Enhancing Self-Efficacy and Achievement Through Rewards and Goals: Motivational and Informational Effects

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Schunk, D. H. (1984). Enhancing self-efficacy and achievement through rewards and goals: Motivational and informational effects. *Journal of Educational Research, 78*, 29-34.

Abstract:
This experiment compared the effects of performance-contingent rewards and proximal goals on children's task motivation, self-efficacy, and skillful performance. Children deficient in division skills received division instruction and solved problems. Some children were offered rewards based on their actual performances (rewards only); others pursued proximal performance goals (goals only); and children in a third condition received rewards and goals (rewards + goals). Although the three experimental treatments led to equally rapid problem solving during training, combining rewards with goals resulted in the highest self-efficacy and division performance. Future research should investigate whether proximal goals and performance-contingent rewards enhance self-efficacy through a common informational process. Implications for teaching are discussed.

Article:
According to Bandura (1977a, 1981, 1982), different procedures change behavior in part by creating and strengthening a sense of self-efficacy. Self-efficacy refers to personal judgments of how well one can per-form actions in specific situations that may contain ambiguous, unpredictable, and stressful features. Self-efficacy is hypothesized to influence one's choice of activities, effort expended, perseverance when difficulties are encountered, and skillful performance.

People acquire information about their level of self-efficacy through self-performances, vicarious (observational) means, verbal persuasion, and physiological indexes. Although self-performances provide valid efficacy information, efficacy judgments are not mere reflections of those performances. Efficacy appraisal is an inferential process that involves weighting the relative contributions of both ability and nonability factors, such as self-perceptions of ability, amount of effort expended, task difficulty, amount of external aid received, situational circumstances under which the performances occurred, and temporal pattern of successes and failures (Bandura, 1981, 1982).

Although the self-efficacy model originally was employed to explain coping behaviors in fearful situations, research has extended this framework to other contexts including cognitive skill acquisition (Schunk, 1983a, 1983b, 1983c). This latter research, which has explored how children acquire information about their self-efficacy in achievement situations, has shown that educational practices are important contextual influences on self-efficacy, and that self-efficacy affects subsequent achievement (Schunk, in press).

One common educational practice involves the use of rewards. Rewarding consequences inform and motivate (Bandura, 1977b). As people work at a task, they notice which behaviors lead to desirable outcomes and which result in undesirable ones. Such information guides future behavior. The anticipation of attaining a desired outcome motivates persons to persevere at a task. There is much evidence showing that offering rewards promotes motivation and task performance compared with no rewards (Dornbush, 1965; Glucksberg, 1962; Goyen & Lyle, 1971; McCullers, 1978; McGraw, 1978; Schunk, 1983c).

Rewards also can enhance self-efficacy more than no rewards, especially when they are tied to actual accomplishments (Schunk, 1983c). Telling children that they can earn rewards based on their level of achievement can promote task motivation and instill a sense of self-efficacy for performing well. As children then work at the task and observe their progress this sense of efficacy is substantiated, which helps to sustain motivation and develop skills (Schunk, in press). Receipt of a reward also validates self-efficacy because it symbolizes progress.

Another common educational practice is goal setting. Goal setting involves establishing a standard or objective to serve as the aim of one's actions. Of central importance are goal properties—specificity, difficulty level, and proximity (Bandura, 1977b; Latham & Yukl, 1975; Locke, 1968; Locke, Shaw, Saari, & Latham, 1981). Goals that incorporate specific performance standards lead to higher performance than no goals or general goals such as "Do your best" (Locke, 1968; Locke et al., 1981; Rosswork, 1977). Assuming that individuals have sufficient ability, there is much evidence demonstrating a positive and linear relation-ship between difficulty level and task performance (Locke et al., 1981; Rosswork, 1977; Schunk, 1983b). Proximal goals, which are close at hand and can be achieved rather quickly, result in greater motivation directed toward attainment and higher performance than no goals or goals extending farther into the future (Bandura, 1977b, 1982; Bandura & Schunk, 1981). Proximal goals are especially influential with young children, who tend to focus on the present and may not be fully capable of representing distant outcomes in thought (Schunk & Gaa, 1981).

