that in some cases situational interest can play an important role in learning. For example, Sadowski (2001) found that adding emotionally interesting details to a text does not help if the to-be-learned material is concrete—as was the case in many of the studies reviewed in this section—but can help if the material is abstract. Although seductive details may not be harmful for all types of lessons, the negative effects are strong and consistent for scientific lessons explaining how something works (Mayer, 2005c).

If adding interesting and vivid details does not facilitate learning, how can educators improve the interest level of text and other instructional materials? To answer this question it is useful to distinguish between *emotional interest*—affect that results from overall arousal or excitement—and *cognitive interest*—affect that results from being able to make sense out of text material (Kintsch, 1980; Wade, 1992). Wade (1992) suggests that "rather than focusing on . . . writing techniques that arouse emotional interest, strategies are needed to increase cognitive interest" (p. 274). To create cognitive interest, teachers need to create or select instructional texts that are coherent so that students can easily determine the underlying structure. In summary, structurally coherent text allows students to understand and therefore enjoy learning. Texts that are interesting are texts that students can understand. Techniques for improving text structure are discussed more fully in Chapter 10.

Motivation Based on Self-Efficacy

"I am confident that I will be able to grasp the main ideas in this chapter." "If I read this section carefully, I will be able to explain what self-efficacy is." "I know that I am capable of scoring an A on a test of the material in this book." If you agree with these statements, you have high self-efficacy for mastering educational psychology; if you mainly disagree with these statements, your self-efficacy could be classified as low.

What is self-efficacy? As you can see from this example, self-efficacy is a kind of personal expectation or judgment concerning one's capability to accomplish some task. Schunk (1991) defines self-efficacy as "an individual's judgments of his or her capabilities to perform given actions" (p. 207), Bandura (1986) defines it as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performance" (p. 391), and Pintrich (2003b, p. 107) defines it as "students beliefs about their ability to do the task."

Self-efficacy is not the same as self-concept (Marsh & Shavelson, 1985). Self-concept is a general view of one's self across domains; self-efficacy is a specific view of one's capacities in a given domain. Self-concept consists of many dimensions, one of which is self-confidence, which is most like self-efficacy. For example, "I am a smart person" relates to self-concept, whereas "I am confident that I can get an A in my educational psychology course" relates to self-efficacy.

Why is self-efficacy important? A student's self-efficacy may play an important role in his or her academic achievement. Schunk (1991) claims that "there is evidence that self-efficacy predicts . . . academic achievement" (p. 207). According to Bandura (1977), self-efficacy affects the amount of effort and persistence that a person devotes to a task.

Where does self-efficacy come from? Suppose that you are taking a class in how to use a computer program for conducting simple statistical tests; since you have never used a

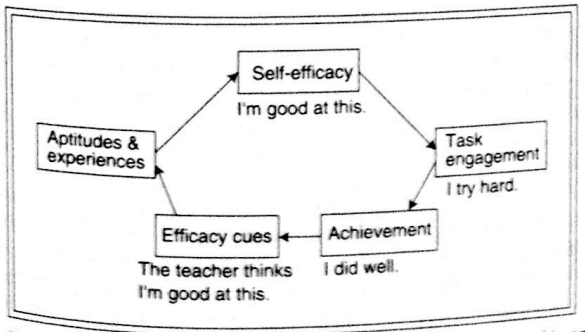
statistics program before, your self-efficacy for this task is still undeveloped. After a few minutes, you find that you are able to use the program easily, so your self-efficacy increases. You look over to see that other first-time learners like yourself are learning to use the program. Your self-efficacy soars because you assume that "if they can do it, I can do it." Your instructor walks by and says, "You can do this!" Again, your self-efficacy grows. Your initial sense of high anxiety, including high heart rate and nausea, has left, and now you feel more relaxed. This bodily change also signals an increase in self-efficacy. These examples describe four sources of self-efficacy: interpreting one's own performance, interpreting the performance of others, interpreting others' expressions of your capabilities, and interpreting one's physiological state.

Figure 14–7 summarizes a theory of self-efficacy, adapted from Schunk (1989, 1991). In any learning situation, students enter with a sense of efficacy that is based on their aptitudes and past experiences in similar tasks. Students' self-efficacy influences what they do, how hard they try, and how long they persist—that is, what Schunk calls "task engagement variables." Throughout the learning episode, the students seek efficacy cues signaling how well they are capable of doing on the task. They use these efficacy cues to establish their self-efficacy for similar tasks in the future. According to Schunk (1991):

> Students derive cues signaling how well they are learning, which they use to assess efficacy for further learning. Motivation is enhanced when students perceive they are making progress in learning. In turn, as students . . . become more skillful, they maintain a sense of self-efficacy for performing well (p. 209).

In short, self-efficacy for a given task both influences and is influenced by students' performance on a task. However, self-efficacy is influenced by how students interpret performance feedback rather than the feedback itself; thus, students who have established high levels of self-efficacy over the course of many experiences are unlikely to suffer lowered self-efficacy as the result of negative performance feedback.

Self-efficacy theory predicts that students work harder and longer when they judge themselves as capable than when they judge themselves as unable to perform a task. In this section, we examine two specific predictions: Self-efficacy is related to study strategy and self-efficacy is related to achievement.



Source: *Adapted from Schunk, D. H. (1989), Self-efficacy and achievement behaviors, Educational Psychology Review, 1, 173–208, with kind permission from Springer Science and Business Media.*

The first prediction of self-efficacy theory is that a student's sense of self-efficacy for a given task is related to the way the student goes about learning a task. That is, the more confident students are in their capacity to learn, the more active they will be in the learning process. To test this hypothesis, a first step is to develop a way of measuring the level of students' self-efficacy and the level of students' learning activity. For example, Zimmerman and Martinez-Pons (1990) presented a series of 10 words to elementary and high school students; for each word, students were asked to rate their ability to spell the word on a scale ranging from completely unsure (0) to completely sure (100). The average rating on the 10 words was used as a measure of verbal self-efficacy. To measure learning activity, Zimmerman and Martinez-Pons asked students to respond to eight open-ended questions, such as:

> Assume your teacher asks students to write a short paper on a topic such as the history of your community or neighborhood. Your score on this paper will affect your report card grade. In such cases, do you have any particular method to help you plan and write your paper? (p. 53).

