Influence of Peer-Model Attributes on Children's Beliefs and Learning

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Abstract:

Schunk, Hanson, and Cox (1987) investigated the effects of peer-model attributes on children's self-efficacy (i.e., perceived capabilities) and skill. Children enrolled in below-grade-level classes for mathematics instruction observed either one or three same-sex peers demonstrating rapid (*mastery model*) or gradual (*coping model*) acquisition of fraction skills, after which they received instruction. Observing a single coping model, multiple coping models, or multiple mastery models led to higher self-efficacy for learning, more rapid problem-solving during the instructional sessions, and higher posttest self-efficacy and skill than did observing a single mastery model. Children who observed coping models (single or multiple) judged themselves similar in competence to the models; children who observed mastery-models judged themselves less competent than the models.

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Observing peers acquiring skills can instill the belief in children that they are capable of learning, which enhances task motivation and skill development (Schunk, 1985). Perceiving one's self to be similar in competence to models is an important means of gaining information about one's self-efficacy for learning (Bandura, 1986). Children who typically experience learning difficulties would be expected to perceive coping models' gradual learning as more similar to their own performances than the rapid learning of mastery models. Such children also may readily discount the successes of a single model. Although multiple models can increase the probability that observers will perceive themselves as similar to at least one model (Thelen, Fry, Fehrenbach, & Frautschi, 1979), Schunk et al. (1987) found that number of models did not affect similarity judgments.

In the present study, we used the Schunk et al. (1987) methodology with children enrolled in on-grade-level classes for mathematics instruction. We did not expect benefits of coping models with this sample. Therapeutic advantages of coping models have typically been obtained in research studies involving fearful subjects in threatening situations fraught with failures (Kornhaber & Schroeder, 1975; Meichenbaum, 1971). We felt that average achievers would perceive themselves similar in competence to mastery models. It even seemed possible that observing coping models could convey to subjects that the task was difficult, which would result in low efficacy for learning (Schunk, 1985). We also did not believe that these subjects would discount the successes of a single model, so diversified modeling was not expected to enhance achievement behaviors.

The coping models used by Schunk et al. (1987) initially made errors and verbalized negative emotive statements reflecting low self-efficacy and ability, high task difficulty, and negative attitudes, after which they verbalized and demonstrated coping behaviors stressing concentration and hard work. Eventually they verbalized positive emotive statements and solved problems skillfully like mastery models. Modeled coping techniques generally raise self-efficacy better than do negative emotive statements (Bandura, 1986). The latter may increase perceived similarity among low-achievers but could lead normal learners to view the task as difficult and to doubt their capabilities. In this study, we added a condition in which coping models did not verbalize negative emotive statements. We expected that this *coping-alone* model treatment would raise self-efficacy and skills better than *coping-emotive* models.

Method

Subjects

The final sample comprised 120 students from five fourth-grade classes in two elementary schools. The 60 boys and 60 girls (mean age = 9 years 4 months) represented various socioeconomic backgrounds but were predominantly middle class. Ethnic composition was 57% White, 19% Black, 15% Mexican American, 7% Asian American, 2% other Hispanic. Subjects were enrolled in on-grade-level classes in mathematics because they had mastered the sequence of skills set forth in the school district's curriculum guide in the time allotted (i.e., no more than 6 months behind schedule). They had received minimal instruction on fractions in their classes. These five classes originally included 128 students. Four children were excluded because they missed some instructional sessions, 1 child was excluded because he viewed the wrong videotape, and 3 children were randomly excluded from the appropriate cells to equalize cell sizes.

Materials and Procedure

Except as will be described, the materials and procedure used during the testing, instructional, and videotape sessions were identical to those used by Schunk et al. (1987). Only a brief overview of their methodology will be given.

Each child initially was pretested on fractions self-efficacy and skill (31-item tests) by one of seven adult testers from outside the school. Following the pretest, children were assigned, randomly as to sex, class, and school, to six treatment conditions according to a 3 (Type of Modeled Behavior: Mastery, Coping Alone, or Coping Emotive) × 2 (Number of Models: Single or Multiple) factorial design. Children viewed a videotape that portrayed a female adult and either one or three same-sex peers learning to work fraction problems rapidly (mastery model) or gradually (coping model).

The *mastery* and *coping-emotive* treatments were identical to the mastery and coping conditions, respectively, of Schunk et al. (1987). The new condition portrayed *coping-alone* models, whose problem-solving behaviors were identical to those of the coping-emotive models but who never verbalized negative achievement beliefs. Instead, coping-alone models verbalized coping statements until problem-solving became more proficient, at which point they verbalized positive achievement beliefs, as did the coping-emotive models.

