

Ability Versus Effort Attributional Feedback: Differential Effects on Self-Efficacy and Achievement

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Abstract:

This experiment explored the effects of ability and effort attributional feedback given during subtraction competency development on children's perceived self-efficacy and achievement. Children who were deficient in subtraction skills received training on subtraction operations and engaged in problem solving, during which they periodically received ability attributional feedback for their progress, effort feedback, ability + effort feedback, or no attributional feedback. Children given only ability feedback demonstrated the highest subtraction skill and self-efficacy; the effort and ability + effort conditions did not differ, but each outperformed the no-feedback condition. Future research should examine in greater detail how children process attributional information and its effects on achievement outcomes.

Article:

According to Bandura's theory of *self-efficacy* (Bandura, 1977, 1981, 1982), different treatments change behavior in part by creating and strengthening percepts of self-efficacy. Self-efficacy refers to judgments of how well one can organize and implement actions in specific situations that may contain ambiguous, unpredictable, and possibly stressful elements. Self-efficacy is hypothesized to affect choice of activities, effort expenditure, and perseverance in the face of difficulties. Efficacy information is conveyed through performance attainments, socially comparative vicarious means, social persuasion, and physiological indexes. Although actual performances provide the most reliable efficacy information, efficacy judgments are not mere reflections of those performances. Efficacy appraisal is an inferential process that involves weighting the relative contributions of many factors, such as self-perceptions of ability, task difficulty, effort expended, amount of external aid received, situational circumstances under which the performances occurred, and temporal pattern of successes and failures (Bandura, 1981).

In the self-efficacy framework, attributional variables constitute an important source of efficacy information and influence performance primarily through their intervening effects on efficacy expectations. Attributional theories of behavior postulate that individuals make causal ascriptions for the outcomes of their actions (Heider, 1958; Kelley, 1967; Kelley & Michela, 1980). In achievement contexts, outcomes often are attributed to ability, effort, task difficulty, or luck (Frieze, 1980; Weiner, 1979; Weiner et al., 1971). Future expectancies of success and failure in part depend upon ascriptions for prior outcomes (Weiner, 1977, 1979). If one believes that the conditions surrounding the task will remain much the same, attributions to relatively stable causes—such as ability or task difficulty—should result in future expectancies of similar outcomes, whereas attributions to the more unstable causes of effort or luck may lead to expectancy shifts (Frieze, 1980; Weiner, 1979).

A number of research studies have attempted to modify children's achievement behaviors by providing effort attributional feedback for their performances (Andrews & Debus, 1978; Chapin & Dyck, 1976; Dweck, 1975; Medway & Venino, 1982; Schunk, 1982). Because effort presumably is under volitional control, ascribing past failures to insufficient effort should have motivational effects and lead to greater task persistence and a higher performance level. In support of this idea, Dweck (1975) had learned-helpless children solve arithmetic problems over trials. Children either always succeeded or occasionally failed to solve a criterion number of problems. When they failed, children were given effort attributional feedback by being told that they should

have tried harder. Following training, subjects who had received the feedback improved or maintained their performances following failure, whereas the performances of children who always had succeeded became poorer.

Other research has examined the effects of providing ability attributional feedback for successes. Such feedback also should exert motivational effects on achievement behavior: Children who believe that past successes are due largely to high ability should expect future success and perform at a high level. Miller, Brickman, and Bolen (1975) provided children with either attributional or persuasory feedback on their arithmetic assignments. Some attributional subjects received ability feedback informing them that they were good in arithmetic, whereas others received effort feedback that stressed their hard work. Persuasory-feedback subjects received either ability *feedback* to the effect that they should be good in arithmetic or effort feedback that they should work hard. Both forms of attributional feedback were significantly more effective than the persuasory conditions in increasing arithmetic performance; however, the two attributional conditions did not differ significantly from one another.