A measure of learning activity was computed by tallying the number of times students mentioned self-regulated learning strategies such as setting goals, seeking information, keeping records, seeking peer assistance, reviewing notes, and organizing information. As predicted, students' perceptions of efficacy were correlated with their reported use of active learning strategies (r = .42). For example, students who expressed confidence in their spelling ability tended to report using more active learning strategies on a verbal task, whereas students who lacked confidence reported fewer active learning strategies.

In another attempt to test the study strategy hypothesis, Pintrich and De Groot (1990) asked seventh-grade students in science and English classrooms to answer questions about their motivation to learn (such as their self-efficacy) and about their level of activity during learning. For example, to evaluate self-efficacy, they asked students to rate agreement or disagreement on a 7-point scale to statements such as "I expect to do very well in this class" and "I am certain that I will be able to learn the material for this class."

To evaluate degree of active learning, the researchers asked students to rate agreement and disagreement on a 7-point scale to statements such as "When I study for this English class, I put the important ideas in my own words" and "I ask myself questions to make sure I know the material I have been studying." As predicted, Pintrich and De Groot (1990) observed correlations between self-efficacy and use of active learning strategies (r = .33 to r = .44). Similarly, in a study of arithmetic learning, Schunk (1981) found a positive correlation between self-efficacy and persistence on exercise problems during learning (r = .30).

These results are consistent with the idea that self-efficacy is related to deeper and more active processing of information during learning, as suggested by the arrow from "self-efficacy" to "task engagement" in Figure 14–7. However, a more practical issue concerns the relation between self-efficacy and academic achievement and lies at the heart of the second prediction of self-efficacy theory. The theory predicts that self-efficacy is positively related to academic achievement, that is, the more confident a student is in his or her capacity to learn a certain lesson, the greater the probability of success in accomplishing that goal.

To examine this prediction, Schunk and Hanson (1985) asked elementary school children who were having difficulty in arithmetic to judge their capacity to solve 25 different pairs of subtraction problems, such as shown in Figure 14–8. Each pair of

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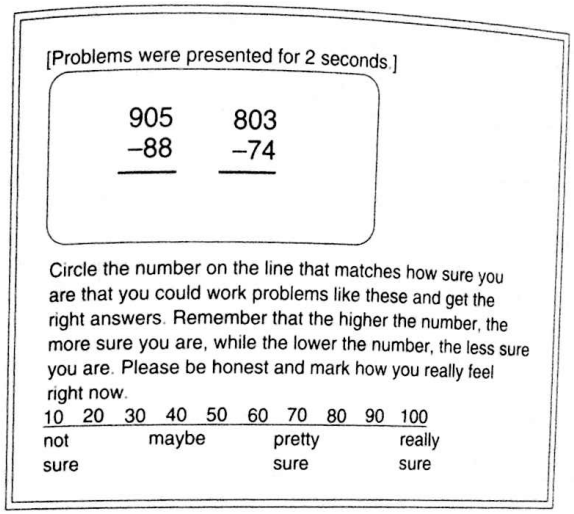

Source: Based on Schunk, D. H., & Hanson, A. R. (1985). Peer models: Influences on Children's self-efficacy and achievement. Journal of Educational Psychology, *77, 313–322.*

problems was presented for 2 seconds, enough time for students to assess problem difficulty but not enough time to actually solve the problems. Students rated their capacity to solve each pair of problems on a 100-point scale ranging from "not sure" (10) to "maybe" (40) to "pretty sure" (70) to "really sure" (100). The average rating for the 25 problems constitutes a measure of Self-efficacy. Then students received instruction in how to solve subtraction problems. The number of problems that were correctly completed during instruction provides a measure of ease of learning. Finally, students took a 25-item subtraction test. The number of correct answers on the test constitutes a measure of achievement.

Is self-efficacy related to achievement in subtraction? The answer from Schunk and Hanson's (1985) study is clearly yes. The correlation between self-efficacy and achievement was high (r = .66). Furthermore, Schunk (1989) reported that similarly high rates were obtained across a series of studies in many domains (r = .46 to r = .90). Is self-efficacy related to ease of learning? Again, Schunk and Hanson's (1985) study produced a strong correlation between self-efficacy and ease of learning (r = .38), and Schunk (1989) reported that similarly high correlations were obtained in other studies (r = .33 to r = .42). In conclusion, performance during and after learning appears to be related to students' judgments of their capabilities for learning.

Another test of the achievement hypothesis concerns how changes in self-efficacy are related to changes in achievement. According to the theory, when a student's self-efficacy is raised, the student's academic performance also increases. For example, in Schunk and Hanson's (1985) study previously described, students rated their self-efficacy for subtraction, took a subtraction pretest, received instruction, and then again rated their self-efficacy for subtraction and took a subtraction posttest. Some students received instruction aimed at improving self-efficacy (student-model group). Students in the student-model group viewed two 45-minute videotapes presented on 2 consecutive

days. The tapes portrayed a teacher writing subtraction problems on the board and a student successfully solving them. The student model verbalized aloud the steps in solving the problem and occasionally made positive statements such as "I can do that one" or "I like doing these." The student models in the videotape were selected to be similar to students in the study. When a student model finished a problem, the teacher stated that the solution was correct and then wrote another problem on the board, and so on throughout the videotape. After viewing the videotapes, the students received 40 minutes of workbook-based instruction on each of 5 consecutive school days. At the beginning of each session, each student was given a workbook containing a sheet explaining how to carry out the needed operations, two worked-out examples, and a series of pages with similar problems to solve. Students were free to consult with a proctor if they needed help. Other students received the same 5 days of workbook-based instruction but viewed videotapes showing a teacher solving the problems (teacher-model group) or saw no videotapes at all (no-model group).

Figure 14–9 summarizes changes in self-efficacy and achievement from before to after instruction. As you can see, the student-model group showed a large change in self-efficacy and in achievement, whereas the changes for the no-model and teacher-model groups were more modest. These results support the idea that modeling "can raise self-efficacy because it implicitly conveys to observers that they are capable of performing the modeled operation" (Schunk & Hanson, 1985, p. 319). Thus, self-efficacy is not based solely on one's prior performance but is also influenced by observing peers. Importantly, the increase in self-efficacy is related to a concurrent increase in academic performance. Schunk and Hanson suggested that "teachers who systematically incorporate peer models into their instruction, at least with children who have skill deficiencies, may help promote children's skills and self-efficacy for acquiring them" (p. 321).

