Self-Efficacy and Achievement Behaviors

By: Dale H. Schunk

Schunk, D. H. (1989). Self-efficacy and achievement behaviors. *Educational Psychology Review, 1*, 173-208.

Abstract:
In this article self-efficacy research is reviewed in domains relevant to education. Research addressing cognitive skills, social skills, motor skills, and career choices has shown that self-efficacy is an important construct that helps to explain students' learning and performance of achievement-related behaviors. Research also has identified variables that are associated with educational contexts and that signal to students how well they are achieving or making progress in learning. These task-engagement variables include models/social comparative information, goal setting, attributional and performance feedback, strategy instruction, cognitive processing, and reward contingencies. A suggested future self-efficacy research agenda might include maintenance and generalization of changes in self-efficacy, the identification of additional task-engagement variables, instrument development and validation, integration of efficacy information from diverse sources, developmental influences on self-efficacy, and teachers' sense of efficacy.
KEY WORDS: achievement; self-efficacy; motivation.

Article:

SELF-EFFICACY AND ACHIEVEMENT BEHAVIORS

There is growing evidence that personal cognitions influence the instigation, direction, and persistence of behaviors. Various theoretical traditions emphasize the importance of individuals' beliefs concerning their capabilities to exercise control over important aspects of their lives (Bandura, 1982; Corno and Mandinach, 1983; Dweck and Leggett, 1988; Nicholls, 1983; Schunk, 1987b; Stipek and Weisz, 1981; Thomas, 1980; Weiner, 1985).

The purpose of this review is to examine the role of one type of personal cognition: *Perceived self-efficacy,* defined as, "People's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). The central hypothesis is that self-efficacy is an important variable in understanding students' behaviors in educational contexts.

In this article I provide a brief overview of self-efficacy theory and discuss some early self-efficacy research and substantive issues. The bulk of the article reviews research on students' self-efficacy for acquiring skills and performing achievement behaviors. The domains reviewed are those most germane to education: cognitive skills, social skills, motor skills, career choices. The article concludes with suggestions for future research.

SELF-EFFICACY THEORY

Antecedents and Consequences

Bandura (1977, 1982) hypothesized that perceived self-efficacy affects choice of activities, effort expenditure, and persistence. People who hold a low sense of efficacy for accomplishing a task may avoid it; those who believe they are capable should participate more eagerly. Especially when facing obstacles, individuals who feel efficacious ought to work harder and persist longer than whose who doubt their capabilities.

Individuals acquire information to appraise self-efficacy from their performance accomplishments, vicarious (observational) experiences, forms of persuasion, and physiological indexes. One's own performances offer quite reliable guides for assessing self-efficacy. In general, successes raise efficacy and failures lower it, although once a strong sense of efficacy is developed an occasional failure will not have much effect.

Students acquire much capability information from knowledge of others. Similar others offer the best basis for comparison (Rosenthal and Zimmerman, 1978; Schunk, 1987a). Observing similar peers perform a task conveys to observers that they, too, are capable of accomplishing the task. Information acquired vicariously typically has a weaker effect on self-efficacy than does performance-based information, because a vicarious increase in efficacy is negated easily by subsequent unsuccessful performances.

Students often receive persuasory information that they possess the capabilities to perform a task (e.g., "You can do this"). Although positive persuasory feedback enhances self-efficacy, this increase is apt to be short-lived if individuals' subsequent efforts turn out poorly. Students also derive efficacy information from physiological indexes (e.g., heart rate, sweating). Bodily symptoms signaling anxiety might be interpreted to mean one lacks necessary skills.

Information acquired from these sources does not influence self-efficacy automatically but rather is cognitively appraised (Bandura, 1977, 1982). Efficacy appraisal is an inferential process: Persons weigh and combine the contributions of such person and situational factors as perceived ability, task difficulty, amount of effort expended, amount of external assistance received, task outcomes, patterns of successes and failures, perceived similarity to models, and persuader credibility.

I do not wish to convey that self-efficacy is an important influence on all behaviors. Efficacy appraisal typically does not occur for well-established skills or behaviors (Bandura, 1982). People are apt to assess their capabilities for accomplishing a task when personal or situational conditions are altered. Students are more likely to assess self-efficacy for learning new material than for accomplishing review exercises.

I also do not want to imply that self-efficacy is the only influence on behavior — also important are such factors as skills, outcome expectations, and the perceived value of outcomes. High self-efficacy will not produce competent performances when requisite *skills* are lacking. *Outcome expectations—beliefs* concerning the probable outcomes of one's actions—are important because individuals are not motivated to behave in ways they believe will result in negative outcomes. The perceived *value* of outcomes refers to how much people desire those outcomes relative to others. Assuming adequate skills, positive outcome expectations, and valued outcomes, self-efficacy is hypothesized to influence the choice and direction of much human behavior.

Related Conceptions

The current emphasis on the role of person cognitions in regulating human behavior has historical precedent. Tolman (1959), for example, believed one type of learning involved the formation of expectancies that certain responses to stimuli would produce given results. Rotter's (1966) *locus of control* emphasizes perceived control over outcomes. People presumably differ in whether they believe that outcomes occur independently of how one behaves (external control) or are highly contingent on one's behavior (internal control). Although positive outcome expectations are important in achievement settings, they do not guarantee learning. Students who believe their teacher will praise them for scoring 100% on a spelling test (positive outcome expectation) may not study the words if they doubt their capabilities to learn to spell them (low efficacy).

Also relevant to the present formulation are *expectancy-value* theories. Although there are differences between theories, the basic idea is that the probability of behavior occurring in a given situation is a function of how much the individual values particular reinforcers (outcomes) and the individual's expectation of obtaining those reinforcers as a result of performing that behavior (Atkinson, 1957; Rotter, 1954). People are motivated to act when they believe an action, will produce outcomes they value.

Outcome expectations and values influence behavior but do not completely determine it. Individuals' expected outcomes in given situations depend on their judgments of the types of actions they are capable of performing (Bandura, 1986). Students who value high grades, and believe that diligent studying will produce them will not be motivated to study if they doubt their capabilities to study effectively. Response-outcome contingency beliefs are important influences on behavior, but they neglect individual differences in capabilities to produce the response necessary to obtain the outcome. People who believe they lack the skill to perform a behavior are not likely to attempt that behavior. When skills are well established, response-outcome contingency beliefs should be better predictors of what people do in given situations.

Attribution theories are also relevant. The basic assumption is that people seek to explain the causes of important events in their lives (Heider, 1958; Weiner, 1985). Students often attribute successes and failures to such factors as ability, effort, task difficulty, and luck. In turn, attributions influence expectancies of future successes. Assuming that performance conditions are not expected to change, students who attribute prior successes to stable factors (high ability, easy task) will hold higher achievement expectations than students who stress less-stable factors (high effort, good luck). Attributions are hypothesized to constitute one type of cue students use to appraise their self-efficacy in achievement situations.

Psychological conceptions of how cognitions influence behaviors stress such factors as outcome expectations, perceived value of outcomes, and attributions for prior outcomes. Self-efficacy theory differs from these views because it emphasizes students' beliefs concerning their capabilities to act in given ways rather than the outcomes of those actions. This is not to imply that self-efficacy and outcome beliefs are unrelated in school. Students who attribute prior successes to their abilities feel capable of performing well in the future, and they expect (and usually receive) outcomes they value (good grades, teacher praise) following successful performances.

EARLY SELF-EFFICACY RESEARCH

Early self-efficacy research conducted by Bandura and his colleagues in therapeutic contexts trained individuals to cope with feared situations. These investigators determined how different experimental treatments affected individuals' self-efficacy to perform various behaviors and examined the extent that self-efficacy accurately predicted subsequent coping behaviors. In short, this early research treated self-efficacy both as an effect of interventions and as an antecedent of behavioral change. Investigators subsequently applied the construct in a variety of clinical and nonclinical settings. This latter research has extended the generality of the hypothesized role of self-efficacy in behavioral change. Representative early studies are summarized in the following sections.

Self-Efficacy and Coping Behaviors

Bandura *et al.* (1977) administered adult snake phobics a behavioral pretest comprising progressively more threatening encounters with a snake. Given their phobic nature, subjects performed few tasks. For the self-efficacy assessment, sunjects designated which tasks they felt they could perform and rated their certainty of performance.

Subjects were assigned to one of three conditions: participant modeling, modeling, control. Participant-modeling subjects observed therapists model encounters with a snake, after which therapists engaged in various activities jointly with subjects over increasingly longer time periods. Performance aids were withdrawn as treatment progressed. Modeling subjects received the same amount of treatment time but they only observed therapists model the feared activities. Controls received the assessments without intervening training. Following training, subjects were tested on self-efficacy and approach behaviors.

Participant modeling led to a substantial increase in self-efficacy from pretest to posttest; modeling subjects demonstrated moderate improvement; controls showed no change. Participant-modeling subjects judged posttest self-efficacy higher than subjects in the other conditions; modeling subjects rated self-efficacy higher

than controls. Both modeling conditions showed significant increases in approach behaviors, with participant modeling producing the greater increases.

The relation between posttest self-efficacy and performance was explored by comparing each subjects' efficacy judgment for each task with his or her performance on that task. Correspondence was defined as subjects judging they could perform a task and then performing it, or judging they could not perform a task and then not performing it. Correspondence percentages were 89% (participant modeling), 86& (modeling), and 90% (control).

Bandura and Adams (1977) administered phobics, a systematic desensitization treatment. While they were deeply relaxed, they imagined themselves performing the feared activities until they no longer experienced anxiety. Desensitization increased subjects' self-efficacy; correspondence was 84%.