Following the videotape, children judged their self-efficacy for learning to solve fraction problems, their perceived similarity in competence to the model, interest in watching the tape, and the perceived competence of the model; all except the last measure were used by Schunk et al. (1987). The 10-unit model competence measure ranged from 10–20 (*not very good*), through 40 (*okay*) and 70 (*pretty good*), to 100 (*really good*). Children judged how good they felt the model was at learning to solve problems. Consistent with Schunk et al., we asked children in multiple model conditions to select the one child who seemed most like themselves in learning to work math problems and to base their competence judgments on this model.

All children received the fractions instructional program during six 40-min sessions conducted by seven adults from outside the school. Sessions included instruction and practice on different fraction operations. The posttest (of self-efficacy and skill) was given on the day following the last instructional session.

Results

Means and standard deviations of all measures are shown in Table 1. Preliminary analyses of variance (ANOVAs) yielded no significant between conditions differences, on pretest measures or on any measure, that were due to children's tester, class, school, sex, or ethnic background. Data were pooled across these variables for the remaining analyses.

Means and Standard Deviations for All Measures as a Function of Experimental Condition

Pretest-to-posttest changes on self-efficacy and skill were evaluated using the t test for correlated scores (Winer, 1971). All six experimental conditions showed significant improvements in each measure, range of $t(19)$ values = 5.84–15.54, all $ps < .01$.

Table 1
Means and Standard Deviations for All Measures as a Function of Experimental Condition

Measure	Phase	Single model						Multiple models					
		Mastery		Coping-alone		Coping-emotive		Mastery		Coping-alone		Coping-emotive	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Self-efficacy[a]	Pretest	48.8	17.9	47.3	17.4	50.0	16.0	50.9	17.6	44.4	14.1	47.6	17.8
	Posttest	76.3	17.2	81.2	13.2	78.9	13.9	81.3	14.2	74.7	14.2	78.1	11.6
Skill[b]	Pretest	1.9	1.9	2.3	2.0	1.9	2.1	2.3	3.3	1.9	2.4	2.4	3.2
	Posttest	11.5	4.4	11.4	5.2	13.0	3.8	12.2	4.5	12.8	3.5	12.1	3.3
Self-efficacy for learning[a]		68.3	19.5	68.6	11.5	85.1	10.6	75.9	16.2	69.1	18.5	79.1	14.0
Perceived similarity[c]		53.0	29.2	56.5	24.8	76.0	30.5	57.5	17.1	58.0	31.9	76.0	22.6
Model competence[d]		78.5	24.3	58.5	19.8	39.0	22.2	70.5	24.6	59.0	28.3	35.0	21.6
Interest[e]		55.0	32.0	68.5	33.8	78.5	28.5	65.5	30.0	49.0	30.4	54.0	26.4
Training performance[f]		166.3	19.6	169.8	21.7	164.1	20.3	175.9	17.5	168.6	17.3	164.8	27.3

Note. $N = 120$, n per condition = 20.
[a] For self-efficacy and self-efficacy for learning, mean judgments per problem are given (score range = 10–100; 10 = *low*). [b] Skill = number of correct solutions on 31 problems. [c] Perceived similarity ranged from 10 (*I'm not as good*) to 100 (*I'm much better*). [d] The 10-unit model competence measure ranged from 10–20 (*not very good*), through 40 (*okay*) and 70 (*pretty good*), to 100 (*really good*). [e] 10 (*not interesting*)–100 (*really interesting*). [f] Training performance = number of problems completed.

Posttest self-efficacy and skill were analyzed with a 3 (type of Modeled Behavior) × 2 (Number of Models) multivariate analysis of covariance (MANCOVA) with the corresponding pretest measures as covariates. Neither the main effects nor the interaction was statistically significant.

Self-efficacy for learning was analyzed with a 3 × 2 analysis of covariance (ANCOVA) using pretest efficacy as the covariate. This analysis yielded a significant main effect for type of modeled behavior, $F\ (2, 113) = 7.87$, $p < .01$, $MS_e = 226.67$. Planned orthogonal comparisons (Kirk, 1982) revealed a significant difference between the two coping-model conditions, $t(113) = -3.94$, $p < .01$. Children in the coping-emotive condition judged self-efficacy for learning significantly higher than did children in the coping-alone condition.

