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Article in American Educational Research Journal · September 1986

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Positive Interdependence, Academic and Collaborative-Skills Group Contingencies, and Isolated Students

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The effects of (a) opportunity to interact with classmates, (b) positive goal interdependence, (c) positive goal and positive reward interdependence, and (d) positive goal and reward interdependence with an added contingency for the use of collaborative skills were investigated. The dependent measures were achievement, interpersonal attraction, and the voluntary use of collaborative skills by socially withdrawn and isolated students. Four socially isolated and withdrawn sixth-grade students (two male and two female) were studied in a reading class. The results indicate that both positive goal and reward interdependence are needed to maximize student achievement and the interpersonal attraction between socially withdrawn and nonhandicapped students. The specific reinforcement for engaging in collaborative skills was required to maximize the voluntary engagement in the skills by socially withdrawn and isolated students.

There is a basic theoretical disagreement among researchers as to whether positive goal interdependence and positive reward interdependence mediate the relationship between cooperation and achievement (Johnson,

This study was supported by the National Science Foundation, Grant No. BNS-8211171, and by the United States Department of the Navy, Office of Naval Research, Grant No. N00014-84-K-0009.

We wish to thank the following teachers from Bedford School District for their help and assistance in implementing the study: Hannelore Munson and Eloise Stidworthy. We would also like to thank Scott Richards for assisting in analyzing the data.

Maruyama, Johnson, Nelson, & Skon, 1981). *Positive goal interdependence* exists when students perceive that they can achieve their goals if and only if the other students with whom they are cooperatively linked achieve their goals. *Positive reward interdependence* exists when each member of a cooperative learning group receives the same reward for successfully completing a joint task.

On one side of the controversy are Deutsch (1962) and D. W. Johnson and Johnson (1975) who stated that positive goal interdependence results in a promotive interaction pattern among students, which increases their achievement and interpersonal attraction. From this perspective, given the perception of positive interdependence, students will act to facilitate each others' goal accomplishment (when they have the collaborative skills to do so), and increased achievement and interpersonal liking result. On the other side of the controversy are researchers such as Hays (1976) and Slavin (1983) who stated that positive reward interdependence largely explains the relationship between cooperation and achievement. From this perspective, students will increase their achievement only if there is a specific academic group contingency reinforcing them for doing so, and engage in facilitative behavior only if there is a specific collaborative-skills contingency reinforcing them for doing so.

Contrasting the two theoretical positions is complicated by the fact that although it is possible to implement positive goal interdependence without positive reward interdependence, reward interdependence cannot be implemented without goal interdependence. For group members to be motivated by a group contingency, they must first perceive that their goal accomplishments are positively interdependent. To contrast the two theoretical positions, cooperative learning groups with only positive goal interdependence have to be contrasted with cooperative learning groups having both positive goal and reward interdependence. It is also possible that it is the opportunity to interact with classmates or the reinforcement of the use of collaborative-social skills that promotes achievement in cooperative situations. The first purpose of this study is to compare the relative efficacy of positive goal interdependence, positive reward interdependence, opportunity to interact with classmates, and the reinforcement of collaborative skills on achievement.

Withdrawn and socially isolated children are at risk for a variety of adjustment problems in later life (Hartup, 1983; D. W. Johnson, 1980; D. W. Johnson & Johnson, 1982, 1983; Putallaz & Gottman, 1982). Difficulty with peer relationships during childhood and adolescence has been linked to later development problems in such diverse realms as academic achievement, antisocial behavior, psychological disturbance, and physical health (Amidon & Hoffman, 1965; Cowen, Pederson, Babijiah, Izzo, & Trost, 1973; Miller & Ingham, 1976; Roff, Sells, & Golden, 1972). Two of the causes of poor peer relationships (such as lacking friends and being un-

popular) are (a) not being placed in an entry situation aimed at constructively introducing socially isolated and withdrawn students to their non-handicapped peers (Corsaro, 1981; Putallaz, 1983), and (b) lack of social skills (see Asher, 1983; Asher & Renshaw, 1983). Interventions are needed, therefore, that place students in entry situations in which constructive interaction and positive relationships can develop and in which students are taught and actually use interpersonal and small group skills. Within competitive and individualistic learning situations, legitimate opportunity to interact with peers is infrequent and, therefore, the peer interaction that does occur is often in violation of the rules and is perceived to be disruptive. Within cooperative learning situations, however, students are required to interact constructively with one another and to use collaborative social skills.