In the present study, third-grade children participated in a subtraction competency-development program and periodically received ability attributional feedback for their task successes, effort feedback, both forms of feedback, or no attributional feedback. Although attributional feedback is viewed as an important influence on achievement behaviors by self-efficacy and attributional theories, there is little research comparing the effects of different types of feedback on self-efficacy and skills. Miller et al. (1975) included ability and effort feedback treatments; however, they did not assess children's specific performance expectancies, but rather, only mathematical skills and self-esteem. Specific expectancies (self-efficacy) constitute a theoretically crucial link between attributional feedback and subsequent behavioral change. Further, third-grade children were employed in the present study, whereas Miller et al. used second graders. As Nicholls (1978) has shown, third grade (around age 9) is important developmentally because the concept of ability begins to emerge. At earlier ages, children view effort as the prime cause of outcomes and ability-related terms as closely associated with effort, which could explain the similar effects of ability and effort feedback in the Miller et al. study. To the extent that the children in the present study had begun to differentiate ability from effort, important differences between the two forms of feedback might occur.

Providing attributional feedback during competency development was expected to enhance children's rate of problem solving and lead to higher self-efficacy and skills compared with not providing attributional feedback. The present sample had experienced repeated difficulties with subtraction and was expected to enter the experiment with low subtraction efficacy. As children observe their progress during problem solving, they begin to develop a sense of efficacy. Young children value high ability and high effort (Harari & Covington, 1981), and they use both to explain successes in achievement contexts (Frieze, 1980; Frieze & Bar-Tal, 1980; Frieze & Snyder, 1980). In the self-efficacy model, attributional feedback constitutes a persuasive means of conveying efficacy information. Telling children that they possess subtraction ability should support their perceptions of progress and help validate their sense of efficacy. A heightened sense of efficacy sustains task motivation and fosters skill development. Similarly, telling children that they have been working hard should convey that they are efficacious enough to succeed and that they can actualize their capabilities through sustained effort. Schunk (1982) found that providing effort attributional feedback for successful problem solving resulted in significantly higher levels of arithmetic skill and self-efficacy compared with feedback that stressed the need to work hard and with no attributional feedback.

Although the different forms of attributional feedback were expected to enhance children's task motivation and rate of problem solving equally well, they were expected to differ in their effects on self-efficacy. It was predicted that ability feedback alone would promote self-efficacy more than effort feedback alone. Attribution research has shown that successes attained with low effort foster ability attributions, whereas the same level of success resulting from greater effort implies a lower ability level (Frieze, 1980; McMahan, 1973; Weiner, 1979). There is developmental evidence showing that third graders use inverse compensation in judging effort from ability information (Kun, 1977; Surber, 1980); that is, children infer less effort as outcomes are presented

as resulting from higher ability. Thus, it was expected that effort feedback alone would lead to self-perceptions of greater effort expended than would ability feedback alone. Success attained with less effort promotes self-efficacy more than when greater effort is required (Bandura, 1981).

Combining ability with effort feedback was not expected to promote self-efficacy in an additive fashion; rather, it was felt that these children might discount the ability information in favor of effort. Given the findings on inverse compensation (Kun, 1977; Surber, 1980), the ability feedback should result in perceptions of low effort expended; however, effort feedback conflicts with this perception. There is developmental evidence showing that some third graders also use inverse compensation in judging ability from effort (Surber, 1980). Because the present sample was expected to have begun to differentiate ability from effort, they might question their level of ability somewhat because of the effort feedback and thereby feel less efficacious than children receiving ability feedback alone.

Method

Subjects

The sample included 44 third-grade children drawn from four classes in one elementary school. Ages ranged from 8 years 4 months to 10 years 2 months ($M = 8.8$ years). The 24 boys and 20 girls were predominantly middle class. Because this study focused on processes whereby skills could be developed when they were lacking initially, children's teachers were shown the subtraction skill test and identified children who they felt could not solve correctly more than about 25% of the problems. These children were administered the pretest individually by one of three female adult testers.