In a second experiment, Bandura and Adams gave subjects participant modeling until they successful performed all tasks up to a prespecified level. Following treatment, subjects judged self-efficacy for performing tasks and received the behavioral posttest. Although all subjects demonstrated comparable treatment performance, there was considerable posttest variability: Some subjects failed to perform tasks they had successfully performed, some moved slightly beyond treatment level, others achieved terminal performance. Efficacy judgments prior to the posttest predicted subjects' actual performances better than did their performances during treatment.

Self-Efficacy and Achievement Behaviors

Three studies exemplify different types of early research exploring the influence of self-efficacy on students' achievement behaviors. Brown and Inouye (1978) investigated perceived model-observer similarity in competence. Male college students, judged self-efficacy for solving anagrams and were given anagrams to solve. Subjects were told they performed better than a model or the same as a model, or were given no competence information. They then observed the model (a confederate) fail to solve anagrams. Subjects again judged efficacy and attempted to solve anagrams, some of which were insolvable. Subjects who believed they were as competent as the model judged efficacy lower and showed less persistence than subjects given no competence information, who, in turn, judged efficacy lower and persisted for less time than subjects who believed they were more competent than the model. Self-efficacy and persistence were positively correlated with one another.

Zimmerman and Ringle (1981) determined the influence of an adult model's persistence and statements of confidence for solving puzzles on children's self-efficacy and persistence. Children were exposed to a model who unsuccessfully attempted to solve a wire-puzzle problem for a long (5 min) or short (30 sec) time, and who verbalized statements of confidence or pessimism. Children judged self-efficacy for solving a similar puzzle before and after model exposure. Both the 5-min modeled persistence and statements of confidence raised children's self-efficacy. Compared with self-efficacy prior to model exposure, children who observed a pessimistic model persist for 5 min significantly lowered their efficacy judgements.

In the initial self-efficacy research involving cognitive skill-learning (Schunk, 1981), low-achieving children received cognitive modeling or didactic instruction on long division. Modeling children observed an adult verbalize aloud division operations while simultaneously applying them to problems. Didactic subjects reviewed instructional pages portraying the step-by-step solution of division problems. Modeling was expected to be more effective because coupling explanatory principles with exemplary modeling promotes skills better than principles alone (Rosenthal and Zimmerman, 1978).

This study also explored the effects of effort-attributional feedback. Within each instructional condition, children either periodically received effort feedback as they solved problems or received no effort feedback. For the feedback, children were told they had worked hard after their efforts led to success, and that they needed to work harder when difficulties followed lackadaisical efforts.

Effort has received considerable attention in attributional theories because it presumably is under volitional control and amenable to change. Ascribing past failures to insufficient effort exerts motivational effects. When students believe that additional effort will produce success they persist longer and increase their achievement (Weiner, 1979). Attribution retraining programs often concentrate on changing children's causal ascriptions for failure from low ability to insufficient effort (Andrews and Debus, 1978; Dweck, 1975). Effort feedback is a persuasive source of efficacy information. To be told one can achieve results through hard work motivates one to do so because such information conveys that one possesses the capabilities to perform well. Providing effort feedback for successes supports students' perceptions of their capabilities and enhances self-efficacy and skills.

Both cognitive modeling and didactic instruction increased self-efficacy, division skill, and task persistence, but modeling led to higher skill. The effort feedback had no added benefits on achievement outcomes. Providing effort feedback for success and difficulty may have conveyed different efficacy information. Telling children effort is the reason for their successes supports their perceptions of skill improvement and conveys they can continue to perform well with hard work; telling them they need to work hard following difficulty might convey they are not doing well. They may conclude they are not capable and wonder whether more effort will produce better results. These effects were disentangled in a follow-up study summarized later (Schunk, 1982).

The hypothesized relation between self-efficacy and subsequent division performance was explored by computing the probability of an accurate solution as a function of the level of efficacy. Regardless of treatment, higher efficacy was associated with progressively greater division skill. Path analysis also was employed to reproduce the correlation matrix comprising instructional treatment (modeling — didactic), self-efficacy, persistence, and skill. The most parsimonious model showed a direct effect of treatment on skill and an indirect effect through persistence and self-efficacy, an indirect effect of treatment on persistence through self-efficacy, and a direct effect of self-efficacy on skill and persistence.

SUBSTANTIVE ISSUES

These early studies indicated the usefulness of the self-efficacy construct as a predictor of behavioral changes and suggested ways to impact subjects' self-efficacy. Research also highlighted some substantive issues that needed to be addressed. Three important issues concerned whether self-efficacy influenced learning as well as performance, how self-efficacy related to motivational indexes, and which factors contributed to subjects' accuracy in judging efficacy.

Learning vs. Performance

Much early self-efficacy research addressed skills which participants were able to perform but typically did not because of personal and situational reasons. Snake phobics, for example, avoid snakes because of anxiety and negative outcome expectancies (e.g., "If I get near the snake, it will bite me"). Treatments that promote people's interactions in feared situations do so by raising their self-efficacy for successfully managing threatening activities.

Some school activities involve performance of previously learned skills, but much time is spent on learning. Self-efficacy should influence new learning as well as the performance of previously learned skills. Recent research has included measures of *self-efficacy for learning,* or students' beliefs about their capabilities to effectively apply their knowledge to acquire new skills (Schunk, 1987b). In assessing self-efficacy for learning, students make judgments about what they will need to learn, what knowledge and skills are prerequisites for the new learning, how well they can recall the prerequisite information from memory, how easily they have learned similar skills in the past, how well they can attend to the teacher's instruction and rehearse material to be learned, and how skillfully they can monitor their level of understanding. Self-efficacy for learning involves assessing what will be required in the learning context and how well one can use one's knowledge and skills to produce new learning.

Self-Efficacy and Motivation

Self-efficacy originally was hypothesized to influence choice of activities, effort expenditure, and persistence. These postulated effects are likely to occur in contexts where behaviors reflect performance of previously learned skills. These propositions require modification when self-efficacy is applied to classroom situations involving learning.

Choice of activities is not a good index of motivation in schools because students typically do not choose whether to participate in learning activities (Brophy, 1983). Choice is meaningful under a limited set of conditions (e.g., activities during free time). Higher self-efficacy does not always lead to greater persistence. At the outset of a learning activity, students persist regardless of whether they have high self-efficacy for learning because the teacher keeps them on-task. As skills develop we might expect efficacy to bear a negative, rather than a positive, relationship to persistence; students should not have to persist as long to correctly answer questions, solve problems, and so on.

Where skill-learning is involved, cognitive effort seems to be an appropriate index of motivation (Corno and Mandinach, 1983). A large part of students' time during instruction is devoted to understanding the content (Peterson *et al.*, 1982). Students with higher self-efficacy for learning are more likely to engage in such mental activities as rehearsing information and monitoring their level of understanding.

Self-Efficacy and Outcomes

To judge self-efficacy accurately, people must be able to distinguish successes from failures. In situations requiring performance of previously learned skills, individuals usually can determine whether they have succeeded or failed. Judging self-efficacy in skill-learning contexts is more complex. Students often learn some components of a skill but no others. To the extent students are unaware of the full range of task demands, they could misjudge self-efficacy due to incomplete information.

In mathematics, for example, students employ *buggy algorithms*, or erroneous strategies resulting in problem solutions (Brown and Burton, 1978). Because buggy algorithms produce solutions, employing them leads to a false sense of competence, especially in the absence of teacher feedback. The research result is students with high self-efficacy and low skills who persist on difficult problems but still solve them incorrectly. Research has begun to address the procedures people use to judge efficacy and the factors influencing judgments (Cervone and Peake, 1986).

Literature Review

Self-efficacy research reviewed in this article addresses four areas: cognitive skills, social skills, motor skills, and career choices. This article represents a comprehensive but nonexhaustive review of research topics relevant to education. Studies were included if they systematically assessed students' self-efficacy for learning or performing behaviors; some self-efficacy studies in the preceding four domains were excluded, however, because they were conceptually and methodologically similar to research that was summarized. Several other important lines of research were excluded. Research on clinical (therapeutic) behavioral change and health-related behaviors (e.g., smoking cessation, weight loss) was excluded because of its tangential relevance to education. Not reviewed were studies assessing efficacy-related constructs (e.g., locus of control, self-concept, ability attributions) but not self-efficacy. Although relevant to education (as noted in the final section), research on teachers' sense of efficacy was excluded because of the article's focus on students' self-efficacy. Readers interested in these topics should consult other reviews (Ashton and Webb, 1986; Bandura, 1986; Strecher *et al.*, 1986).

Cognitive Skills

The studies summarized in this section examined students' self-efficacy for learning and performing cognitive skills in such domains as mathematical computation and problem-solving, listening and reading comprehension, and writing. Schunk (1987b) formulated a self-efficacy model applicable to cognitive domains (Fig. 1). This model postulates a reciprocal influence between self-efficacy, task engagement variables, and achievement

behaviors. At the start of an educational activity, students differ in their beliefs about their capabilities to acquire knowledge, perform skills, master the material, and so forth. This initial sense of self-efficacy varies as a function of prior educational experiences and such personal characteristics as abilities and attitudes. Social, instructional, and other contextual variables associated with the learning context affect students while they are cognitively engaged with academic material. Students derive cues signaling how well they are accomplishing the task. They use these cues to assess efficacy for future learning or performance. Cues include performance outcomes, outcome patterns, attributions, social comparisons, persuader credibility, and bodily symptoms. In turn, self-efficacy affects motivation and skillful performance.

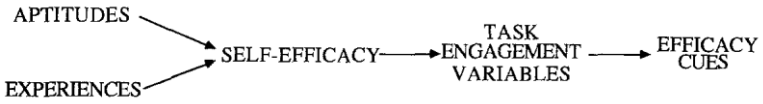

Fig. 1. Self-efficacy model of achievement behavior.

Although this model was formulated to address cognitive-skill performance, its basic features seem applicable to the other areas addressed in this article. Some empirical tests of predictions of this model in cognitive domains are discussed in the following sections.