Do students who enter their first year of college with higher self-efficacy tend to get higher college grades? Chemers, Hu, and Garcia (2001) addressed this question in a study involving the entire freshman class at a major university in California. Students were asked to complete a questionnaire that measured their academic self-efficacy as well as several other factors. In addition, the researchers obtained the students' high school grade point average (GPA) and first-year college GPA from university records (with permission, of course). Figure 14–10 shows the relations among these variables. As you can see, high school grades were significantly related to college grades—confirming the idea that past performance is a good predictor of future performance. Importantly, self-efficacy upon entering college was also significantly related to grades at the end of the first year of college, even when the effects of high school grade-point average were statistically eliminated. In other words, for students who had high grades in high school and students who had low grades in high school and everyone in between, there was a strong relation between self-efficacy beliefs and first-year grades. In short, students who believed they were capable of doing well in their courses performed better than students who did not believe they were capable of doing well. Interestingly, high school GPA was also significantly related to self-efficacy beliefs, suggesting a self-perpetuating loop in

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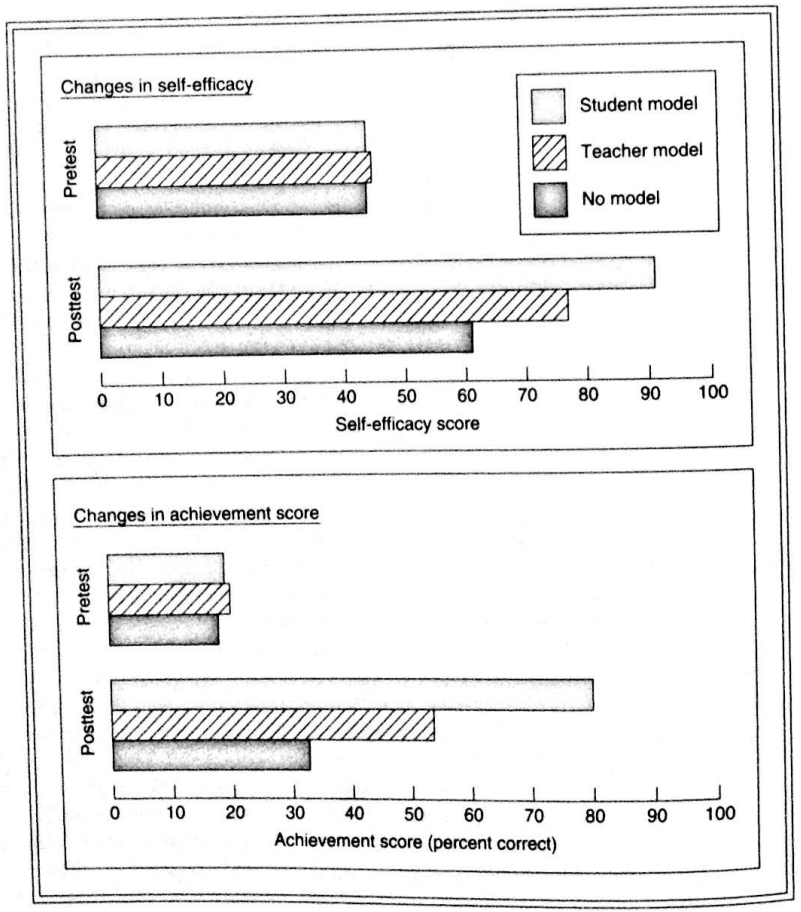

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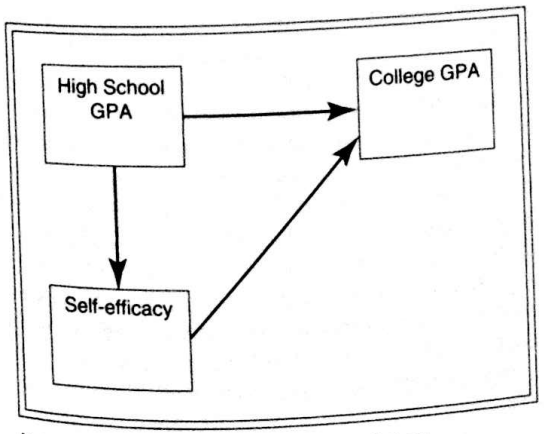


Note: Bolded arrows indicate significant relations.
Adapted from Chemers, Hu, & Gareia (2001).

which obtaining high grades in the past is related to having higher self-efficacy which in turn is related to obtaining high grades in the future. There are many other studies (e.g., Pietsch, Walker, & Chapman, 2003; Pintrich, 2003b) that yield similar results, so there is reason to accept Chemers, Hu, and Garcia's (2001) conclusion that "self-efficacy . . showed powerful relationships to academic performance" (p. 61).

Overall, these results provide a consistent picture of how self-efficacy influences academic performance. Students who have confidence in their capabilities engage in deeper processing of the material during learning, which in turn results in a better understanding of the material. Thus, when achievement tests emphasize understanding, high self-efficacy students are likely to perform better than low self-efficacy students. Pintrich (2003a) summarizes the findings on self-efficacy as follows: "It has been a major finding . . . that when people expect to do well, they tend to try hard, persist, and perform better" (p. 671). This pattern was confirmed in a recent review of self-efficacy studies in which 54 out of 60 effects were positive, prompting the authors to conclude that there was a "small favorable influence of positive self-beliefs on academic achievement" (Valentine, DuBois, & Cooper, 2004, p. 126).

Motivation Based on Attributions

Suppose that you fail a quiz in math class. You search for a reason, a cause, a justification for this outcome. You might, for example, attribute your failure to lack of ability: "I'm not very good in math." Alternatively, you might decide that your performance was caused by lack of effort: "I didn't study enough." Perhaps you might determine that your failure was caused by task difficulty: "That was a really hard quiz." Other possible causes have to do with luck ("I made some unlucky guesses"), mood ("I just had a bad math day"), or hindrance from others ("The guy in front of me was so noisy I couldn't concentrate").