Pretest

Self-efficacy judgments. Children's percepts of self-efficacy for solving subtraction problems correctly were measured following procedures of previous re-search (Bandura & Schunk, 1981; Schunk, 1981, 1982). The efficacy scale ranged from 10 to 100 in 10-unit intervals from high uncertainty (10), through intermediate values (50-60), to complete certitude (100). Children initially received practice with the efficacy assessment 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 25 sample pairs of subtraction problems for about 2 sec 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 were not identical. Thus, children were judging their capability to solve different types of problems and not whether they could solve any particular problem. Children made their judgments privately by circling an efficacy value. They were advised to be honest and to mark how they really felt. Self-efficacy scores were summed across all 25 judgments and averaged.

Subtraction skill test. The skill test was administered immediately following the efficacy assessment. The test included 25 subtraction problems ranging from two to six columns. Each problem tapped one of the following subtraction operations: no borrowing, borrowing once, borrowing from a 1, borrowing twice, borrowing caused by a zero, and borrowing across zeros. Of these 25 problems, 8 were similar in form and in operations required to some of the problems that children solved during the subsequent training sessions, whereas the other 17 were more complex. For example, during training, children solved problems requiring double borrowing, whereas some skill test problems required triple borrowing. The measure of skill was the number of problems that children solved correctly.

The tester presented the problems one at a time and verbally instructed children to examine each problem, to decide how long they wanted to spend on it, and to 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 tester also recorded the time children spent with each problem. These persistence scores were summed across all 25 problems and averaged.

Training Procedure

Following the pretest, children were randomly assigned within sex and classroom to one of four treatment groups ($n = 11$ in each group) according to a 2 (ability attributional feedback: given/not given) \times 2 (effort attributional feedback: given/not given) factorial design. Children received 40-min. training sessions over three consecutive school days, during which they worked on a training packet consisting of seven sets of material. These sets were ordered in terms of least to most difficult as follows: no borrowing, borrowing once in two-column problems, borrowing once in three-column problems, borrowing once caused by a zero, borrowing twice, borrowing from a 1, and borrowing across zeros (Friend & Burton, 1981). The format of *each set* was identical. The first page contained written explanation of the subtraction operation and two step-by-step worked examples. The next six pages each contained several problems to solve. Previous pilot work showed that *if* children worked diligently they could complete the entire packet during the sessions.¹

Each child was escorted individually to a large room by one of three female adult proctors. Each proctor was responsible for approximately equal numbers of children in each treatment condition. Children were seated at sufficient distances from other children to preclude both visual and auditory contact. Initially, the proctor reviewed the first explanatory page by pointing to the operations while reading from a narrative that explained the steps. If children indicated a lack of understanding, the proctor reread the relevant narrative but did not supplement it on her own. The proctor explained that whenever children came to a similar page they were to bring it to the proctor for review. The proctor then stressed the importance of careful work and retired to an out-of-sight location. Children solved problems alone and received no performance feedback on the accuracy of their work. They marked their places at the end of each session and resumed there the following day.²

Treatment Conditions

Ability attributional feedback. The proctor monitored the progress of these children every 8 min during each training session by walking up to each child and asking, "What page are you working on?" After children replied with the page number, the proctor linked children's prior *achievement* to ability by *remarking*, "You're good at this." The ability feedback was given in a matter-of-fact tone of voice and without any accompanying social reinforcers such as smiles or pats. The proctor then departed.

Effort attributional feedback. This treatment was identical to the ability feedback condition except that following the child's reply the proctor linked the child's prior achievement with effort by remarking, "You've been working hard." This remark also was given matter-of-factly and without accompanying social reinforcement, after which the proctor departed.

Ability + effort- attributional feedback. These children received both forms of feedback. The procedures were similar to those of the previous conditions. Following the child's reply, the proctor either remarked, "You're good at this, and you've been working hard" or, "You've been working hard and you're good at this." These versions were alternated successively for each child to eliminate any potential bias resulting from order of feedback.

No attributional feedback. These children were monitored in the same fashion as the feedback treatments except that after the child replied the proctor remarked, "OK," and departed. This group controlled for the effects of monitoring included in the above conditions and any potential influence of feedback apart from the attribution it contained.