Cooperative learning situations have been consistently found to promote more frequent and constructive interaction and more positive relationships between handicapped and nonhandicapped students than do competitive, individualistic, or traditional learning situations (Johnson, Johnson, & Maruyama, 1983; Madden & Slavin, 1983; Sharan, 1980). Given that cooperative learning situations provide an entry into constructive interaction between socially isolated and withdrawn students and their non-handicapped peers, it is unclear from these studies whether the relationship between cooperation and positive peer relationships is caused by (a) the opportunity to interact when there is no goal or reward interdependence for doing so, (b) positive goal interdependence, (c) an academic group contingency, or (d) a collaborative-skills group contingency. A second purpose of this study was to determine the relative impact of these variables on the interpersonal attraction between socially isolated/withdrawn students and their classmates and the frequency with which socially isolated/withdrawn students voluntarily and spontaneously use collaborative skills.

Only a few of the studies of interpersonal attraction have provided behavioral (as opposed to self-report paper-and-pencil) evidence of interpersonal attraction, and evidence that the positive relationships formed during the cooperative learning activities generalized to unstructured situations in which students could choose with whom they wished to work (R. Johnson & Johnson, 1981, 1982). Behavioral evidence of such generalization will strengthen the conclusion that cooperative learning experiences do promote both positive cross-handicap relationships and the appropriate use of collaborative skills by handicapped students. The third purpose of this study is to provide behavioral evidence of the generalizability of relationships formed within cooperative learning groups.

Finally, the research on cooperative learning largely consists of short-term studies lasting a few weeks or less (Madden & Slavin, 1983; Slavin, 1983). Most of the existing long-term studies have included pre- and post-measures given months apart with no verification that cooperative learning

has actually taken place in an acceptable form and frequency in classrooms. There is an absence of long-term studies on cooperative learning in which careful monitoring of the amount of operationalization of cooperative learning takes place weekly. A final purpose of this study was to conduct a carefully controlled and monitored long-term study of cooperative learning that lasts for most of the academic school year.

METHODS

Sample

Four sixth-grade students (two male and two female) were identified as social isolates and as academically deficient on the basis of (a) achievement scores during the month of September, (b) ratings by their fifth-grade teachers as being below average on academic and appropriate social behavior, (c) sociometric rating by peers as being least chosen for a work partner, field-trip partner, and social partner, (d) their attitudes toward reading class, and (e) observation of their interaction with peers in a classroom free-time situation. The four students were about 2 years below grade level academically, were identified as special needs students, and were the most in need of learning the academic and collaborative skills needed for learning cooperatively with their classmates. The study was conducted in a suburban, upper-middle-class school district near Boston.

The students were part of a sixth-grade reading class with a class enrollment of 19. The class was the lowest level regular education reading class, with students averaging approximately one year below grade level in reading performance. The class was taught by a regular English teacher and a special needs resource teacher. Both teachers were experienced in using cooperative learning strategies.

Independent Variables

Students met in condition to study vocabulary words for 20 minutes a week. The following procedure was implemented over the 21 weeks of the study. Students were assigned vocabulary words on Monday. They met in condition to review the vocabulary words for 20 minutes on Thursday in preparation for a 15-minute quiz on Friday. On Tuesday they were given the choice of studying together or alone for 20 minutes to complete a nonvocabulary instructional task. The specific contingency used was bonus points toward their test grades. The following conditions were included:

Baseline 1	4 weeks
Positive Goal Interdependence	3 weeks
Academic Group Contingency 1	4 weeks
Academic and Collaborative-Skills Group Contingencies	4 weeks
Academic Group Contingency 2	3 weeks
Baseline 2	3 weeks
Postchecks	6 weeks

The *baseline* condition consisted of assigning vocabulary words on Monday, assigning students a nonvocabulary assignment on Tuesday and giving them the choice of working alone or with up to three classmates to complete the assignment, having students work alone to review the vocabulary words for 20 minutes on Thursday, and giving them the 15-minute test on Friday. All instructions, feedback, and rewards were presented to individuals. No contingent reinforcement was used other than individual grades recorded in the teacher's grade book.

The *positive goal interdependence* condition consisted of the same sequence of activities except that students worked in cooperative learning groups for 20 minutes on Thursdays (instead of working individualistically). Groups were designed to be heterogeneous with 3 to 4 members with at least one student who was strong both academically and socially, and one who was neither academically nor socially strong. Students' academic and social strength were measured by their prior quiz grades, recommendations from former teachers, quality and quantity of verbal interaction during the Baseline condition, and student sociometric results. Each targeted student was assigned to a different group and neither best friends nor worst enemies were placed in the same group. The positive goal interdependence was structured by informing students that they were responsible for ensuring that all members of their learning group had to master the assigned vocabulary words. All group members signed the written products submitted to the teacher on review day. The teacher provided little more than supportive feedback for turning in the assigned products. No collaborative skills were taught and no rewards were offered for skilled participation in the cooperative learning groups.