The remaining videotape measures were analyzed with a 3 × 2 ANOVA. Analysis of the interest measure yielded nonsignificant results. A significant main effect for type of modeled behavior was obtained on the perceived similarity measure, $F\ (2, 114) = 7.46$, $p < .01$, $MS_e = 702.90$. Subjects who observed one or more mastery models judged similarity lower than did children who had observed single or multiple coping (alone or emotive) models, $t(114) = -2.21$, $p < .05$. Coping-emotive children made higher similarity judgments than did subjects in the coping-alone condition, $t(114) = -3.16$, $p < .01$. Mean similarity judgments of mastery and coping-alone subjects were in the 50–60 (*we're the same*) range, whereas judgments of coping-emotive children fell toward the 90–100 (*I'm much better*) end point.

An ANOVA applied to the model competence measure yielded a significant main effect for type of modeled behavior, $F\ (2, 114) = 25.40$, $p < .001$, $MS_e = 558.47$. Children who observed mastery models judged the models more competent than did subjects who observed coping models, $t(114) = 5.87$, $p < .01$, and coping-alone subjects judged model competence higher than did coping-emotive subjects, $t(114) = 4.12$, $p < .01$. Mean judgments of coping-emotive subjects fell toward the 10–20 (*not very good*) end point, those of coping-alone subjects were between the 40 (*okay*) and 70 (*pretty good*) descriptors, and the means of mastery-model subjects were between 70 and 100 (*really good*).

The number of problems that children completed during the instructional sessions was analyzed with a 3 × 2 ANOVA, which yielded nonsignificant main effects and a nonsignificant interaction. An identical pattern of results was obtained by using the proportion of problems that subjects solved correctly.

Product–moment correlations were computed among the posttest measures, videotape measures, and instructional session performance (number of problems completed). Posttest self-efficacy and skill related positively to one another, to efficacy for learning, and to rate of problem-solving during the instructional sessions (ps < .01). Self-efficacy for learning was correlated positively with perceived similarity ($p < .01$) and negatively with model competence ($p < .05$). Perceived similarity and model competence also were inversely related ($P < .01$).

Discussion

This study shows that the type of modeled behavior can have important effects in achievement settings. Consistent with Schunk et al. (1987), observing coping-emotive models led to the highest self-efficacy for learning; however, the subjects of Schunk et al. judged themselves to be similar in competence to coping models, whereas our coping-emotive children judged themselves to be more competent than the models. This difference is likely due to children's prior experiences. The Schunk et al. subjects were working below grade level in mathematics and may have felt that the performances of coping models were similar to their typical experiences. Normal learners who observe peers having difficulties and verbalizing negative statements may judge themselves as more competent than the peers, which can enhance self-efficacy and task performance (Bandura, 1986; Brown & Inouye, 1978).

In contrast to Schunk et al. (1987), the present differences in efficacy for learning did not translate into variations in children's performances during the instructional sessions or on the posttest. These nonsignificant results do not seem surprising, given that coping-emotive subjects judged themselves to be more competent than the models. Coping-emotive children overestimated their learning efficacy as a result of observing peers. This boost in self-efficacy resulting from comparison with the model causes efficacy to lose some of its predictive utility. As Bandura (1986) explains, one's actual performances constitute a more reliable source of efficacy information than do vicarious experiences. It is likely that the efficacy beliefs of coping-emotive children became more consistent with their skills as a consequence of their actual participation at the task.

Having children observe coping-emotive models would not be instructionally desirable when—as in the present study— children overestimate their competence. If they subsequently encounter difficulty in learning, they might begin to doubt their learning capabilities, and this doubt could negatively affect motivation and skill acquisition. Coping-emotive models seem more desirable for children who often experience learning problems and who are unlikely to overestimate their efficacy for learning. In contrast, portraying coping skills without negative comments can teach children skills and should not negatively affect self-efficacy so long as learners believe that they can surmount difficulties (Bandura, 1986).

No differences were found between single and multiple models. Observing a competent peer can enhance children's learning beliefs if they view themselves as equally capable. Multiple models may be more useful when learners could discount the successes of a single model; for example, when children believe that the content is difficult to learn.

These results and those of Schunk et al. (1987) have implications for educational practice. Children who believe that they are superior in competence to peers may feel highly capable of learning, but this increase in perceived efficacy can be easily outweighed by children's subsequent performances. Children who view themselves as inferior to peers may doubt their capabilities for learning, and such doubt negatively affects task performance. Teachers need to choose peers for classroom models judiciously, to ensure that children view themselves as comparable in learning ability to the models.

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