Models

Exposure to models is an important task engagement variable affecting students' self-efficacy and achievement behaviors. A study by Relich *et al.* (1986) involved low-achieving children who received instruction on division skills. Children either were exposed to models explaining and demonstrating division operations or reviewed the same operations in an instructional packet. Within these two conditions, half of the subjects also received attributional feedback statements stressing ability and effort. Although treatments were equally effective in raising division skills, the treatment combining modeling with attribution led to the highest self-efficacy.

Student modeling occurs not only as a consequence of teachers explaining and demonstrating skills but also when students socially compare their performance with those of peers. Models who are similar or slightly higher in competence provide the best information for assessing one's capabilities. Students who observe a similar peer learn a task are apt to believe they can learn as well. Peer models may enhance self-efficacy better than teacher models among low-achieving students who doubt they are capable of attaining the teacher's level of competence.

These ideas were tested with elementary school children who had encountered difficulties learning subtraction with regrouping (Schunk and Hanson, 1985). Children observed videotapes portraying a peer mastery model, a peer coping model, or a teacher model; no model (control) children did not observe tapes. In the peer model conditions, an adult teacher repeatedly provided instruction on different operations, after which the peer solved problems. Teacher-model subjects observed videotapes portraying only the teacher providing instruction. All children judged self-efficacy for learning to subtract, and participated in an instructional program.

This study also investigated the effects of mastery and coping models. Coping models have been employed in therapeutic contexts to reduce avoidance behaviors in fearful clients (Thelen *et al.*, 1979). Unlike mastery models who perform faultlessly from the outset, coping models initially demonstrate the typical difficulties of observers but gradually improve their performances and gain confidence. Coping models illustrate how coping behaviors and positive thoughts overcome difficulties. Coping models may be especially beneficial with students who have learning difficulties; they might perceive their typical classroom performances similar to those of coping models.

The peer mastery model solved problems correctly and verbalized positive achievement beliefs reflecting high self-efficacy and ability, low task difficulty, and positive attitudes. The peer coping model initially made errors and verbalized negative beliefs, but gradually performed better and verbalized coping statements (e.g., "I need

to pay attention to what I'm doing"). Eventually, the coping model's problem-solving behaviors and verbalizations matched those of the mastery model.

Observing a peer increased self-efficacy and skill better than observing a teacher model or no model; teacher-model children outperformed the controls. No differences were obtained between the mastery and coping conditions. Children may have focused more on what the models had in common (task success) than on their differences (rate of learning, number of errors, type of achievement beliefs). Although subjects' prior subtraction successes were limited to problems without regrouping, they might have drawn on these experiences and concluded that if the model could learn, they could too.

Follow-up research used a similar methodology but a task (fractions) on which children had experienced few successes (Schunk *et al.,* 1987). Children viewed videotapes portraying peer mastery or coping models learning to add and subtract fractions. This study also investigated the effects of multiple models: Children observed one or three peers. Multiple models increase the likelihood that observers will view themselves as similar to at least one of the models (Thelen *et al.,* 1979).

Observing coping models enhanced achievement outcomes more than observing mastery models; however, multiple models — coping or mastery—promoted outcomes as well as a single coping model and better than a single mastery model. Children who observed single models judged themselves more similar in competence to coping models than to mastery models. The benefits of multiple models did not depend on perceived similarly in competence. Similarity may be a more important source of efficacy information when students are exposed to a single model and have a less-diverse set of modeled cues to use in assessing efficacy.

The effects on self-efficacy of providing students with social comparative information were tested during a long division instructional program over sessions (Schunk, 1983b). This study also assessed the effects of goal-setting (discussed next). Half of the subjects were given performance goals each session; the other half were advised to work productively. Within each goal condition, half of the subjects were told the number of problems that other similar children had completed — which matched the session goal — to convey goal attainability; the other half were not given comparative information. Goals enhanced posttest self-efficacy; comparative information promoted motivation (rate of problem-solving) during the sessions. Subjects given goals and comparative information demonstrated the highest division skill. These results suggest that providing children with a goal and attainability information increases self-efficacy for learning, which heightens task performance and skill acquisition.

Goal Setting

Goal-setting is another important task engagement variable (Bandura and Cervone, 1983; Locke *et al.,* 1981). When students are given or set a goal, they experience a sense of self-efficacy for attaining it, which is substantiated as they work at the task and observe their goal progress. Goal properties — specificity, difficulty, proximity—are especially important. Goals incorporating specific performance standards are more likely to raise self-efficacy than general goals (e.g., "Do your best") because progress toward a specific goal is easier to gauge. Pursuing easier goals may raise self-efficacy during the early stages of skill acquisition, but difficult goals raise efficacy better once skills begin to develop. Difficult goals offer more information about learning capabilities than easier goals. Proximal (close-at-hand) goals enhance achievement outcomes better than distant goals. Students can readily judge progress toward an immediate goal, whereas judging progress toward a long-term goal often is difficult.

Bandura and Schunk (1981) tested the effects of proximal goals by presenting children with sets of subtraction material. Some children pursued a proximal goal of completing one set during each instructional session; a second group was given a distant goal of completing all sets by the end of the last session; a third group was advised to work productively (general goal). Proximal goals heightened motivation during the instructional program and led to the highest skill and self-efficacy. The distant goal resulted in no benefits compared with the general goal.

Schunk (1983c) tested the effects of goal difficulty during a long division instructional program. Children received either difficult (but attainable) or easier goals of completing a given number of problems each session. To preclude children from perceiving the goals as too difficult and thereby stifling their motivation, an adult trainer gave half of the subjects in each goal condition direct goal attainment information (e.g., "You can work 25 problems"). The other half received social comparative information (other similar children completed that many problems). Difficult goals led to more rapid problems-solving during the instructional program compared with easier goals. Direct goal attainment information promoted self-efficacy, and students who received difficult goals and direct goal information demonstrated the highest skill.

The role of goal difficulty in brainstorming was explored by Locke *et al.* (1984). Undergraduates participated over multiple timed trials on giving uses for common objects. Some subjects were taught a strategy to generate uses; others were told to give only good uses (antibrainstorming condition). Midway through the study, half of the subjects in each condition were assigned a moderately dificult goal of 12 uses, whereas the other half were asked to set their own goal. Subjects also rated goal commitment and judged self-efficacy for generating different numbers of uses. Self-efficacy judgments for moderate-to-difficult goals accurately predicted future performance. Selfefficacy and goal commitment were positively related for subjects who set their own goals. Strategy training affected level of goal-setting through its effect on self-efficacy.

Allowing students to set learning goals can enhance their commitment to attaining them, which is necessary for goals to affect performance (Locke *et al.,* 1981). Self-set goals also promote self-efficacy (Schunk, 1985). Sixth graders, classified as learning-disabled in mathematics, received subtraction instruction and practice over sessions. Some children set specific performance goals each session, others had comparable goals assigned, and children in a third condition did not set or receive goals. At the start of each instructional session, self-set children judged themselves more confident of attaining their goals than did assigned-goal subjects. Children in the two goal conditions demonstrated more rapid problem-solving during the sessions than no-goal subjects. Self-set goals led to the highest self-efficacy and skill.

Attributional Feedback

Attributional feedback to students while they are engaged in academic tasks influences self-efficacy. In particular, effort feedback for prior successes supports students' perceptions of their progress, sustains motivation, and increases efficacy for further learning (Schunk, 1987b). The timing of feedback also is important. Early task successes constitute a prominent cue for forming ability attributions. Feedback linking early successes with ability (e.g., "That's correct. You're really good at this") should enhance learning efficacy. Many times, however, effort feedback for early successes may be more credible, because when students lack skills they realistically have to expend effort to succeed. As students develop skill, switching to ability feedback better enhances self-efficacy.

These ideas have been tested in several studies (Schunk, 1982, 1983a, 1984b; Schunk and Cox, 1986). Schunk (1982) disentangled effort feedback for prior and future achievement. Linking children's prior achievements with effort (e.g., "You've been working hard") led to more rapid problem-solving, higher self-efficacy, and skill, compared with linking future achievements with effort ("You need to work hard"). Schunk (1983a) showed that ability feedback for prior success ("You're good at this") enhanced self-efficacy and skill better than effort feedback or ability-plus-effort feedback. The latter subjects judged effort expenditure during the instructional program greater than ability-only students. Combing ability and effort feedback apparently led to some discounting of ability information in favor of effort.

To investigate sequence effects, Schunk (1984b) periodically provided one group of children with ability feedback, a second group with effort feedback, and a third condition with ability feedback during the first half of the instructional program and effort feedback during the second half. This latter sequence was reversed for a fourth condition. Ability feedback for early successes, regardless of whether it was continued, led to higher ability attributions, self-efficacy, and skill, compared with effort feedback for early successes.

Schunk and Cox (1986) presented subtraction instruction to middle school students classified as learning-disabled in mathematics. Students received effort feedback during the first half of the instructional program, effort feedback during the second half, or no effort feedback. Each type of feedback promoted self-efficacy and skill better than no feedback; first-half feedback enhanced students' effort attributions. Given students' learning disabilities, effort feedback for early or later successes likely seemed credible, because they realistically had to expend effort to succeed. Over a longer time, effort feedback for successes on the same task could lose its effectiveness; as students become more skillful they might wonder why they still have to work hard to succeed.

Kloosterman (1988) obtained additional evidence for the relationship between attributions and efficacy. Seventh graders judged attributions for their successes and failures in mathematics and completed a measure of mathematical efficacy in which subjects rated their self-confidence to learn and perform mathematical tasks. Kloosterman found that an attributional style emphasizing ability and effort for successes and low effort for failures was a strong predictor of confidence.