Proximal goals also promote self-efficacy better than no goals or distant goals (Bandura & Schunk, 1981; Schunk, 1983a, in press). Suggesting proximal goals to children can convey a sense of efficacy for attaining them. As children later observe their goal progress this sense of efficacy is substantiated, which should help to sustain motivation and foster skill development. Gauging progress is more difficult in the absence of goals or when goals are temporally distant (Bandura, 1977b).

The preceding discussion suggests that performance-contingent rewards and proximal goals may exert similar effects on children's task motivation, self-efficacy, and skillful performance. Accordingly, the purposes of this study were to compare the effects of performance-contingent rewards to those of proximal goals, and to determine the effects of combining rewards with goals. During a division skill-development program, some children were offered performance-contingent rewards (rewards only), others received proximal goals (goals only), and children in a third condition received both treatments (rewards + goals). Based on the preceding considerations, the rewards-only and goals-only conditions were not expected to differentially influence achievement behaviors.

Of central interest was how rewards + goals would compare with either treatment alone. For goals to influence performance persons must be committed to attaining them, and there is evidence that the addition of rewards to goals can lead to higher goal commitment compared with goals alone (Locke, 1968; Locke et al., 1981). People also are more apt to accept goals when they believe they can attain them (Mento, Cartledge, & Locke, 1980). At the same time, combining rewards with goals should provide a clearer standard against which to gauge progress than rewards alone. Despite these ideas, Rosswork (1977) found that the addition of varying levels of incentives to goals did not promote children's academic performances more than the goals by themselves; however, goal commitment was not assessed so it is unknown whether incentives exerted any effect.

In this study, the rewards + goals treatment was not expected to boost children's task motivation during the training program more than either treatment alone, because of evidence that performance-contingent rewards and proximal goals, by themselves, exert strong motivational effects (Bandura & Schunk, 1981; Schunk, 1983c). The prior considerations do suggest that combining rewards with goals might result in a strong initial sense of self-efficacy for performing well, which should be validated as children solve problems during training. Thus, it was predicted that children in the rewards + goals condition would demonstrate higher self-efficacy and skillful performance compared with the rewards-only and goals-only conditions.

Method

The sample included 33 children drawn from 2 elementary schools. Ages ranged from 9 years to 11 years, 4 months *(M* = 10.2 years). The 20 girls and 13 boys were predominantly middle class. Because this study focused on processes whereby skills could be developed when they initially were lacking, children's teachers were shown the division skill test and identified children who they felt could not solve correctly more than about 25% of the problems. These children were individually administered the pretest by one of the four female adult testers.

Self-efficacy judgments. Children's perceptions of self-efficacy for solving division problems correctly were measured following procedures of previous research (Bandui a & Schunk, 1981; Schunk, 1983a, 1983b, 1983c). The efficacy scale ranged from 10 to 100 in 10-unit intervals from high uncertainty (1), through intermediate values (50-60), to complete certitude (100). Children initially received practice by judging their certainty of successfully jumping progressively longer distances. In this concrete fashion, children learned the meaning of the scale's direction and the different numerical values.

Following this practice, children were shown 14 sample pairs of division problems for about 2 seconds each. This brief exposure allowed assessment of problem difficulty but not actual solutions. The two problems constituting each pair were similar to one another in form and operations required, and corresponded to one problem on the ensuing skill test although they involved different numbers. Children privately judged their certainty of being able to solve correctly each type of problem depicted by circling an efficacy value. Thus, children were judging their capability to solve different types of problems and not whether they could solve any particular problem. Self-efficacy scores were summed across the 14 judgments and averaged.

Division skill test. The skill test, which was administered immediately following the efficacy assessment, included 14 division problems ranging from 1 to 3 digits in the divisor and 2 to 5 digits in the dividend. Half of these problems were similar in form and operations required to some of the problems that children subsequently solved during the training sessions, whereas the other half were more complex. During training, for example, children had to "bring down" numbers once or twice per problem, whereas some skill test problems required bringing down three numbers.

The tester presented the problems one at a time and verbally instructed children to examine each problem, indicate whether they wanted to try to solve it, and place each page on a completed stack when they finished solving the problem or chose not to work on it any longer. Children were given no performance feedback. The measure of skill was the number of problems children solved correctly; small computational errors were discounted here.