Alternatively, suppose that your history teacher praises you for giving a particularly insightful answer to a question during class discussion. Being an inquisitive person, you seek an explanation for your success. Again, among the possible causes of your success are ability ("I'm really pretty smart in history"), effort ("I guess all my studying is paying off"), ease of task ("That was really a pretty easy question"), luck ("The answer just came to me out of nowhere"), mood ("Everything is going great for me this morning"), or help from others ("The teacher helped by smiling and nodding as I answered"). These stated causes are examples of attribution theory applied to academic learning (Weiner, 1979, 1984, 1985, 1986, 1992). According to attribution theory, students seek to understand the world around them, such as searching for the causes of success and failure on academic tasks. Students may attribute their success or failure to a variety of causes, including ability, effort, task difficulty, and luck. Table 14–2 shows how each of these causal ascriptions relates to each of three dimensions: *Locus* refers to whether the cause is internal or external to the student; *stability* refers to whether the cause is constant or changing over time; and *controllability* refers to whether the cause is or is not influenced by the student. For example, ability is internal, stable, and uncontrollable; effort is internal, unstable, and controllable; task difficulty is external, stable, and uncontrollable; and luck is external, unstable, and uncontrollable.

According to attribution theory, the causal ascriptions that a student makes are related to academic motivation. First, let's focus on ability and effort. If a student attributes failure

TABLE 14–2 Why did I fail

Event	Attribution	Example	Locus	Stability	Controllability
Failure	Ability	I'm not smart enough	Internal	Stable	Uncontrollable
Failure	Effort	I didn't try hard enough	Internal	Unstable	Controllable
Failure	Task difficulty	This is too hard for me	External	Stable	Uncontrollable
Failure	Luck	I had bad luck	External	Unstable	Uncontrollable

to an uncontrollable stable cause such as ability ("I'm not smart enough"), the student is likely to give up and to be less persistent when confronted with similar tasks in the future. If a student attributes failure to a controllable unstable cause such as effort ("If I try harder, I can do this"), the student is likely to persist even in the face of failure. Pintrich (2003b, p. 107) notes that "attribution theory proposes that the causal attributions an individual makes for success or failure—not the actual success or failure event—mediates future expectancies." According to Weiner (1992) "achievement-change programs have been developed that attempt to induce individuals to ascribe failure to lack of effort (an unstable cause) rather than to low ability (a stable cause)" (p. 861).

Let's examine two basic predictions of attribution theory for education: *attributional training hypothesis*—students who are trained to attribute academic success or failure to effort are more likely to work hard than students who attribute their performance to ability—and the *attributional feedback hypothesis*—teachers who show sympathy or pity when students fail convey the idea that students lack ability.

To investigate the first hypothesis, consider the following scenario. Josh, a sixth grader with a learning disability, is given a paragraph to read. He reads each word but does not do well on a reading comprehension test. The teacher suspects that Josh is not actively processing the material, so the teacher provides direct instruction in active reading strategies such as summarization, that is, locating the main idea and its supporting details in a paragraph. However, when given a new paragraph to read, Josh does not use the active reading strategies he just learned, and he continues to perform poorly on reading comprehension tests.

What's going on in this situation? On the cognitive level, Josh seems to lack appropriate reading strategies. This problem can be addressed through strategy training, such as teaching Josh how to summarize paragraphs. On the motivational level, Josh may have developed the belief that he will not be able to answer comprehension questions no matter how hard he studies. This problem can be addressed through attributional training, such as helping Josh to recognize that test performance depends on effort during learning (rather than on his innate ability). In the Josh scenario, strategy training alone did not seem to be helpful, perhaps because Josh also needed attributional training. In short, Josh knew what to do (from strategy training), but he did not believe that doing it would really help him.

According to attribution theory, strategy training is only part of the prescription for changing students' academic performance; in addition, students need to change the way

they attribute success and failure. To test this hypothesis, Borkowski, Weyhing, and Carr (1988) asked a group of children with reading disabilities and adolescents from special education classes to take pretests, receive training, and then take posttests. The pretest and posttest included a reading strategy test designed to evaluate the degree to which students could summarize a paragraph, and a reading comprehension test that tested how well students could answer questions about a passage they read. The reading strategy test asked students to read and then summarize paragraphs; higher scores indicate better summaries. The reading comprehension test was a standardized test that measured students' ability to read passages and then answer inferential questions; higher scores indicate better reading comprehension.

Some students received strategy and attribution training, as summarized in Figure 14–11, whereas others received only strategy training. For attributional training, students learned a summarization strategy for finding main ideas and supporting details. During learning, the instructor made intentional errors and then discussed with students the importance of not attributing failure to noncontrollable factors such as ability or task difficulty. The instructor modeled positive self-attributions while learning, such as "I need to try to use the strategy," and a discussion of the causes of success emphasized statements such as "I tried hard, used the strategy, and did well." Then students learned the summarization strategy, along with the modeling of attributions during learning that emphasized "strategy use equals success." In contrast, the strategy-only group learned how to summarize paragraphs by finding main ideas and supporting details but did not receive any attributional training.

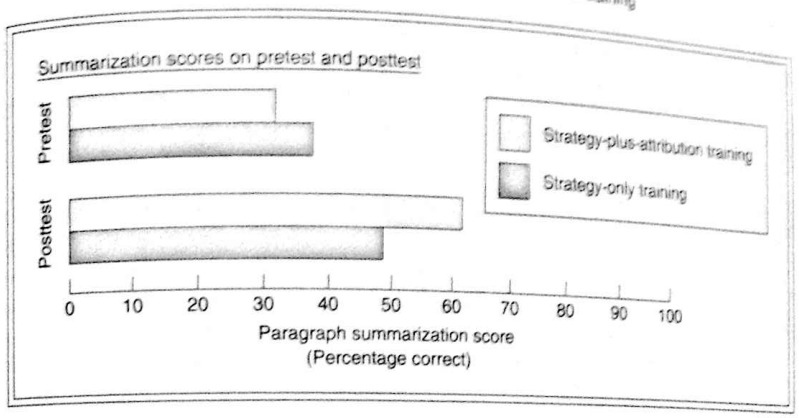
Figure 14–12 summarizes the pretest-to-posttest changes for the two groups. As you can see, students who were given attribution and strategy training performed better on summarizing paragraphs than strategy-only students. This finding indicates that effective use of strategies depends partly on students' belief that the effort required to use a strategy actually will have an effect on their performance. In addition, the attribution-and-strategy group performed better than the strategy-only group on reading comprehension questions involving inference but not on questions involving literal memory for the material. Again,

FIGURE 14–11
Partial script for attribution training

Student receives strategy training in how to identify main topic and supporting examples.
Instructor demonstrates how to summarize a paragraph but selects topic sentence at random.
Class discusses reasons for instructor's mistake and concludes that failure was due to a controllable factor: not using the right strategy.
Instructor says, "I need to try to use the strategy." Instructor uses strategy and succeeds in summarizing the paragraph. Instructor emphasizes that effortful use of strategy resulted in success.
Instructor and students take turns summarizing paragraphs. Instructor continues to attribute errors to lack of effort and success to effortful use of correct strategy.