Performance Feedback

Performance feedback during task engagement affects self-efficacy. Schunk (1983d) gave elementary school children subtraction instruction over sessions. One group (self-monitoring) reviewed their work at the end of each session and recorded the number of workbook pages they completed. A second group (external monitoring) had their work reviewed at the end of each session by an adult who recorded the number of pages completed. In a third condition (no monitoring), children received instruction but were not monitored and did not receive instructions to monitor their work.

The self- and external monitoring conditions led to higher self-efficacy and skill compared with the no-monitoring condition. The two progress-monitoring conditions did not differ on any measure. The benefits of monitoring did not depend on children's performances during the instructional sessions, because the three conditions did not differ in amount of work completed. Monitoring of progress, rather than the agent, enhanced children's perception of their learning progress and efficacy for continued improvement. In the absence of monitoring, children may have been unsure about how well they were learning.

Strategy Instruction

Learning strategies are systematic plans that assist encoding of information and task performance. Learning strategies improve performance on the task at hand and generalize beyond the learning context (Pintrich *et al.*, 1986). Strategy instruction also is an effective means of promoting self-efficacy (Corno and Mandinach, 1983). The belief that one can apply a strategy to improve learning instills in learners a sense of personal control over achievement outcomes, which raises self-efficacy.

Students are assisted in learning a strategy by verbalizing aloud the steps in the strategy while applying them. Verbalization helps students attend to important task features and, as a form of rehearsal, assists coding and retention. Verbalization seems most beneficial for students who typically perform in a deficient manner; it may help them work at tasks systematically (Hallahan *et al.*, 1983). When children can handle the task demands, verbalization may not facilitate performance because it is an additional task and can distract children from the primary task.

Schunk and Rice (1984) tested these ideas with language-deficient children (grades 2 to 4) during listening-comprehension instruction. Half of the children in each grade verbalized strategic steps prior to applying them to questions; the other half applied but did not verbalize the steps. Strategy verbalization led to higher self-efficacy across grades, and promoted performance among third and fourth graders but not among second graders. Perhaps the demands of verbalization, along with those of the comprehension task, were too complex for the youngest subjects. In a follow-up study (Schunk and Rice, 1985), fourth and fifth graders with reading-comprehension deficiencies received strategy instruction and practice. Within each grade, half of the subjects verbalized the strategy prior to applying it. Strategy verbalization led to higher reading comprehension, self-efficacy, and ability attributions across grades.

The Schunk and Cox (1986) study (described above) investigated the effects of type of verbalization. Within each of the three attribution conditions, some students verbalized aloud subtraction solution steps and their application to problems (continuous verbalization), others verbalized aloud during the first half of the instructional program but not during the second half (discontinued verbalization), and those in a third group did not verbalize. Continuous verbalization led to higher self-efficacy and skill than discontinued and no verbalization, which did not differ. When instructed to no longer verbalize aloud, discontinued verbalization students might not have internalized the strategy. A treatment in which verbalizations are gradually faded to a covert (silent) level may help students learn to regulate their performances internally.

Strategy instruction does not ensure that students will use the strategy when not required to do so. Researchers suggest providing students with strategy value information on how strategy use improves performance (Borkowski and Cavanaugh, 1979). Two experiments showed that strategy value information enhances self-efficacy (Schunk and Rice, 1987). Subjects were taught a strategy to find main ideas. Children in the first experiment received specific strategy value information, general information, specific + general (combined) information, or no strategy value information. Specific information was linked to the task at hand; general information conveyed the value of the strategy on all reading tasks. In the second experiment, children received strategy effectiveness feedback, specific strategy value information, or feedback + specific information (combined). The feedback linked children's improved performances with use of the comprehension strategy. In each study, the combined treatment enhanced self-efficacy and skill better than the other conditions, which did not differ. These remedial readers benefited from multiple sources of information on how to improve their reading performance.

Cognitive Processing

Students' beliefs about how well they can cognitively process academic material influence their self-efficacy. Content thought to be difficult to learn may produce a lower sense of self-efficacy than material viewed as easier. While actually working on a task, students who have trouble processing information may conclude they have low ability and feel less efficacious about learning or performing well.

Salomon (1984) found a link between self-efficacy and mental effort. Sixth graders judged self-efficacy for learning from either TV or from written text, after which they watched a film or read the comparable text. They judged amount of mental effort necessary to learn from the medium they were exposed to and were tested on the content. Students judged mental effort greater from print than from TV, and also demonstrated higher achievement scores from print. For print, self-efficacy correlated significantly and positively with mental effort and achievement, whereas in the TV group self-efficacy correlated negatively with effort and achievement. Because students perceived TV to be an easy medium to learn from and felt efficacious about doing so, they expended less effort and achieved at a lower level than when exposed to written text.

Meier *et al.* (1984) found that college students' self-efficacy for writing related to aspects of cognitive processing. Freshmen enrolled in remedial, required, or honors courses wrote essays at the beginning and end of a semester and completed an efficacy measure comprising items which corresponded to course objectives (e.g., write an essay with no major spelling errors, write an essay that expresses ideas clearly). Multiple regression showed self-efficacy to be the best predictor of writing performance on the pretest. Congnitive processing indexes relating strongly to self-efficacy were synthesis-analysis (searching for meaning by categorizing ideas and by comparing and contrasting categories) and elaborative processing (personalizing and concretizing by translating ideas into personal experiences).

Reward Contingencies

Rewards constitute another influential task engagement variable. Rewarding consequences inform and motivate (Bandura, 1986). As students work at a task, they learn which behaviors lead to successful outcomes and which result in failures. Such information guides future behavior. The anticipation of attaining desirable outcomes motivates students to persist. Rewards are likely to enhance efficacy when they are tied to students' actual accomplishments and convey that students have made progress in learning. Receipt of the reward also

symbolizes progress. When rewards are offered merely for task participation, students do not derive the same type of goal-progress information.

Schunk (1983e) provided elementary school children with a long division instructional program. One group (performance-contingent reward) were told they would earn points for each problem solved and would buy prizes based on the monetary value of the points. Task-contingent reward subjects were told they would receive prizes for participating. The effects of reward anticipation and reward receipt were disentangled by allowing students in a third condition (unexpected reward) to choose prizes unexpectedly on completion of the project. Performance-contingent rewards enhanced rate of problem-solving during the instructional program, as well as division self-efficacy and skill. Offering rewards for participation led to no benefits compared with merely providing instruction.

Schunk (1984a) compared the effects of performance-contingent rewards with those of proximal goals. Of central interest was whether combining rewards with goals would provide a clearer standard against which to gauge progress and heighten efficacy better than either treatment alone. Children participated in a long division instructional program. Some were offered rewards based on their actual performances, others pursued proximal performance goals each session, and children in a third condition received rewards and goals. The three conditions led to equally rapid problem-solving during the sessions, but combining rewards with goals produced the highest division self-efficacy and skill.

Predictive Utility

Research has demonstrated the utility of self-efficacy for predicting subsequent achievement outcomes. For example, we have related self-efficacy for learning to the number of arithmetic problems that children complete during the instructional sessions. Significant and positive correlations have been obtained (range of r = 0.33-0.42). More rapid problem-solving has not been attained at the expense of accuracy. Similar correlations have been obtained using the proportion of problems solved correctly. Self-efficacy for learning also correlates positively with posttest self-efficacy and skill (range of r = 0.46-0.90).

Generally, we have found the predictive utility of pretest efficacy to be inadequate because subjects lack skills and judge efficacy low. In contrast, there is greater variability in posttest efficacy and skill measures. Studies in different domains have yielded significant and positive correlations between posttest efficacy and skill (range of r = 0.27-0.84).

We have used multiple regression to determine the percentage of variability in skillful performance accounted for by self-efficacy. These analyses show perceived efficacy accounting for a significant increment in the variability in posttest skill; the range of R^2 values is 0.17-0.24. As discussed earlier, path analysis tested the relationships in a causal model of achievement (Schunk, 1981). In the Relich *et al.* (1986) study, self-efficacy exerted a direct effect on division performance, and instructional treatment had both a direct effect on division performance and an indirect effect through self-efficacy.

Collins (1982) found that self-efficacy predicted achievement outcomes across levels of student ability. She identified fifth graders who were high, average, or low in mathematical ability as determined by standardized tests. Within each ability group, students were classified as high or low in self-efficacy for solving different types of mathematical word problems. Students were given word problems to solve — some of which were insolvable — and the opportunity to rework any problem they solved incorrectly. In the low and average groups, students with high efficacy worked the insolvable problems longer than low-efficacy students. Regardless of ability group, students with higher self-efficacy chose to rework a greater percentage of those they had missed than students with lower efficacy.

The predictive utility of self-efficacy across domains was demonstrated by Shell *et al.* (1989). College students completed measures of self-efficacy, outcome expectations, and skill, for reading and writing tasks. For the out-come expectancy measures, subjects rated the importance of the reading and writing skills for various life

situations (e.g., employment, family life, education). Multiple-regression analyses showed that self-efficacy and outcome expectancies predicted reading achievement, with self-efficacy being the stronger predictor; only self-efficacy accounted for a significant proportion of variance in writing achievement.

Conversely, Norwich (1987) found that self-efficacy did not contribute to the prediction of mathematical performance beyond the effects of mathematical self-concept and prior performance. Children judged self-efficacy for solving a particular type of mathematics problem and then attempted to solve two examples. In light of the studies summarized in this section showing self-efficacy to be a significant predictor, it seems possible that the limited sample of efficacy tasks in this study restricted the variability of, and the potential prediction for, self-efficacy.

Summary

Collectively, research shows that self-efficacy is an important construct for explaining students' learning and performance of cognitive skills in various content areas. Variables associated with learning contexts influence students' self-efficacy: models/social comparative information, goal-setting, attributional and performance feedback, strategy instruction, cognitive processing, and reward contingencies. These and other task-engagement variables highlight cues (e.g., outcomes, attributions) signaling how well students are learning or performing skills. Students use these cues to appraise self-efficacy for continued learning or skillful performance. Different studies also have demonstrated the utility of self-efficacy as a predictor of motivation and achievement behaviors.