This scoring method reflects children's division skills more accurately than one requiring perfect accuracy, by which children who correctly apply division operations but make a small error in subtraction are penalized as much as children who fail to work the problem (Schunk, 1983c). Skill data using the perfect-accuracy method also were analyzed, and yielded similar results to those reported.

Following the pretest, children were assigned randomly within sex and school to one of three treatment groups *(N = 11):* rewards only, goals only, rewards + goals. All children received two 45-minute training sessions over consecutive school days, during which they worked on 2 training packets. Each session followed a similar format except that the first covered problems with 1-digit divisors whereas the second was devoted to 2-digit divisors. The first page in each training packet contained a step-by-step worked example that included bringing down one number. The second page contained a practice problem. The next several pages contained problems for children to solve. Sufficient problems were included in each packet so that children could not complete it during the session.

An adult female proctor escorted children individually to a large room where they were seated at sufficient distances from others to preclude visual and auditory contact. Each of the four adults served as the training

proctor for approximately equal numbers of children in each experimental condition. Initially, the proctor reviewed the explanatory page by pointing to the division operations while reading from a narrative. If children indicated a lack of understanding, the proctor reread the relevant narrative but did not supplement it on her own. Children then worked the practice problem, after which the proctor gave the treatment instructions appropriate to the child's experimental condition (explained below). The proctor stressed the importance of careful work, and retired to an out-of-sight location. Children retained the explanatory page while solving problems alone and received no feedback on the accuracy of their solutions.

Treatment Conditions. Although the three experimental conditions were counterbalanced across schools, within each school the goals-only treatment was administered first, followed by the rewards-only and the rewards + goals conditions. This order was followed because reward systems are quite dynamic and children discuss them with one another. Had all three treatments been administered simultaneously, children in the goals-only condition might have been discouraged because they could not earn rewards. This systematic ordering should not have biased the results because the study was of short duration; however, because between-subject communication was possible, rewards-only and rewards + goals children were asked at the outset what they knew about the project. No child mentioned rewards or goals.

Rewards only. The proctor informed these children at the start of each training session that because they agreed to participate in the project they would earn five points for each problem completed during each session and that at the end of the second session they could exchange their points for prizes equal in monetary value to the points. The proctor then showed children the prizes, which included magic markers, erasable pens, stickers, and small notebooks. The proctor stressed the importance of careful work to discourage children from proceeding through the packet carelessly; this instruction also was given in the other two conditions. At the end of the second session, the proctor totaled children's points and children chose their prizes.

Goals only. The proctor suggested at the start of the first session that these children might want to work at least 20 problems during the period. The proctor then asked children if that sounded reasonable. At the beginning of the second session, the proctor suggested a goal of 10 problems, and asked if that appeared reasonable. No child expressed undue concern over the goals.

These numbers (20 and 10) were arrived at through pilot testing with a group of children comparable to this sample. The pilot sample, on the average, completed 20.8 one-digit divisor problems and 10.4 two-digit problems during 45-minute periods when advised only to work productively. The pilot averages were rounded to 20 and 10 for the actual study.

Because the rewards-only treatment contained elements of both reward anticipation and reward receipt, these effects were disentangled by allowing goals-only children to choose rewards unexpectedly at the end of the second session. The proctor stated that because children agreed to participate in the project they could draw a number from a hat and choose prizes. This random-draw procedure highlighted the lack of relationship between number of problems completed during training and amount of reward. All children drew the number $1.55, which represented the average number of points accrued by the pilot sample (31 problems x 5 points/problem).

Rewards + goals. These children received both of the above sets of treatment instructions prior to each training session. To half of the children the reward instructions were given first, followed by the goal instructions; this order was reversed for the other half. No child in this condition expressed undue concern over the goals for either session.

Goal attainment expectancy. After receiving their goal instructions but prior to working on problems, children in the goals-only and rewards + goals conditions judged their expectancy for attaining the goal suggested to them. Ideally, a measure of goal commitment would have been obtained, because commitment is necessary to promote performance (Locke et al., 1981); however, attempts to assess commitment have been fraught with methodological problems, and subjects often cannot make fine discriminations in degree of commitment (Locke

et al., 1981). Expectancy for goal attainment was assessed because persons are more likely to accept goals when they have higher expectations of attainment (Mento et al., 1980).