Effort Expenditure

Immediately following the last training session, children's perceptions of the amount of effort they expended during the training sessions were assessed. Children privately judged how hard they thought they had worked on a 10-unit (10-100) scale ranging from 10 = not hard to 100 = really hard. No attributional feedback was given immediately prior to this assessment.

Posttest

The posttest was administered the day after the third training session. The 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. The parallel form was developed in previous research (Bandura & Schunk, 1981); the two forms correlated highly ($r = .87$) in a reliability assessment conducted in conjunction with that study.

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 experimental assignment. Each proctor administered all four treatment conditions. 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 (ANOVAS) revealed no significant differences due to tester, classroom, or sex of child, on any pre- or posttest 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. Each posttest measure was analyzed according to a 2 (ability attributional feedback: given/not given) \times 2 (effort attributional feedback: given/not given) analysis of covariance (ANCOVA) using the appropriate pretest measure as the covariate. Significant results were analyzed further using the Newman-Keuls multiple comparison test (Kirk, 1968).

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

For the measure of subtraction skill, ANCOVA yielded a significant main effect for ability feedback, $F(1, 39) = 14.61, p < .001$, as well as a significant Ability \times Effort interaction, $F(1, 39) = 18.33, p < .001$. Post hoc analyses revealed that the ability-feedback condition exhibited significantly ($p < .01$) higher subtraction skill than each of the other three conditions. The two conditions receiving effort feedback did not differ significantly from one another, but each demonstrated significantly ($p < .05$) higher subtraction skill than did the no-feedback condition.

Analysis of persistence scores yielded no significant main effects nor interaction. For the self-efficacy measure, a significant main effect was obtained for ability feedback, $F(1, 39) = 17.02, p < .001$, as well as a significant Ability \times Effort interaction, $F(1, 39) = 15.99, p < .001$. Post hoc comparisons showed that children in the ability condition judged efficacy significantly ($p < .01$) higher than did subjects in each of the other three conditions. The efficacy judgments of effort and ability + effort subjects did not differ, but each condition judged efficacy significantly ($p < .05$) higher than did subjects in the no-feedback condition.

To investigate whether experimental treatments differentially affected rate of problem solving, ANOVA procedures were applied to the number of problems that children completed during the training sessions. A significant main effect for effort feedback was obtained, $F(1, 40) = 4.15, p < .05$, as well as a significant Ability \times Effort interaction, $F(1, 40) = 6.22, p < .05$. Post hoc comparisons revealed that the three attributional feedback conditions did not differ from one another but that each condition completed significantly ($p < .05$) more problems than did children in the no-feedback group. The more rapid problem solving of attributional subjects was not attained at the expense of accuracy. Similar results were obtained using the number of problems that children solved correctly.

Correlational analyses were conducted to test the hypothesized relationships between variables. Product-moment correlations were computed among the posttest variables and training progress, which was defined as

the number of problems completed. Initially, correlations were computed separately within each experimental condition. Since there were no significant between-condition differences on any measure, correlations were averaged with the r to z transformation (Edwards, 1976).

Table 1
Pre- and Posttest Means and Standard Deviations

Measure	Experimental condition								
	Ability feedback		Effort feedback		Ability + effort		No feedback		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Skill ^a									
Pretest	4.5	5.5	4.5	4.9	4.6	4.0	4.3	5.6	
Posttest	18.8	3.7	13.2	3.3	12.6	6.3	8.0	4.7	
Persistence ^b									
Pretest	47.5	18.3	48.1	20.1	53.2	15.8	46.8	20.7	
Posttest	43.0	18.3	43.0	22.8	45.0	15.8	43.1	8.8	
Self-efficacy ^c									
Pretest	39.6	15.9	37.1	13.3	35.8	17.1	36.5	13.4	
Posttest	80.9	13.8	60.4	17.4	60.0	26.6	43.3	9.8	
Training progress ^d	212.3	36.3	224.3	50.4	205.6	59.5	158.4	43.6	
Effort expenditure ^e	57.0	9.7	78.7	12.7	74.3	14.3	42.2	15.1	

Note. $N = 44$; n for each group = 11.