Despite these positive findings, it is clear that additional research is necessary to determine the influence of other potentially important classroom variables. For example, investigators have shown wide differences in how teachers introduce and present academic content (Brophy, 1983). As they introduce content, teachers might convey the expectation that all students can learn or that some may not learn because the material is difficult. While presenting content, teachers can repeatedly link new material to what students already know or attempt little integration. These and other differences in instructional presentations ought to affect students' sense of efficacy for learning content.

A second research emphasis involves maintenance and generalization of self-efficacy and changes in achievement behaviors. Self-efficacy research has not addressed how well changes in self-efficacy and cognitive skills maintain themselves over time or generalize to new situations. In the absence of evidence for durability and generality of behavioral changes, the long-term importance of treatments designed to enhance self-efficacy cannot be gauged. Longer-term research is needed that assesses generalization within and outside of classrooms.

Social Skills

Several investigators have explored how self-efficacy relates to various social behaviors and how training programs impact self-efficacy. The mechanism whereby self-efficacy interacts with social behaviors may be similar to that discussed in conjunction with the cognitive-skill model (Schunk, 1987b). In a social situation, or one involving learning of social behaviors, one's initial self-efficacy ought to depend on personal characteristics and prior experiences. Contextual variables signal to individuals how well they are learning or performing social behaviors. These signals (cues) are used by individuals to assess efficacy for future learning or social performance. The same types of cues seem relevant to the social domain: performance outcomes, outcome patterns, attributions, social comparisons, persuader credibility, and bodily symptoms.

Wheeler and Ladd (1982) developed an instrument to assess children's self-efficacy for peer interactions. Although this study was concerned primarily with instrument validation, the results showed children's social self-efficacy increasing with development. Children judged self-efficacy higher in non-conflict situations than in conflict situations. Subsequent research found the accuracy of children's self-efficacy judgments, as determined by comparing them against actual behaviors, increasing with development (Ladd and Price, 1986).

The role of self-efficacy in aggression was studied by Perry *et al.* (1986). Children in grades 4 to 7 were independently assessed as aggressive or nonaggressive and given measures of self-efficacy and outcome expectations. The efficacy items tapped behaving aggressively, inhibiting aggression, using verbal persuasion, and displaying prosocial behaviors; children judged how easy or hard it was for them to accomplish each item. For the outcome expectation assessment, children imagined performing a behavior and then rated the likelihood of a given outcome. Aggressive children judged self-efficacy for aggressing higher, and self-efficacy for inhibiting aggression lower, than did nonaggressive children. Aggressive children rated higher the likelihood of desirable outcomes resulting from aggression.

Investigators have included self-efficacy measures in training programs to promote assertiveness or cross-sex relations. In a context designed to simulate assertiveness, female college students responded verbally to scenarios (Lee, 1984). Students also judged self-efficacy for responding assertively in the situations and their expectations regarding the outcomes of assertive behaviors. Self-efficacy was significantly and positively correlated with assertiveness. Self-efficacy accounted for 40% of the variance in assertive responses and was a better predictor of assertiveness than the outcome-expectation measure.

Exposure to models is an important task engagement variable that impacts social skills and self-efficacy. Nonassertive adults completed self-efficacy and behavioral role-playing tests and were assigned to treatments (Kazdin, 1979). Subjects were presented with scenes to imagine where an assertive response was appropriate. Subjects imagined a model of the same age and sex as themselves participating in the scene (covert modeling). Some subjects also were told to elaborate the scene (i.e., change or improvise the scene but still make an assertive response). Other subjects imagined the scenes with models not making an assertive response. Covert modeling let to higher self-efficacy and assertive behaviors as assessed during posttreatment role playing, but Covert modeling plus elaboration resulted in greater improvements in both measures.

Maddux *et al.* (1986) manipulated efficacy and outcome expectancies to determine behavioral intentions. College students were exposed to information on the "broken record" technique (i.e. repeating an assertive response against opposition). Subjects were given either high or low outcome expectation information (effective 90% or 10% of the time), high or low efficacy information (easy or difficult to learn), and high or low outcome value information (e.g., technique would increase self-esteem and satisfaction or lead to greater friction with others). Measures included intentions to use the technique, self-efficacy, and outcome expectations. Providing subjects with information on high-outcome expectations and high-outcome value produced greater intentions to perform the behavior. The high self-efficacy manipulation did not influence intentions, although outcome value affected intentions in the high self-efficacy condition but not in the low-efficacy condition. Self-efficacy correlated positively and significantly with intentions and outcome value; the correlation with outcome expections was nonsignificant.

These results are consistent with those of Maddux *et al.* (1982), who found the high-outcome expectation manipulation to increase behavioral intentions but the effect of the high-efficacy treatment to be nonsignificant. The authors suggest that self-efficacy may not be a good predictor of the type of behavior used in these studies (i.e., simple skill with low risk of aversive consequences). It is possible the college-student subjects did not perceive the technique as difficult to perform. Subjects were not selected because of high anxiety, and no measure was collected of their perceptions of task difficulty. To the extent they viewed the task as relatively simple and risk-free, even a lower initial sense of efficacy would not have precluded them from intending to perform the task. Additional research exploring subjects' task perceptions is needed to resolve this question.

Barrios (1983) identified heterosexually anxious male adults who judged self-efficacy for heterosexual encounters and participated in role playing. Perceived efficacy was a significant predictor of subjects' approach behaviors during the role playing. Using adult male members of a prison population, Segal and Marshall (1986) found that self-efficacy correlated significantly with social behaviors. Newman and Goldfried (1987) assessed self-efficacy among undergraduate men for heterosexual encounters, after which subjects engaged in role playing (e.g., social behaviors in dorms, at parties, in classrooms). Subjects were given negative feedback on the

effectiveness of their social behaviors and self-efficacy was reassessed. Subjects then engaged in additional role playing with no feedback, feedback discrediting the earlier negative feedback, or positive feedback, and repeated the efficacy assessment. As expected, the negative feedback diminished self-efficacy. Subsequent discrediting or positive feedback boosted self-efficacy; lack of feedback resulted in no improvement. Self-efficacy correlated positively with external evaluations of self-expressiveness.

Summary

Investigations have demonstrated the utility of self-efficacy in explaining social behaviors. The bulk of social skill research has involved training programs designed to promote subjects' assertiveness or interactions with members of the opposite sex; subjects are individuals who experience anxiety in these situations. Research shows that self-efficacy is impacted by performance-based treatments (e.g., role playing), as well as by the use of models.

Social skills self-efficacy research has been only tangentially relevant to education, but the topic is educationally important because social skills are taught in school. Studies conducted in actual schools are needed. Initial research might be patterned after work by Strain and his colleagues (Strain *et al.*, 1981). Peers are trained to initiate social play with socially withdrawn children by using verbal signals (e.g., "Let's play blocks") and motor responses (handing child a toy). Studies have shown that initiations increase subjects' subsequent social initiations, gains often generalize to classrooms, and amount of gain typically relates to children's entry-level social repertoires. Such procedures also should promote self-efficacy: Subjects are exposed to peer models demonstrating productive social behaviors and have the opportunity to perform the behaviors themselves. This prediction requires empirical investigation.

Motor Skills

Research has investigated the role of self-efficacy in the development and performance of motor skills. As discussed earlier in this article, the belief that one is capable of learning or performing a skill can affect motivation (effort expenditure, persistence). Feedback indicating skillful performance or progress in skill acquisition validates one's sense of efficacy and leads to further skill refinement.

The relationship between self-efficacy and motor skill development was explored by Feltz (1982). College women who could swim but not perform a back dive judged self-efficacy and attempted the dive over trials; physiological anxiety (heart rate) was continuously monitored. On each trial, self-efficacy and prior performance predicted present performance; over trials, the influence of self-efficacy diminished and that of prior performance increased. As subjects gained experience, prior diving performance had greater impact on self-efficacy than self-efficacy had on future performance. Anxiety bore little relationship to self-efficacy or performance. Subsequent research found men and women not differing in self-efficacy, anxiety, or diving performance, but the reciprocal relationship between self-efficacy and diving performance was stronger for women (Feltz, 1988). Regardless of sex, self-efficacy and prior performance were good predictors of later performance.

Other studies have demonstrated significant relationships between self-efficacy and subsequent performance accomplishments. Barling and Abel (1983) found a positive relationship betwen self-efficacy and different aspects of tennis performance. Lee (1982) obtained evidence for a positive efficacy-performance link in competitive gymnastics. Wilkes and Summers (1984) showed that instructions to think confidently significantly enhanced adults' performances on strength tests. Ryckman *et al.* (1982) developed a physical self-efficacy scale, assessing such indexes as physical strength and ability to run fast. Physical self-efficacy related positively to self-report measures of self-esteem and internal locus of control, as well as to behavioral reaction time. In line with Bandura's contention that self-efficacy is a domain-specific construct, McAuley and Gill (1983) found better prediction of behavior with task-specific measures than with the general scale developed by Ryckman *et al.* (1982).

Weinberg and his colleagues have shown that altered self-efficacy influences motor skill performance. Weinberg *et al.* (1979) manipulated self-efficacy by pitting subjects against a confederate who performed well (low self-efficacy) or poorly (high self-efficacy) on a leg-strength task. For the experimental task, subjects competed face-to-face against the confederate on a related leg task. High self-efficacy subjects extended their legs longer than low self-efficacy subjects. This result was replicated by Weinberg *et al.* (1980), in which the competetion was back-to-back. Subsequent research showed that both preexisting and manipulated self-efficacy were related to subsequent performance on a leg-endurance task (Weinberg *et al.*, 1981). Preexisting efficacy exerted the greater effect on the first trial; the effect of manipulated efficacy was greater on the second trial.