The scale was identical to that used to assess pretest self-efficacy, and judgments from the two sessions were averaged. To control for potential effects of making judgments, children in the rewards-only condition judged their certainty of "Doing your best." These latter judgments have no particular relevance to this study and will not be discussed further.

Posttest. The posttest was administered the day after the second training session. Children were informed prior to this assessment that rewards would not be given. The self-efficacy and skill-test instruments and procedures were similar to those of the pretest except that a parallel form of the skill test was used to eliminate possible problem familiarity. Prior research had shown that the parallel forms were highly correlated *(r* = .86) among a sample of children comparable to the present one (Schunk, 1983c).

For any given child, the same tester administered both the pre- and posttests, had not served as the child's training proctor, and was blind to the child's treatment condition. All tests and training materials were scored by an adult who was unaware of children's experimental assignments.

Results

Means and standard deviations of all measures are presented by experimental condition in Table 1. Preliminary analyses of variance revealed no significant differences due to tester, school, or sex of child on any measure, nor any significant interactions. The data therefore were pooled across these variables. There also were no significant differences between experimental conditions on any pretest measure. Analysis of covariance (ANCOVA) was applied to posttest self-efficacy and skill using the appropriate pretest measure as the covariate. The three experimental conditions constituted the treatment factor. Significant F-ratios were analyzed further using the Newman-Keuls multiple comparison test (Kirk, 1968).

The use of analysis of covariance necessitated demonstration of slope homogeneity across treatment conditions (Kerlinger & Pedhazur, 1973). Tests of slope differences for each measure were made by comparing a linear model that allowed separate slopes for the three experimental conditions against one that had only one slope parameter for estimating the pre-posttest relationship pooled across the three conditions. These analyses found the assumption of homogeneity of slopes to be tenable.

On the posttest self-efficacy measure, ANCOVA yielded a significant treatment effect, $F(2,29) = 5.64$, $p < .01$. Newman-Keuls comparisons showed that rewards + goals children judged self-efficacy significantly higher than goals-only *(*$p < .01$) and rewards-only *(*$p < .05$) children. Efficacy judgments of the latter two groups did not differ significantly.

ANCOVA also yielded a significant treatment effect on the posttest measure of division skill, $F(2,29) = 4.69$, $p < .05$. Post-hoc comparisons showed that rewards + goals children exhibited significantly *(*$p < .05$) higher division skill than children in the rewards-only and goals-only conditions, but that the latter two conditions did not differ significantly.

To determine how treatments affected rate of problem solving during training, the number of problems completed was analyzed with analysis of variance. ANOVA yielded a nonsignificant result *(*$F < 2$). An identical result was obtained using problems solved correctly as the measure of training progress.

Correlational analyses were conducted to explore the interrelationship of theoretically relevant variables. Initially, product-moment correlations were computed between posttest self-efficacy, posttest skill, and training progress (number of problems completed), separately for each experimental condition. Because there were no significant between-group differences, correlations were averaged across conditions using an *r* to *z* transformation (Edwards, 1976).

Children's perceptions of self-efficacy bore a positive relationship to subsequent skillful performance, r(31) = .84, $p < .001$. More rapid problem solving during training was associated with higher self-efficacy, r(31) = .52, $p < .01$, and skillful performance, r(31) = .43, $p < .05$. The same pattern of results was obtained using the number of problems solved correctly as the measure of training progress.

The goals-only and rewards + goals conditions differed significantly on the goal attainment expectancy measure, t(20) = 3.34, $p < .01$. Compared with goals-only subjects, rewards + goals children held significantly higher initial expectations for goal attainment.