Source: Based on Borkowski, J. G., Weyhing, R. S., & Carr, M. (1988). Effects of attributional retraining on strategy-based reading comprehension in learning-disabled students. Journal of Educational Psychology, 80, 46–53.

FIGURE 14–12 Learning to read effectively with and without attribution training



the combined training in attribution and strategy was more effective than strategy training alone in producing active learners who could go beyond the information given—that is, learners who were able to transfer.

Students with learning disabilities are often candidates for cognitive strategy instruction. Borkowski, Weyhing, and Carr (1988) conclude that cognitive strategy training will be more effective if it is combined with motivational training:

> Our data suggest that teaching reading strategies alone, or emphasizing the role of effort in isolation, will not prove sufficient for educating students with learning disabilities. Attributions linked to specific subject matter should be manipulated systematically in order to enhance the acquisition and generalization of study skills being taught. (p. 52)

In short, students may need to learn about cognitive aids such as effective study skills, and motivational aids such as the belief that academic success depends on actively using effective study aids.

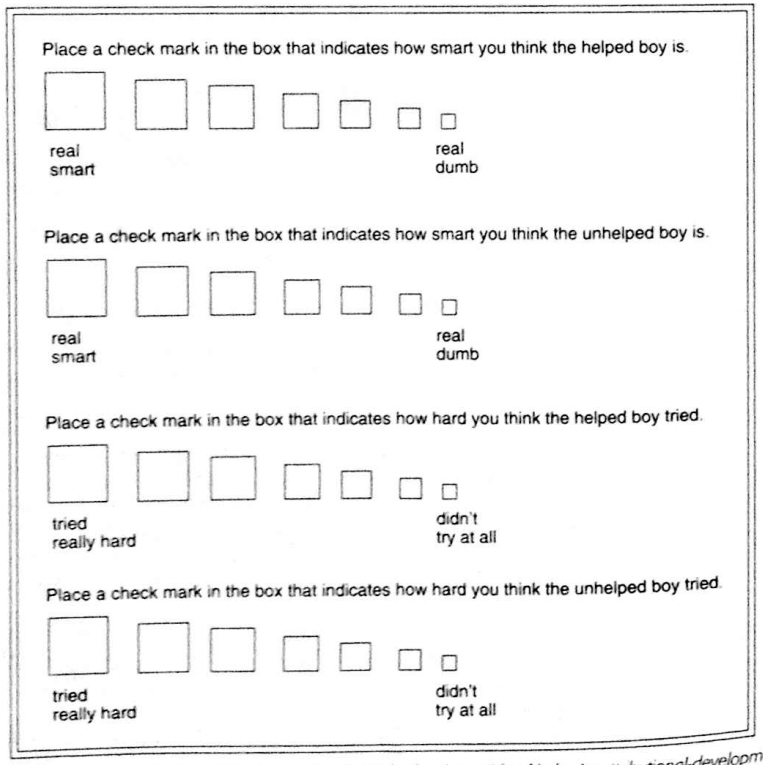
A second important hypothesis based on attribution theory is that students use cues from teachers to make attributions about effort and ability. When a teacher shows a student how to solve a problem, a subtle message is sent: "You were not smart enough to figure it out, so I had to tell you the answer." Consider the following scenario. Elementary school students are sitting at their desks working on a sheet of 10 arithmetic problems while the teacher circulates around the room. The teacher stops at the desk of one boy, looks casually over his shoulder as he works, and then moves on without comment. She stops at the desk of another boy, looks casually over his shoulder, and says, "Let me give you a hint. Don't forget to carry your tens." The help comes early in the student's work on the problem before it was clear whether the student could solve the problem. A few minutes later, the teacher collects the papers; she informs both the unhelped and the helped boy that they had done well, correctly solving 8 out of the 10 problems.

If you had been a student in the class, how would you rate the unhelped and helped students in terms of ability and effort as shown in Figure 14–13? Place a check mark in the figure that indicates how smart you think each boy is and how much each boy tried.

Graham and Barker (1990) asked elementary school students to view videotapes depicting the situation you just read about and to give ratings as you just did in Figure 14–13. If you are like the 5- to 10-year-old students in Graham and Barker's study, you rated the student who received help from the teacher as less able and less hard working than the student who did not receive help, even though neither student asked for help and both correctly solved 8 out of 10 problems. These results are summarized in Figure 14–14.

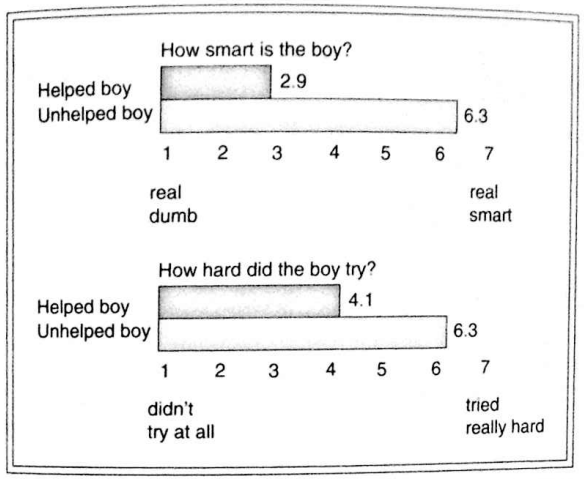
Consider a related situation in which you, as a sixth-grade student, are given some puzzle problems to solve. You are told that you will have 60 seconds to solve each problem because "one minute is the right amount of time for kids your age" based on a bogus "Table of 6th-Grade Norms." You fail to solve each problem in the time allotted. Whenever you fail to solve a problem within 60 seconds, the experimenter says, "Stop. Your time is up. You didn't get that one right because you didn't solve it in time." Then the experimenter demonstrates the correct solution and says, "I feel sorry for you

FIGURE 14–13
How smart and how hard-working was each boy?