Three studies examined the effects of observing models on subjects' self-efficacy and performance. Feltz *et al.*, (1979) compared the impact of participant, live, and videotaped modeling on college women's skill and self-efficacy for performing a back dive. In the participant modeling condition, an adult model initially explained and demonstrated the dive, and assisted while the student performed four dives. The student then completed four dives unassisted. Similar procedures were followed in the live and videotaped modeling conditions, except that in the videotaped condition the model appeared on videotape and in both conditions the model did not physically assist while the student performed the dive. Participant modeling led to higher diving self-efficacy and skill than either the live or videotaped modeling condition, which did not differ. Regardless of condition, self-efficacy and skill were positively correlated.

The influence of model similarity and self-efficacy statements on observers' self-efficacy and muscular endurance was explored by Gould and Weiss (1981). College women observed a videotaped demonstration of an endurance task by either a similar (nonathletic female college student) or dissimilar (athletic male student) model. The model verbalized positive efficacy statements (e.g., "I can do it"), negative statements ("I'm not very good at tests like this"), irrelevant statements, or no statements. Observing a similar model produced higher self-efficacy and muscular endurance compared with observing a dissimilar model. Similar model-positive statement and similar model-negative statement subjects displayed the highest performance. Being exposed to negative statements led to the lowest self-efficacy.

A study by Taylor (1989) showed that feedback concerning a model's performance influenced observers' self-efficacy for competing successfully against the model but not their self-efficacy for performing the task. Male college students judged personal self-efficacy for performing a leg-strength task and were classified as high or low on this measure. Subjects then were assigned randomly to a high or low competitive self-efficacy condition by being given information indicating they were likely to perform better or worse than a peer model. Subjects completed the task twice and were given bogus feedback indicating they either won or lost against the peer. Self-efficacy was assessed after each trial. Subjects with high initial personal self-efficacy performed better than those with low initial personal efficacy. In the high competitive efficacy condition, subjects with high personal efficacy outperformed subjects with low personal efficacy; there was no difference between the performances of high and low personal efficacy subjects in the low competitive efficacy condition. Competitive outcome (success or failure) influenced competitive efficacy but not personal efficacy.

The benefits of goal-setting and self-evaluation were demonstrated by Bandura and Cervone (1983, 1986). An ergometer — operated by alternatively pushing and pulling arm levers — exerted a force that rotated a wheel having wind vanes, which created resistance against the individual's effort. Following a baseline evaluation, some subjects pursued a goal of increasing their performance by 40% over their baseline, others were given feedback that they had increased their performance by 24% over baseline, subjects in a third condition received goals + feedback, and controls received neither goals nor feedback (Bandura and Cervone, 1983). Goals + feedback exerted the strongest effect on subjects' efforts; neither factor alone was as influential. Perceived self-efficacy for goal attainment significantly predicted subsequent effort among goals + feedback subjects. Providing subjects with a goal and progress feedback instated a sense of efficacy for goal attainment. Follow-up research varied the discrepancy between the goal and subsequent performance feedback (Bandura and Cervone, 1986). Self-efficacy for goal attainment increased as the discrepancy decreased. Self-efficacy was positively related to subsequent effort expenditure across the goal discrepancy conditions.

Summary

Research shows that self-efficacy predicts performance accomplishments across such diverse motor skill tasks as diving, tennis, gymnastics, tests of muscular endurance and strength, and reaction time. This predictive utility pertains to preexisting self-efficacy and to self-efficacy manipulated by experimental instructions or treatments. As with cognitive and social skills, self-efficacy is responsive to subjects' performance accomplishments and exposure to models. Goal-setting and self-evaluation help to boost performances, and similarity between observers and models enhances behavioral changes.

The generality of the self-efficacy construct needs to be extended through research with younger subjects (school-age children). As with the social domain, motor skills are educationally relevant because they are taught in school, but because the extant motor skill research has been conducted with adult subjects, it is unknown how much direct educational relevance it has. Younger children, for example, may benefit more from participant modeling procedures where teachers initially model and guide children's performances and performance aids are withdrawn gradually. With development, children's self-efficacy may be impacted better via exposure to models. The results of tests of these hypotheses would have important implications for teaching and learning in school.

Career Choices

The final area of educationally relevant self-efficacy research reviewed is career choices. Hackett and Betz (1981) suggested that individuals' perceived career options can be predicted in part by their self-efficacy for learning or performing the various jobs required by the profession. One who holds a strong sense of efficacy for succeeding in a profession ought to persist longer and expend greater effort to succeed in activities leading to the profession (e.g., courses), as well as in the job-related duties. Hackett and Betz further postulated important sex differences in career self-efficacy. Compared with men, women often are not encouraged to engage in activities that would strengthen self-efficacy for given professions (e.g., science, mathematics). To the extent one holds a low sense of efficacy for succeeding in a given field, one is unlikely to choose that field for a career.

These ideas were tested by Betz and Hackett (1981). College undergraduates judged self-efficacy for satisfying educational requirements of various occupations and for performing the normal job duties. There were sex differences for half of the occupations. Men reported higher self-efficacy for performing the job duties of accountant, drafter, engineer, highway patrol officer, and mathematician, all of which are traditionally male professions. Women reported higher efficacy for the traditionally female occupations of dental hygienist, home economist, secretary, and social worker. Multiple regression and correlational analyses showed that self-efficacy was strongly related to expressed interests in occupations.

Persistence in academic majors as a function of self-efficacy beliefs was explored in studies by Lent *et al.* (1984, 1986). Undergraduates enrolled in a career-planning course for students desiring science and engineering careers judged self-efficacy for successfully completing the educational requirements and job duties of 15 science and engineering fields (Lent *et al.,* 1984). Over the following year, subjects with higher self-efficacy earned higher grades and persisted longer in scientific and technical majors than did those with lower efficacy. Self-efficacy was positively related to mathematical ability and academic achievement. Follow-up research showed that self-efficacy accounted for a significant portion of the variability in grades in science and technical courses, persistence in technical majors during the following year, and interest in science and engineering careers (Lent *et al.,* 1986).

Career decision-making was examined in two studies. Taylor and Betz (1983) specified five career choice competencies: accurate self-appraisal, gathering occupational information, goal selection, making future plans, and problem solving. These authors formulated several specific behaviors relevant to each competency, and had college students judge self-efficacy for successfully accomplishing each behavior. There were no sex differences in self-efficacy with respect to career decision-making tasks. Regardless of sex, lower self-efficacy was associated with greater career indecision. Post-Kammer and Smith (1985) presented students in grades 8 to 9 with descriptions of predominantly male or female occupations. Self-efficacy was assessed for each

occupation's educational requirements and performing its job duties. Results were mixed with respect to sex differences. Boys judged themselves more efficacious for the careers of drafter and engineer, but there were no sex differences for mathematician or physician. Self-efficacy accounted for a significant portion of the variability in interest in pursuing given careers.

Summary

Investigators have postulated self-efficacy to be an important predictor of students' choices of academic majors and careers. Students who believe they can complete the educational requirements for the typical duties associated with a career should be more likely to choose that career than students who hold doubts about their capabilities. Research generally supports this prediction. It also has been suggested that self-efficacy may contribute to differential choices by male and female students; educational, familial, and social experiences may preclude students from gaining efficacy-enhancing experiences in certain areas, which should negatively impact career choices. Research offers some support for this idea, although studies have yielded mixed results.

Unlike the preceding domains covered in this review, much career choice research has followed students over time to determine long-term prediction of outcomes. This trend might be extended to both older and younger students. In addition, a useful area of future research might be career changes of individuals who have worked in a particular field for some time. It seems reasonable to hypothesize that self-efficacy would be important: People are more likely to change to a career in which they perceive themselves as capable of succeeding than to one where they doubt their capabilities to succeed. Self-efficacy also might be examined in the careers subjects are leaving to determine whether they doubt their abilities to perform well in their jobs or whether other factors (e.g., low pay, lack of advancement) are more important reasons for leaving.

CONCLUSIONS AND NEW DIRECTIONS

Self-efficacy research addressing cognitive skills, social skills, motor skills, and career choices has shown that self-efficacy is an important construct for explaining students' learning and performance of achievement-related behaviors. Research also has shown that variables associated with learning contexts signal to students how well they are achieving or making progress in learning. These task-engagement variables include models/social comparative information, goal-setting, attributional and performance feedback, strategy instruction, cognitive processing, and reward contingencies. Future research might continue to apply the self-efficacy model (Fig. 1) with cognitive skills, as well as test its predictions in other domains.

In the preceding sections, I suggested areas requiring research attention. I also believe that, regardless of domain, research should address measurement issues, integration of efficacy information from diverse sources, developmental influences on self-efficacy, and teachers' sense of efficacy.

MEASUREMENT ISSUES

The preceding review highlights some measurement issues to be addressed in the future. Research is necessary to ensure that self-efficacy instruments are reliable and validly reflect the content of the applicable domain. The self-efficacy construct is hypothesized to be domain-specific. Self-efficacy reflects the point that general measures of psychological constructs do not predict behavior as well as measures pertaining to specific situations (Bandura, 1986). As a consequence, researchers typically have developed their self-efficacy measures to pertain specifically to the range of tasks being studied.

At a minimum, researchers should report reliability data in research reports. Studies also can help to determine the predictive validity of self-efficacy by relating efficacy measures to various achievement-related outcomes (e.g., achievement, attitudes, intrinsic motivation). It would help if self-efficacy instruments were published as appendices to published articles. These practices will assist researchers as they compile findings from efficacy studies and attempt to resolve inconsistencies.