^a Number of correct solutions on 25 problems. ^b Average number of sec per problem. ^c Average judgment per problem; range of scale: 10(low)–100. ^d Number of problems completed. ^e Range of scale: 10(low)–100.

The more problems that children completed during training, the more problems that they solved correctly on the posttest, $r(42) = .49, p < .01$, but training progress was related negatively to posttest persistence, $r(42) = -.61, p < .01$. The more efficacious that children felt following training, the more posttest problems they solved correctly, $r(42) = .51, p < .01$; however, self-efficacy bore an inverse relationship to subsequent persistence, $r(42) = -.30, p < .05$. Persistence also was correlated negatively with skill, $r(42) = -.31, p < .05$. An identical pattern of results was obtained using the number of problems that children solved correctly as the measure of training progress.

Analysis of the effort expenditure measure yielded a significant main effect for effort feedback, $F(1, 40) = 9.72, p < .01$, as well as a significant Ability \times Effort interaction, $F(1, 40) = 6.77, p < .05$. Post hoc comparisons showed that the two effort-feedback conditions did not differ from one another but that each judged effort expenditure significantly greater than did ability-feedback ($p < .05$) and no-feedback ($p < .01$) subjects. Children who received only ability feedback made significantly ($p < .05$) higher effort judgments than did no-feedback subjects.

Discussion

The present study demonstrates that providing attributional feedback to children in the context of competency development constitutes an effective means of promoting rapid problem solving, self-efficacy, and achievement. One explanation of these effects is as follows. As children observe their problem-solving progress during training they begin to develop a sense of efficacy. Providing attributional feedback helps to support their self-perceptions of progress and validates their sense of efficacy (Schunk, 1982). A heightened sense of efficacy helps to sustain task motivation, which leads to greater skill acquisition. When children receive no attributional feedback, they might wonder how efficacious they are despite their progress. A lower sense of efficacy relative to that inculcated by attributional feedback leads to less sustained effort and skill acquisition.

Although the three attributional feedback conditions demonstrated equally rapid problem solving during training, children who received only ability feedback judged themselves the most efficacious and solved correctly the highest number of posttest problems. These differences may have resulted from children's perceptions of their effort expenditure during training as influenced by the attributional feedback. Children who

received only ability feedback judged that they had expended less effort than did children who were given only effort feedback. This finding is consistent with developmental literature showing that third graders use inverse compensation in judging effort from ability information (Kun, 1977; Surber, 1980). The same degree of success obtained with less effort should strengthen self-efficacy more than when greater effort is required (Bandura, 1981). In turn, a strong level of self-efficacy leads to a high subsequent demonstration of skill.

The present results with third graders differ from those of Miller et al. (1975), who found that ability and effort feedback exerted similar effects on second-graders' mathematical performance. It seems likely that the different subject populations were responsible. According to Nicholls (1978), by age 9, children are in a stage of transition from essentially viewing ability and effort as synonymous to differentiating these concepts. As such, ability feedback should exert stronger effects on third graders than younger children. Research also shows that ability attributions become increasingly important in explaining success as children become older, whereas effort as a causal factor declines in importance (Nicholls, 1979). Although attributions were not collected in the present study, this latter point suggests that the two forms of feedback may have been adopted differentially as attributions by the corresponding subjects. Research shows that attributional feedback changes children's attributions (Andrews & Debus, 1978; Dweck, 1975).

The present findings also differ from those of Schunk (1982). Although the past-attribution treatment of that study was similar to the present effort-feedback condition, the latter did not promote children's achievement outcomes as well as the former despite comparable subject populations and problem-solving progress during training. The central procedural difference is that perceived effort expenditure was not assessed in the Schunk (1982) study. This measure likely made amount of effort expended salient to children, and assuming that they had begun to differentiate ability from effort should have influenced their efficacy judgments and subsequent performance. Without such a measure, children may focus more on their recent task successes in judging efficacy. Additional research is needed because there is little evidence on how children weight and combine efficacy information from multiple sources (Bandura, 1981).