Source: Based on Graham, S., & Barker, G. P. (1990). The down side of help: An attributional-developmental analysis of helping behavior as low-ability cue. Journal of Educational Psychology, 82, 7–14.

FIGURE 14–14
Student ratings of ability and effort given each boy



Source: Based on Graham, S., & Barker, G. P. (1990). The down side of help: An attributional-developmental analysis of helping behavior as low-ability cue. Journal of Educational Psychology, 82, 7–14.

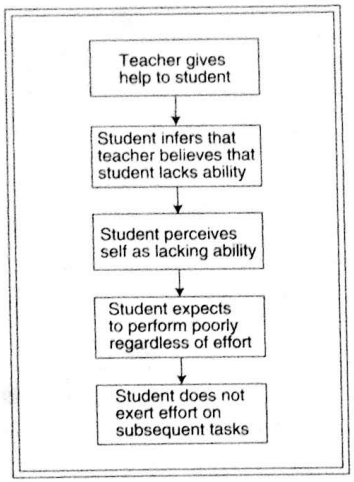
because you haven't gotten any of these puzzles right so far." She leans forward with hands folded, gazes directly at you, and speaks in a quiet tone. This procedure is repeated for five failed puzzles. If you are like the children in Graham's (1984) study, you interpret the teacher's sympathetic comments as cues that you lack the ability to solve the problems. When Graham compared sixth-grade students who received sympathy and pity after each failure with those who simply were told they had failed, she found the pitied students were more likely than the unpitied students to rate lack of ability as a cause of their failures.

According to Graham and Barker (1990) and Graham (1984, 1991), help or pity from a well-meaning teacher may be interpreted by the receiving student as a cue that the student lacks the ability to succeed. Figure 14–15 summarizes an attributional model of the process by which teachers' help results in poorer performance:

First, the teacher—who is perceived to have high ability—provides unsolicited help to a student.
Second, the student infers that the teacher gave help because she believes the student lacks ability.
Third, the student perceives himself or herself as having low ability.
Fourth, the student expects his or her lack of ability to result in poor performance on subsequent tasks.
Fifth, the student does not try hard on subsequent tasks.

When a teacher provides unsolicited help to a student, the student may infer that the teacher has a low opinion of his or her ability; when a student thinks that the teacher perceives him or her to have low ability, the student comes to share this belief, which in turn

FIGURE 14–15
A student's chain of reasoning about teacher help–giving



Source: Based on Graham, S., & Barker, G. P. (1990). The down side of help: An attributional-developmental analysis of helping behavior as low-ability cue. Journal of Educational Psychology, 82, 7–14.

causes the student to expect poor performance on subsequent tasks and therefore to not try hard.

Consider another example of the negative consequences of unproductive attributional beliefs. John is taking a somewhat difficult course in which the grade is based mainly on a term paper, but he puts off writing the paper to the very last day and stays up all night in a noisy room to write it. This is an example of *self-handicapping*—choosing to put obstacles in the way of academic success, which enable the learner to deflect the cause of possible failure away from ability and onto the self-imposed obstacles. In a study involving Australian college students, Martin, Marsh, and Debus (2000) found that students' scores on external attributional orientation (i.e., agreeing to statements such as "Some of my lower grades have seemed to be due to bad luck") tended to be positively related to scores on self-handicapping (i.e., agreeing to statements such as "I don't attend all the classes in this area so I have an excuse if I don't do as well as I hoped"), which in turn were negatively related to end-of-year grades. Importantly, self-handicapping is also negatively related to students' reported use of deep learning strategies and persistence, so that students who self-handicap tend to exert less effort during learning. These results provide a picture of motivation in which students who do not believe that their effort can improve their learning tend to put obstacles in their path, exert less effort during learning, and ultimately achieve lower grades.

Pintrich (2003a) summarizes the research findings on attribution and related theories by saying, "the general trend is that students who believe they have personal control of their own learning . . . are more likely . . . to achieve at higher levels than students who do not feel in control" (p. 672). In short, when you believe that effort makes a difference, you are more likely to work hard during learning.

Motivation Based on Goal Orientation

Allison, Bruce, and Carl are all in the same statistics course. Allison's main goal is to learn the material as well as she can, because she knows that an understanding of statistics will help her be successful in the future. This is an example of a mastery goal, because Allison's goal is to master the material. Bruce wants to get the top grade in the class. This is an example of a performance-approach goal, because Bruce's goal is to perform well on tests. Finally, Carl's main goal is to avoid looking bad in comparison to other students, so he just does not want to perform poorly on the tests. This is an example of a performance-avoidance goal, because Carl's goal is to avoid performing poorly on tests. As you can see, you have a mastery goal if you want to increase your competence, and you have a performance goal if you want to attain positive judgments of your performance or avoid negative judgments of your performance (Ames, 1992, Dweck, 1986; Dweck & Leggett, 1988; Elliot, 1999). Table 14–3 provides a description of each of three kinds of achievement goal orientation along with example questionnaire items.

Is achievement goal orientation related to academic achievement? This question has motivated a series of studies that are beginning to show that the answer is yes—with mastery and performance-approach goals sometimes related positively to academic achievement and performance-avoidance goals sometimes related negatively to academic achievement.

If you want to get the highest grade in the class, will that goal actually help you do so? According to a recent review of research (Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002), the answer is an overwhelming yes. Harackiewicz, Barron, Pintrich, Elliot, and Thrash (2002) make an important distinction between two types of performance goals: *performance-approach goals*, in which students want to look good in comparison to their

TABLE 14–3
Three kinds of achievement goals

Type of Goal	Definition	Example of Questionnaire Items
Mastery	Student's goal is to understand the material.	"I want to learn as much as possible from this class." "It is important to me to understand the content of this course as thoroughly as possible."
Performance-approach	Student's goal is to get top grades.	"My goal in this class is to get a better grade than most of the students." "I am motivated by the thought of outperforming my peers."
Performance-avoidance	Student's goal is to not get low grades.	"My goal for this class is to avoid performing poorly." "My fear of performing poorly in this class is what motivates me."

Adapted from Elliot (1999).

fellow students, and *performance-avoidance goals*, in which students want to not look bad in comparison to their fellow students. In 10 studies of college students involving 21 different ways of measuring performance, performance-approach goals were significantly positively related to test performance on 19 of the 21 measures. Mastery goals (and in other studies, performance-avoidance goals) did not fare as well.