Self-efficacy research methodology has been limited in that researchers have employed quantitative methods using between-conditions comparisons. The generality of the self-efficacy construct could be extended by

collecting data in other ways (e.g., longitudinal studies, case studies, oral histories). Although such studies would include fewer subjects, they would yield rich data sources to examine such issues as subjects' perceptions of the role of self-efficacy in achievement settings and how self-efficacy changes over time. There also is no requirement that self-efficacy be assessed with simple numerical response scales, as has been typically the case. Subjects might be asked, for example, to describe verbally their level of confidence for performing tasks in different situations.

Integration of Efficacy Information

Research is needed on how students cognitively process different pieces of information in forming and modifying their perceptions of self-efficacy for acquiring or performing skills. In school, students routinely acquire self-efficacy information in diverse ways. As they work on tasks they gain efficacy information directly from their own accomplishments. They also observe their peers' performances. Teachers periodically provide persuasory information as they monitor students' efforts (e.g., "You can do better").

Information from direct, vicarious, and persuasory sources may not be consistent. A student may perform poorly, but observe peers succeed and be told by the teacher, "Your can do better." An important research issue concerns how students resolve such discrepancies. We might expect that actual performance information would "count" more heavily than other sources, but perhaps as suggested by the Schunk *et al.* study (1987), observing several peers succeeding would enhance self-efficacy for learning despite prior failures.

Developmental Influences on Self-Efficacy

Developmental factors should influence the cues students derive from task-engagement variables and how students cognitively process these cues to form and alter perceptions of self-efficacy. Research is needed on each of these aspects. For example, short-term and specific goals should be maximally motivating and provide clear information to young children concerning their progress. With development, students become able to represent long-term objectives in thought, break such objectives into a series of sub-goals, and self-regulate performances over time. Children's social comparisons also undergo developmental changes. Young children's comparisons focus on peers' overt performances. As children acquire a conception of underlying abilities, the basis for perceived similarity may shift from tangible outcomes to underlying abilities.

Developmental factors are likely to influence how students interpret various forms of feedback. With respect to attributions, young children stress effort as a cause of outcomes, but with development ability attributions become increasingly important influences on self-efficacy. An important question concerns how children weigh and combine effort and ability information to form self-efficacy judgments at various stages of development.

Research is needed on the role of self-efficacy across the life span. The subjects in the studies summarized in this article were children, adolescents, or young adults. Life does not remain static after early adulthood; in the middle and advancing years people reassess their capabilities to master new challenges (Bandura, 1986). People often change jobs or careers in their middle years, they reenter school or the workplace after an absence of many years, and rapid technological advances require them to change the way they conduct their work. We know little about whether perceived efficacy operates in similar fashion across the life span or in achievement situations more common to older individuals than to children or adolescents. Within this context, research also is needed among racial and ethnic minorities to reflect the changing cultural demographics of our society. We need to know how self-efficacy operates among members of minority groups; for example, how value systems of minority groups influence perceived efficacy and the influence of efficacy on behavior relative to other factors.

Teachers' Sense of Efficacy

Despite this article's orientation, the self-efficacy construct is not confined to students. Self-efficacy seems useful to help explain the behaviors of teachers. Teachers' sense of efficacy refers to their beliefs concerning their capabilities to help students learn (Ashton and Webb, 1986). Teachers' efficacy ought to influence teaching behaviors: choice of activities, effort expended, and persistence. Teachers with a low sense of efficacy doubt

their capabilities to influence students' learning. They avoid planning activities that they believe exceed their capabilities. They may not persist in helping students having difficulty learning, expend additional effort to find materials, or think of ways to reteach content inways that students might understand better. In contrast, teachers with higher self-efficacy might be likely to develop challenging activities to work on in the classroom and help students succeed on these tasks. They may be less apt to "give up" on students who have trouble learning. In short, teachers' self-efficacy could influence not only teachers' behaviors but also student achievement.

Research is needed on the role of self-efficacy in explaining individual differences in teachers' behaviors and on ways to enhance teachers' efficacy. Initial research in this area is promising. Ashton and Webb found that teachers with higher self-efficacy were more likely to have a positive classroom environment (e.g., less student anxiety and teacher criticism), support students' ideas, and meet the needs of all students in the class. High teacher efficacy was positively associated with teachers' use of praise, individual attention to students, less use of criticism, frequent checking on students' progress in learning, and high student achievement on mathematics and language tests. Future research might address the mechanisms whereby teachers' efficacy exerts its effects on teaching behaviors and on interventions designed to enhance teacher efficacy.

REFERENCES

Andrews, G. R., and Debus, R. L. (1978). Persistence and the causal perception of failure: Modifying cognitive attributions. *J. Educat. Psychol. 70:* 154-166.

Ashton, P. T., and Webb, R. B. (1986). *Making a Difference: Teachers' Sense of Efficacy and Student Achievement,* Longman, New York.

Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychol. Rev. 64:* 359-372.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychol. Rev. 84:* 191-215.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *Am. Psycho!. 37:* 122-147. Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory,* Prentice-Hall, Englewood Cliffs, New Jersey.

Bandura, A., and Adams, N. E. (1977). Analysis of self-efficacy theory of behavioral change. *Cogni. Therapy Res. 1:* 287-310.

Bandura, A., Adams, N. E., and Beyer, J. (1977). Cognitive processes mediating behavioral change. *J. Personal. Social Psychol. 35:* 125-139.

Bandura, A., and Cervone, D. (1983). Self-evaluative and self-efficacy mechanisms governing the motivational effects of goal systems. *J. Personal. Social Psychol. 45:* 1017-1028.

Bandura, A., and Cervone, D. (1986). Differential engagement of self-reactive influences in cognitive motivation. *Organizat. Behav. Human Decision Proc. 38:* 92-113.

Bandura, A., and Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *J. Personal. Social Psychol. 41:* 586-598.

Barling, J., and Abel, M. (1983). Self-efficacy beliefs and tennis performance. *Cognit. Therapy Res.* 7: 265-272.

Barrios, B. A. (1983). The role of cognitive mediators in heterosocial anxiety: A test of self-efficacy theory. *Congit. Therapy Res.* 7: 543-554.

Betz, N. E., and Hackett, G. (1981). The relationship of career-related self-efficacy expectations to perceived career options in college women and men. *J. Couns. Psychol. 28:* 399-410.

Borkowski, J. G., and Cavanaugh, J. C. (1979). Maintenance and generalization of skills and strategies by the retarded. In Ellis, N. R. (ed.) *Handbook of Mental Deficiency, Psychological Theory and Research,* 2nd ed., Erlbaum, Hillsdale, New Jersey, pp. 569-617.

Brophy, J. (1983). Conceptualizing student motivation. *Educat. Psychol. 18:* 200-215.

Brown, I., Jr., and Inouye, D. K. (1978). Learned helplessness through modeling: The role of perceived similarity in competence. *J. Personal. Social Psychol. 36:* 900-908.

Brown, J. S., and Burton, R. R. (1978). Diagnostic models for procedural bugs in basic mathematical skills. *Cogni. Sci. 2,* 155-192.

Cervone, D., and Peake, P. K. (1986). Anchoring, efficacy, and action: The influence of judgmental heuristics on self-efficacy judgment and behavior. *J. Personal. Social Psychol. 50:* 492-501.

Collins, J. (1982, March). *Self-Efficacy and Ability in Achievement Behavior,* paper presented at the meeting of the American Educational Research Association, New York.
Corno, L. and Mandinach, E. B. (1983). The role of cognitive engagement in classroom learning and motivation. *Educat. Psychol. 18:* 88-108.
Dweck, C. S. (1975). The role of expectations and attributions in the alleviation of learned helplessness. *J. Personal. Social Psychol. 31:* 674-685.
Dweck, C. S., and Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychol. Rev. 95:* 256-273.
Feltz, D. L. (1982). Path analysis of the causal elements in Bandura's theory of self-efficacy and an anxiety-based model of avoidance behavior. *J. Personal. Social Psychol. 42:* 764-781.
Feltz, D. L. (1988). Gender differences in the causal elements of self-efficacy on a high avoidance motor task. *J. Sport. Exer. Psychol. 10:* 151-166.
Feltz, D. L., Landers, D. M., and Raeder, U. (1979). Enhancing self-efficacy in high-avoidance motor tasks: A comparison of modeling techniques. *J. Sport Psychol. 1:* 112-122.
Gould, D., and Weiss, M. (1981). The effects of model similarity and model talk on self-efficacy and muscular endurance. *J. Sport Psychol. 3,* 17-29.
Hackett, G., and Betz, N. E. (1981). A self-efficacy approach to the career development of women. *J. Vocat. Behav. 18:* 326-339.
Hallahan, D. P., Kneedler, R. D., and Lloyd, J. W. (1983). Cognitive behavior modification techniques for learning disabled children: Self-instruction and self-monitoring. In McKinney, J. D., and Feagans, L. (eds.), *Current Topics in Learning Disabilities,* Ablex, Norwood, New Jersey, (pp. 207-244).
Heider, F. (1958). *The Psychology of Interpersonal Relations,* Wiley, New York.
Kazdin, A. E. (1979). Imagery elaboration and self-efficacy in the covert modeling treatment of unassertive behavior. *J. Consult. Clin. Psychol.* 47: 725-733.
Kloosterman, P. (1988). Self-confidence and motivation in mathematics. *J. Educat. Psychol. 80:* 345-351.
Ladd, G. W., and Price, J. M. (1986). Promoting children's cognitive and social competence: The relation between parents' perceptions of task difficulty and children's perceived and actual competence. *Child Devel. 57:* 446-460.
Lee, C. (1982). Self-efficacy as a predictor of performance in competitive gymnastics. *J. Sport Psychol.* 4: 405-409.
Lee, C. (1984). Accuracy of efficacy and outcome expectations in predicting performance in a simulated assertiveness task. *Cogni. Therapy Res. 8:* 37-48.
Lent, R. W., Brown, S. D., and Larkin, K. C. (1984). Relation of self-efficacy expectations to academic achievement and persistence. *J. Couns. Psychol. 31:* 356-362.
Lent, R. W., Brown, S. D., and Larkin, K. C. (1986). Self-efficacy in the prediction of academic performance and perceived career options. *J. Couns. Psychol. 33:* 265-269.
Locke, E. A., Frederick, E., Lee, C., and Bobko, P. (1984). Effect of self-efficacy, goals, and task strategies on task performance. *J. Appl. Psychol. 69:* 241-251.
Locke, E. A., Shaw, K. N., Saari, L. M., and Latham, G. P. (1981). Goal setting and task performance: 1969-1980. *Psychol. Bull. 90:* 125-152.
Maddux, J. E., Norton, L. W., and Stoltenberg, C. D. (1986). Self-efficacy expectancy, outcome expectancy, and outcome value: Relative effects on behavioral intentions. *J. Personal. Social Psychol. 51:* 783-789.
Maddux, J. E., Sherer, M., and Rogers, R. W. (1982). Self-efficacy expectancy and outcome expectancy: Their relationship and their effects on behavioral intentions. *Cognit. Therapy Res. 6:* 207-211.
McAuley, E., and Gill, D. (1983). Reliability and validity of the physical self-efficacy scale in a competitive sport setting. *J. Sport Psychol.* 5: 410-418.
Meier, S. , McCarthy, P. R., and Schmeck, R. R. (1984). Validity of self-efficacy as a predictor of writing performance. *Cognit. Therapy Res. 8:* 107-120.
Newman, C., and Goldfried, M. R. (1987). Disabusing negative self-efficacy expectations via experience, feedback, and discrediting. *Cogni. Therapy Res. 11:* 401-417.