As discussed in previous research (Schunk, 1982), attributional feedback conveys approval, which is a form of social reinforcement. It is possible that the present ability and effort attributional feedback treatments differed somewhat in their social reinforcement value. Thus, telling children that they are good at subtraction may convey approval more explicitly than does telling children that they have been working hard.

It seems unlikely that social reinforcement differences were responsible for the present results, because children who received ability + effort feedback did not differ from subjects who received only effort feedback, and demonstrated lower self-efficacy and subtraction skill than ability-feedback subjects. These findings suggest that ability + effort children weighted the effort feedback more heavily. They judged effort expenditure greater than that of ability-feedback children but comparable to that of effort-feedback subjects. Ability + effort children may have wondered how good at subtraction they really were if they had to work hard to succeed; that is, they may have questioned somewhat the validity of the ability feedback. This interpretation is consistent with developmental research showing that by the third grade some children use inverse compensation in judging ability from effort information (Surber, 1980).

Despite the present benefits of attributional feedback, they must be qualified. Attributional feedback was effective because it was paired with successful problem solving. Had children been unsuccessful, they may have discounted the feedback in favor of high task difficulty, which is a prominent attribution when persons do not succeed (Frieze & Weiner, 1971). Such an attribution would not have sustained problem-solving progress or enhanced self-efficacy. Similarly, the validity of the attributional feedback also depended upon children perceiving the task as average in difficulty, which the present procedures were designed to foster. Ability feedback on tasks perceived as easy is uninformative of one's capabilities, since it confirms the known. As tasks become difficult, a combination of ability and effort is necessary for success (Kelley, 1971); therefore, straight ability feedback on difficult tasks would lose some of its credibility. Similarly, effort attribution is most effective with intermediate-difficulty tasks (Kukla, 1972; Weiner, Heckhausen, Meyer, & Cook, 1972).

Children should not develop a sense of efficacy when told that they had worked hard at a task they thought was easy. If they viewed the task as highly taxing, they might wonder whether they could sustain the high level of effort required for success. Such self-doubts would not enhance self-efficacy.

The nonsignificant effect of attributional feedback on persistence, along with the negative correlations of persistence to self-efficacy and skill, seem surprising. According to self-efficacy theory, as persons develop skills and a sense of efficacy they should persist longer at tasks (Bandura, 1977, 1981, 1982). Previous research applying the self-efficacy model to achievement contexts has supported this hypothesis (Schunk, 1981, 1982). The present results for persistence may be partly artifactual. As Table 1 depicts, children were quite perseverant on the pretest despite their lack of skill and instructions to decide how long they wanted to spend on each problem. Given the high initial persistence, we actually might expect that children would spend less time on problems as they acquire skills and a sense of competence (Bandura & Schunk, 1981). This issue deserves further investigation.

The present results support the idea that although self-efficacy is influenced by prior accomplishments it is not a mere reflection of them (Bandura & Schunk, 1981; Schunk, 1981, 1982). Thus, the three attributional feedback conditions did not differ in rate of problem-solving during training, but ability-feedback subjects subsequently judged self-efficacy the highest. In addition, this research supports the idea that perceptions of capabilities bear an important relationship to subsequent achievement. Similar results have been obtained previously with children and adults (Covington & Omelich, 1979; Schunk, 1981, 1982). Personal expectations for success are viewed as important influences on behavior by a variety of theoretical approaches to achievement (Bandura, 1981; Covington & Beery, 1976; Kukla, 1972; Moulton, 1974).

Future research should explore in finer detail developmental changes in how children process attributional feedback and its effects on achievement outcomes. For example, we might expect a further shift in the importance of ability information relative to effort beyond the third grade. Such re-search has implications for teachers of young children. Knowing how children's interpretation of attributional feedback progressively changes with development would allow teachers to structure their feedback accordingly, including over the course of a school year, to enhance children's achievement and sense of efficacy.

Notes:

¹ The validity of the attributional feedback depended upon children successfully solving problems. To this end, each explanatory page fully covered the operations required on the ensuing six pages of problems.

² To determine whether children were succeeding at the task, proctors privately checked children's work after children departed each day. Disregarding occasional small computational errors, children solved the problems correctly.

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