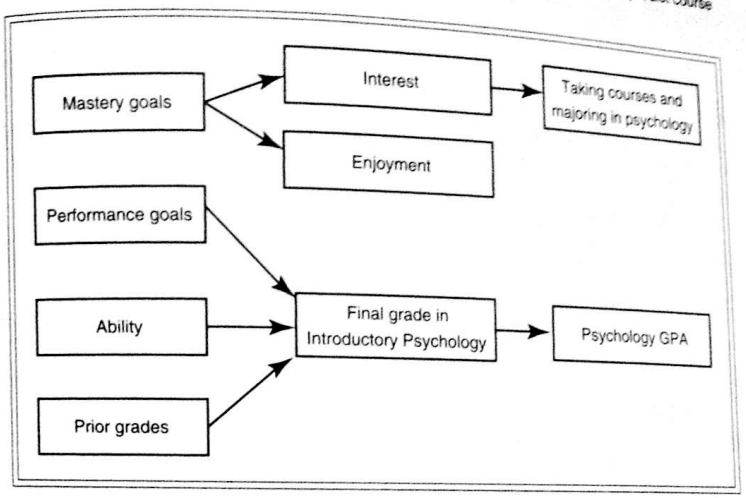
What is wrong with the idea that performance-approach goals lead to higher achievement? Midgley, Kaplan, and Middleton (2001) suggest three problems concerning the what, who, and how of performance-approach goals. First, if achievement is measured by test scores (which is common in research studies), then students with performance-approach goals may be memorizing material to do well on tests at the expense of long-term retention and understanding. Second, concerning who, there is some evidence that performance-approach goals are more helpful for boys, for older students, and for students in competitive learning environments. Third, concerning how, performance-approach goals may lead to self-handicapping in which students avoid new and challenging learning experiences, avoid cooperating with peers, and rely on cheating. In rebuttal, Harackiewicz, Barron, Pintrich, Elliot, and Thrash (2002) agree that "performance-approach goals may have some negative consequences, but empirical evidence is meager at present" (p. 640). The current state of the research literature reviewed by these authors shows that higher levels of performance-approach goals are associated with higher performance on academic tests, so there is reason to make a distinction between performance-approach and performance-avoidance goals.

Let's take a closer look at the role of mastery and performance-approach goals. Jack and Sarah enter college in the same class, take Introductory Psychology in their freshman year, and end up majoring in psychology. Both have similar SAT scores and similar grades in high school. Jack's academic goals include ending up with a grade point average that puts him in the top 10% of his class (i.e., a performance-approach goal), whereas Sarah's academic goal is to learn psychology as well as she can (i.e., a mastery goal). Who will get better grades in the Introductory Psychology course, and who will wind up with a higher grade point average in psychology? According to research by Harackiewicz, Barron, Tauer, and Elliot (2002), Jack—the student with performance-approach goals—will get a higher grade in the Introductory Psychology course and will end up graduating with a higher psychology GPA than Sarah—the student with the mastery goals.

Harackiewicz, Barron, Tauer, and Elliot (2002) asked college students to complete a series of questionnaires—evaluating their goal orientation and related factors—and collected information concerning their high school grades and SAT scores. All students in the study took an Introductory Psychology course in their freshman year and later graduated with a major in psychology. Figure 14–16 shows that mastery goals were positively related to the students' levels of interest and enjoyment in the class, which also were related to taking more courses in psychology and majoring in psychology, but mastery goals were not positively related to their grade in the class. In contrast, performance-approach goals were related to grades in the course, which in turn were related to the student's psychology GPA at graduation. Of course, ability (as measured by SAT score) and prior knowledge (as measured by GPA in high school) were also related to college grades.

Harackiewicz, Barron, Tauer, and Elliot conclude that these results "reveal clear evidence for the beneficial effects of adopting both mastery and performance-approach goals in college courses" because (1) "students who adopted mastery goals in their initial coursework in psychology were more likely to enjoy lectures, express interest in psychology,

FIGURE 14–16 Mastery goals predict interest and enjoyment but performance goals predict course grades



Adapted from Harackiewicz, Barron, Tauber, & Elliot (2002).

enroll in additional psychology courses, and ultimately declare a major in psychology"; and (2) "students who adopted performance-approach goals for their initial course work in psychology received higher grades in the introductory course, higher grades in additional psychology courses taken over their academic careers, as well as higher GPAs for all courses over the entire academic career" (p. 573). In short, both mastery goals and performance-approach goals appear to be related to academic motivation, although they are related to different aspects of academic motivation.

Harackiewicz, Barron, Tauer, Carter, and Elliot (2000) conducted a similar study and came up with the same pattern of results: mastery goals predicted subsequent enrollment in psychology courses (but not course grades), whereas performance-approach goals predicted grades (but not interest in taking more courses). In answer to the question "Why do some students excel in their college courses and develop an interest in an academic discipline?" Harackiewicz et al. (2000) take a "multiple goal perspective" (p. 316) in which mastery and performance-approach goals have complementary positive effects. Pintrich (2000) has also noted that mastery goals are sometimes related to academic performance, especially when they work together with performance-approach goals.

Although research shows that mastery and performance-approach goals are related to important academic outcomes in college students, you might be wondering if there are similar results with younger students. To explore this issue, Wolters (2004) gathered the following information about a large group of junior high school students taking a mathematics course: (1) a questionnaire about motivational beliefs, including mastery orientation, performance-approach orientation, and performance-avoidance orientation; (2) a questionnaire concerning motivational engagement, including choice, effort, persistence,

TABLE 14–4

Does goal orientation affect engagement, learning strategies, and course grade?

Goal Orientation	Motivational Engagement				Learning Strategy		Course Grade
	Choice	Effort	Persistence	Non-procrastination	Cognitive	Meta-cognitive	
Mastery	+	+	+	+	+	+	
Performance-approach							+
Performance-avoidance	–			–	–		

Note: + *indicates significant positive relation,* - *indicates significant negative relation, and blank indicates no significant relation, with effects of prior achievement, gender, and classroom structure removed.*

Adapted from Wolters (2004).

and nonprocrastination; (3) a questionnaire concerning use of effective learning strategies, including cognitive strategies and metacognitive strategies; and (4) course grade.