Nicholls, J. G. (1983). Conceptions of ability and achievement motivation: A theory and its implications for education. In Paris, S. G., Olson, G. M., and Stevenson, H. W. (eds.), *Learning and Motivation in the Classroom,* Erlbaum, Hillsdale, New Jersey, pp. 211-237.
Norwich, B. (1987). Self-efficacy and mathematics achievement: A study of their relation. *J. Educat. Psychol. 79:* 384-387.
Perry, D. G., Perry, L. C., and Rasmussen, P. (1986). Cognitive social learning mediators of aggression. *Child Development,* 57, 700-711.
Peterson, P. L., Swing, S. R., Braverman, M. T., and Buss, R. (1982). Students' aptitudes and their reports of cognitive processes during direct instruction. *J. Educat. Psychol. 74:* 535-547.
Pintrich, P. R., Cross, D. R., Kozma, R. B., and McKeachie, W. J. (1986). Instructional psychology. *Ann. Rev. Psycho!. 37:* 611-651.
Post-Kammer, P., and Smith, P. L. (1985). Sex differences in career self-efficacy, consideration, and interests of eighth and ninth graders. *J. Couns. Psycho!. 32:* 551-559.
Relich, J. D., Debus, R. L., and Walker, R. (1986). The mediating role of attribution and self-efficacy variables for treatment effects on achievement outcomes. *Contemp. Educat. Psychol. 11:* 195-216.
Rosenthal, T. L., and Zimmerman, B. J. (1978). *Social Learning and Cognition,* Academic Press, New York.
Rotter, J. B. (1954). *Social Learning and Clinical Psychology,* Prentice-Hall New York. Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psycho!. Monographs, 80* (whole no. 609).
Ryckman, R. M., Robbins, M. A., Thornton, B., and Cantrell, P. (1982). Development and validation of a physical self-efficacy scale. *J. Personal. Social Psychol. 42:* 891-900.
Salomon, G. (1984). Television is "easy" and print is "tough": The differential investment of mental effort in learning as a function of perceptions and attributions. *J. Educat. Psychol. 76:* 647-658.
Schunk, D. H. (1981). Modeling and attributional effects on children's achievement: A self-efficacy analysis. *J. Educat. Psycho!. 73:* 93-105.
Schunk, D. H. (1982). Effects of effort attributional feedback on children's perceived self-efficacy and achievement. *J. Educat. Psychol.* 74: 548-556.
Schunk, D. H. (1983a). Ability versus effort attributional feedback: Differential effects on self-efficacy and achievement. *J. Educat. Psychol.* 75: 848-856.
Schunk, D. H. (1983b). Developing children's self-efficacy and skills: The roles of social comparative information and goal setting. *Contemp. Educat. Psycho. 8: 76-86.*
Schunk, D. H. (1983c). Goal difficulty and attainment information: Effects on children's achievement behaviors. *Human Learn. 2:* 107-117.
Schunk, D. H. (1983d). Progress self-monitoring: Effects on children's self-efficacy and achievement. *J. Exper. Educat. 51:* 89-93.
Schunk, D. H. (1983e). Reward contingencies and the development of children's skills and self-efficacy. *J. Educat. Psychol. 75:* 511-518.
Schunk, D. H. (1984a). Enhancing self-efficacy and achievement through rewards and goals: Motivational and informational effects. *J. Educat. Res. 78:* 29-34.
Schunk, D. H. (1984b). Sequential attributional feedback and children's achievement behaviors. *J. Educat. Psychol. 76:* 1159-1169.
Schunk, D. H. (1985). Participation in goal setting: Effects on self-efficacy and skills of learning-disabled children. *J. Special Educat. 19:* 307-317.
Schunk, D. H. (1987a). Peer models and children's behavioral change. *Rev. Educat. Res.* 57: 149-174.
Schunk, D. H. (1987b). Self-efficacy and motivated learning. In Hastings, N. and Schwieso, J. (eds.), *New Directions in Educational Psychology: 2. Behavior and Motivation in the Classroom,* Falmer Press, London, pp. 233-251.
Schunk, D. H., and Cox, P. D. (1986). Strategy training and attributional feedback with learning-disabled students. *J. Educat. Psychol. 78:* 201-209.
Schunk, D. H., and Hanson, A. R. (1985). Peer models: Influence on children's self-efficacy and achievement. *J. Educat. Psychol. 77:* 313-322.

Schunk, D. H., Hanson, A. R., and Cox, P. D. (1987). Peer-model attributes and children's achievement behaviors. *J. Educat. Psychol. 79:* 54-61.
Schunk, D. H., and Rice, J. M. (1984). Strategy self-verbalization during remedial listening comprehension instruction. *J. Exper. Educat. 53:* 49-54.
Schunk, D. H., and Rice, J. M. (1985). Verbalization of comprehension strategies: Effects on children's achievement outcomes. *Human Learn. 4:* 1-10.
Schunk, D. H., and Rice, J. M. (1987). Enhancing comprehension skill and self-efficacy with strategy value information. *J. Reading Behav. 19:* 285-302.
Segal, Z. V., and Marshall, W. L. (1986). Discrepancies between self-efficacy predictions and actual performance in a population of rapists and child molesters. *Cognit. Therapy Res. 10:* 363-376.
Shell, D. F., Murphy, C. C., and Bruning, R. H. (1989). Self-efficacy and outcome expectancy mechanisms in reading and writing achievement. *J. Educat. Psychol. 81:* 91-100.
Stipek, D. J., and Weisz, J. R. (1981). Perceived personal control and academic achievement. *Rev. Educat. Res. 51:* 101-137.
Strain, P. S., Kerr, M. M., and Ragland, E. U. (1981). The use of peer social initiations in the treatment of social withdrawal. In Strain, P. S.,(ed.), *The Utilization of Classroom Peers as Behavior Change Agents,* Plenum, New York, pp. 101-128.
Strecher, V. J., DeVellis, B. M., Becker, M. H., and Rosenstock, I. M. (1986). The role of self-efficacy in achieving healthy behavior change. *Health Educat. Quart. 13:* 73-92.
Taylor, J. (1989). The effects of personal and competitive self-efficacy and differential outcome feedback on subsequent self-efficacy and performance. *Cognit. Therapy Res.* 13: 67-79.
Taylor, K. M., and Betz, N. E. (1983). Applications of self-efficacy theory to the understanding and treatment of career indecision. *J. Vocat. Behav. 22:* 63-81.
Thelen, M. H., Fry, R. A., Fehrenbach, P. A., and Frautschi, N. M. (1979). Therapeutic videotape and film modeling: A review. *Psychol. Bull. 86:* 701-720.
Thomas, J. W. (1980). Agency and achievement: Self-management and self-regard. *Rev. Educat. Res. 50:* 213-240.
Tolman, E. C. (1959). Principles of purposive behavior. In Koch, S. (ed.), *Psychology: A Study of a Science,* vol. 2, McGraw-Hill, New York, pp. 92-157.
Weinberg, R. S., Gould, D., and Jackson, A. (1979). Expectations and performance: An empirical test of Bandura's self-efficacy theory. *J. Sport Psychol. 1:* 320-331.
Weinberg, R. S., Yukelson, D., and Jackson, A. (1980). Effect of public and private efficacy expectations on competitive performance. *J. Sport Psychol. 2:* 340-349.
Weinberg, R. S., Gould, D., Yukelson, D., and Jackson, A. (1981). The effect of preexisting and manipulated self-efficacy on a competitive muscular endurance task. *J. Sport Psychol.* 4: 345-354.
Weiner, B. (1979). A theory of motivation for some classroom experiences. *J. Educat. Psychol. 71:* 3-25.
Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychol. Rev. 92:* 548-573.
Wheeler, V. A., and Ladd, G. W. (1982). Assessment of children's self-efficacy for social interactions with peers. *Devel. Psychol. 18:* 795-805.
Wilkes, R. L., and Summers, J. J. (1984). Cognitions, mediating variables, and strength performance. *J. Sport Psychol. 6:* 351-359.
Zimmerman, B. J., and Ringle, *J.* (1981). Effects of model persistence and statements of confidence on children's self-efficacy and problem solving. *J. Educat. Psychol. 73:* 485-493.