Table 1.—Pre- and Posttest Means (and Standard Deviations)

Measure	Phase	Experimental Condition: Rewards Only	Goals Only	Rewards + Goals
Self-efficacy[a]	pretest	43.5 (26 0)	41.9 (21 3)	43.5 (15.4)
	posttest	60 8 (20 7)	62.0 (20.4)	80.6 (17.8)
Skill[b]	pretest	0 9 (1 0)	0 8 (1.0)	1 0 (1 1)
	posttest	6 2 (2.9)	5.9 (2 7)	9 2 (2 7)
Training progress[c]	attempted	38.6 (17 2)	35 9 (14.4)	42.4 (18 1)
	correct	34 3 (17 1)	32.4 (15.6)	36.9 (20 9)
Goal attainment[d]	- - -	- - -	51.6 (14 1)	75 2 (15.8)

Note $N = 33$; $N = 11$

[a]Average judgment per problem; range of scale 10 (low)–100.

[b]Number of correct solutions on 14 problems

[c]Number of problems.

[d]Range of scale: 10 (low)–100.

Discussion

This study demonstrated that combining performance-contingent rewards with proximal goals led to higher self-efficacy and division performance than either treatment by itself. One explanation for these effects is as follows. Compared with goals alone, rewards + goals may have engendered a greater degree of goal commitment. Goals will promote performance only if persons are committed to attaining them, and research shows that combining rewards with goals can strengthen goal commitment (Locke, 1968; Locke et al., 1981). To the extent that high goal commitment was associated with a strong sense of self-efficacy for performing well, this initial sense of efficacy should have been validated as children then solved problems during training and observed their goal progress (Schunk, in press). This explanation is supported by the finding that rewards + goals children judged themselves more certain of attaining their goals than goals-only subjects. Individuals are more apt to accept goals when they believe that they can attain them (Mento et al., 1980).

Telling rewards-only children that they would earn rewards based on the work they accomplished probably created an initial sense of self-efficacy for performing well (Schunk, in press); however, combining rewards with goals ought to have provided a clearer standard against which to gauge progress compared with rewards alone. Knowledge that one is making progress helps validate an initial sense of self-efficacy (Bandura, 1982). A clear standard against which to assess progress may be especially important for promoting self-efficacy among young children, who otherwise may not be fully aware of how well they are performing (Schunk & Gaa, 1981). This explanation is only suggestive, because children's initial sense of self-efficacy for performing well was not assessed. Future research that includes such a measure could investigate whether proximal goals and performance-contingent rewards enhance achievement behaviors in part through a common informational process of conveying an initial sense of self-efficacy that children are capable of succeeding at the task.

Previous research in achievement situations where self-efficacy is developed largely through self-performances has shown that efficacy judgments are not mere reflections of those performances (Bandura & Schunk, 1981; Schunk, 1983a, 1983b). This study supports this finding, because children in the rewards-only, goals-only, and rewards + goals conditions did not differ in their rates of problem solving during training but rewards + goals subjects subsequently judged self-efficacy higher. That experimental treatments did not differentially influence

task motivation is not surprising, because proximal goals and performance-contingent rewards, by themselves, motivate young children (Bandura & Schunk, 1981; Schunk, 1983c, in press).

This study also supports the idea that self-efficacy bears an important relationship to subsequent achievement (Bandura, 1977a, 1981, 1982). Covington and Omelich (1979) found that adults' personal expectations of successful performance were one of the best predictors of later performance. Personal expectations for success are viewed as important influences on behavior by a variety of theoretical approaches (Bandura, 1982; Covington & Beery, 1976; Kukla, 1972; Moulton, 1974; Schunk, in press; Weiner, 1979).

This study suggests implications for teaching practice. Previous research shows that establishing proximal goals for children fosters achievement behaviors compared with no goals (Bandura & Schunk, 1981; Schunk, in press). Goal setting fits well with normal lesson planning, because teachers plan activities around blocks of time. Especially with young children, these activities tend to be short-term. Goal-setting procedures can be easily implemented in classrooms and can enhance school achievement (Gaa, 1973).

These findings suggest that teachers who regularly dispense rewards would be well advised to link them clearly to children's progress toward goal attainment to maximize achievement behaviors. Teachers who wish to avoid using rewards may need to provide children with explicit information indicating that goals are attainable, especially when children may believe that the goals are difficult. For example, teachers could verbally provide students with persuasive self-efficacy information, such as "I know you can do this." Such information ought to be most important during the early stages of skill acquisition when children lack task experience and knowledge of how well they are capable of performing.

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