As you can see in Table 14–4, mastery orientation is positively related to effective engagement measures and effective learning strategy measures but not significantly related to course grade; performance-approach orientation is not significantly related to effective engagement or learning strategies but is significantly related to higher grades; performance-avoidance orientation is negatively related to some engagement measures and not significantly related to grade. These results are consistent with studies involving college students and high school students in which (a) mastery orientation does not predict teacher-assigned grades in spite of being tied to self-reported engagement and effective learning strategies, and (b) performance-approach orientation predicts teacher assigned grades in spite of not being tied to engagement and effective learning strategies.

What is the explanation for this pattern, and in particular, why is mastery orientation related to engagement and learning strategies but not directly related to higher grades? Wolters (2004) proposes that the teachers' grading practices may reward "completing repetitive work, being compliant, well-behaved, or generally exhibiting a surface-level understanding of the material" (p. 248) so grades may be largely based on performing low-level skills and recalling memorized facts.

If mastery goals can play a role in academic success, then you would want to know how to promote them in students. Let's visit a college classroom and ask students to rate the classroom climate—such as how interesting the professor's lecture are, how much emphasis the professor puts on evaluation, and how harsh the grading is. For example, suppose we ask students to rate statements from 1 (strongly disagree) to 7 (strongly agree) such as: "The professor presents material in an interesting manner" (lecture interest), "The professor is more concerned with our grades than what we learn" (evaluation focus), and "The grading structure makes it almost impossible to get an A in this course" (harsh evaluation). We can also ask them to complete a survey that indicates their level of mastery, performance-approach,

and performance-avoidance goals. When Church, Elliot, and Gable (2001) carried out this study, they found that the classroom climate factors were significantly correlated with the goal-orientation factors: Mastery goal orientation was positively related to lecture interest and negatively related to evaluation focus and harsh evaluation, whereas performance-avoidance goal orientation showed the opposite set of relations. In short, students are more likely to want to understand the material (i.e., have a mastery goal orientation) when they perceive the classroom climate as having an interesting professor who does not emphasize grades and does not grade harshly. Although the results are promising, they do not show that the classroom climate causes goal orientation. If we want to test that idea, we would have to compare the goal orientations of students who take the same course under two different classroom climates.

Overall, there is emerging evidence that students' achievement goals can affect their effort during learning and ultimately can affect their grades. Pintrich (2003a) offers a fitting summary of the research: "Both mastery and performance-approach goals can have some positive outcomes, whereas performance-avoidance goals do not seem to lead to any positive outcomes" (p. 677). In short, it can be useful for students to want to understand the material and to perform well on tests.

Another important motivation theory is task value theory, which is based on the idea that people are more likely to engage in learning tasks that they find valuable (Wingfield & Eccles, 2002). However, Bong (2001) found a strong correlation between scores on questionnaires measuring task value (e.g., "I think what I learn in this class is important" or "I think this course is a useful subject") and questionnaires measuring mastery goal orientation (e.g., "In this course, I like problems and materials the best that really make me think" or "I like problems and tasks that I can learn from in this class, even if I make a lot of mistakes") and self-efficacy (e.g., "I can master even the hardest material in this course if I try" or "I know I will be able to learn the material for this class"). You might also see that task value theory has similarities to interest theory in that both focus on the degree to which the learner values the material in the lesson. Pintrich (2003a) has proposed that "task value beliefs seem to predict choice behavior, such as intentions to enroll in future . . . courses" (p. 675), whereas other factors such as self-efficacy beliefs "seem to predict achievement once students are enrolled in the course."

Chapter Summary

In this chapter we explored four possible roots of motivation. According to interest theory, students learn best when they can find some personal value in the material. According to self-efficacy theory, students learn best when they are confident in their capabilities to learn the material. According to attribution theory, students learn best when they believe that academic achievement depends on how much effort they devote to learning. According to achievement goal theory, students learn best when they want to understand the material and when they want to perform well.

Although these four views of motivation to learn differ, they share features that could eventually become unifying themes. First, these four views of motivation emphasize the domain-specificity of motivation. In contrast to earlier theories that viewed motivation as a general drive (Hull, 1943) or general personality characteristic (Atkinson, 1964), current

theories are based on the idea that motivation depends on the student's interaction with the specific material to be learned. Second, these four views of motivation emphasize the connection between motivation and cognition. In contrast to previous theories that viewed motivation to be an automatic drive-reduction system (Hull, 1943), current theories hold that motivation is related to learners' interpretations, memories, beliefs, and self-explanations about the learning situation. Third, these four views are based on research with humans in realistic academic settings rather than on research with hungry rats in contrived situations.

Modern theories of motivation provide useful implications for education. Teachers should create situations that mesh with the interests of the students so that students can see some personal value in learning the material. Teachers should create situations in which students can observe their peers succeeding and also experience success themselves. Teachers should create situations in which students can learn that their academic successes and failures depend on their effort rather than solely on their ability. Finally, teachers should help students develop productive goals for learning.

This chapter shows how motivational and cognitive processes are both involved in learning, so it is unwise to emphasize one at the expense of the other. Although motivation is widely recognized as a crucial component in education, it has not received as much attention in research or theory as cognition has. For example, Ames and Ames (1984) note that only since the 1960s "has the systematic study of motivational processes in education settings received significant and sustained attention by researchers in psychology and education" (p. xi). Although cognitive theories of learning have come to dominate educational psychology, they "lack an adequate conceptualization of the impact of motivational and emotional factors in learning" (Krapp, Hidi, & Renninger, 1992, p. 4). In short, educational psychologists should continue to examine not only ways of improving student learning but also ways of helping students want to learn.

SUGGESTED READINGS

Dewey, J. (1913). *Interest and effort in education.* Cambridge, MA: Riverside Press. (A classic little book on the role of interest in learning.)

Pintrich, P. R. (2003a). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology, 4,* 667–686. (A comprehensive review of research on academic motivation.)

Pintrich, P. R. (2003b). Motivation and classroom learning. In W. M. Reynolds & G. E. Miller (Eds.), *Handbook of psychology: Vol. 7. Educational psychology* (pp. 103–122). New York: Wiley. (Another comprehensive review of research on academic motivation.)

Pintrich, P. R., & Schunk, D. H. (2002). *Motivation in education* (2nd ed). Upper Saddle River, NJ: Merrill/Prentice Hall. (A foundational book on motivation research.)