The *academic group contingency* condition consisted of adding to the positive goal interdependence procedures by giving each group member two bonus points toward their quiz grade if all group members scored 80% or more correct on the Friday quiz.

The *academic and collaborative skills group contingencies* condition consisted of (a) giving two bonus points toward the quiz grade of each member if all group members scored 80% or more correct on the Friday quiz, and (b) giving two bonus points toward each member's quiz grade if each group member was observed engaging in three out of the four collaborative skills during vocabulary review on Thursdays. The four skills were sharing ideas and information, directing by keeping the group on task and asking task-related questions, praising and encouraging the task-related contributions of other members, and checking to make sure everyone in the group understood what was being taught. These skills were carefully explained and taught to the class.

Two *postcheck* sessions were recorded as a 6-week followup after Baseline 2.

Dependent Variables

The three dependent variables were achievement, social interaction, and interpersonal attraction. *Achievement* was measured by vocabulary quizzes. Each week students individually took a vocabulary quiz consisting of 10 to 15 words that were assigned the previous Monday and that followed the course curriculum. The difficulty of the words was equalized across conditions. Scores were obtained by summing each student's scores across all tests.

The *peer social interaction* measure was composed of four categories of behavior: task interaction (summarizing, directing, checking, information seeking, and tutoring), maintenance interaction (praising, supporting, encouraging, and active listening), off-task/negative interaction (off-task or hostile statements), and no interaction. A sequential time-sampling procedure was used to take data each week on the nature of oral interactions during the generalization day in which students had the choice of working together or alone on a nonvocabulary academic task. During the 20-minute period each targeted student's behavior was sampled once per 2 minutes for a total of 10 observations per student. Each observation lasted 10 seconds. If more than one type of interaction was emitted during the observation, only the first type was recorded. The results from all observations were summed together to derive a score for each student. Reliability was determined twice during baseline and once per condition thereafter by having two independent observers record the same students. Reliabilities were calculated on a trial-by-trial basis. The reliability was 96%.

Two measures of *interpersonal attraction* were used. The first consisted of the total amount of interaction between the targeted students and their classmates during the free-choice study period in which students could choose with whom they wished to study. This was indicated by the amount of time students spent alone without interacting with anyone as measured by the observation procedure described above. The second was a sociometric measure, which was given twice, once after the baseline condition and once after the academic and collaborative-skills group contingencies condition. Students were asked to write down the names of students with whom they would most and least like to work on a report. The number of times each target student was listed for a positive or negative choice was recorded for the class.

Analysis

A repeated-measures ANOVA was used to analyze the data. A *t* test was used to analyze the sociometric data.

Experimental Check

The results of the observations of teachers' implementation of the conditions indicated that the conditions were implemented successfully.

RESULTS

The results for the entire class (see Table I) indicate that neither the addition of positive goal interdependence nor the addition of an academic group contingency to the opportunity to interact with classmates significantly increased achievement, but the combination of academic and collaborative-skills group contingencies did, $F(5, 90) = 15.86, p < .01$. The higher achievement was maintained when the collaborative-skills group contingency was dropped and when the students were returned to the baseline condition. When the Baseline I condition was compared with the average of the positive interdependence and group contingencies conditions, the results indicate that the students achieved higher in the cooperative conditions, $t(18) = 4.15, p < .01$.

For the target students, achievement increased when positive goal interdependence was added and again when the academic group contingency was added, $F(5, 15) = 2.19, p < .11$. The higher achievement was maintained after the collaborative-skills group contingency was dropped and when the target students were returned to the baseline condition. When an average of the positive interdependence and group contingency conditions was compared with the Baseline 1 condition, the results indicated that the target students achieved higher in the cooperative conditions, $t(3) = 4.80, p < .05$.

TABLE I
Mean Responses on Dependent Variables in the Positive Goal Interdependence with Collaborative-Skills and Academic Group Contingencies Condition

Dependent variables	Conditions ^a								F
	1	2	3	4	5	6	7	8	
Achievement									
Class (N = 19)	76.14	76.22	77.09	86.11	89.21	82.56			15.86***
Target students only (N = 4)	67.93	74.69	79.13	81.19	82.06	80.50			2.19
Interpersonal attraction									
Interaction: Avoidance	61.44	36.6	40.63	9.38	2.50	19.15	25.00	7.50	3.80***
Social interaction									
Task	5.54	22.50	23.12	54.38	71.88	49.18	32.50	35.00	9.00***
Off-task	11.11	.83	0	0	0	0	0	0	33.10***
Maintenance	21.91	40.00	36.25	36.24	25.62	31.67	42.50	57.50	2.29*
Sociometrics									
Most like to do a report with	2.68			2.53					$t = .35$
Least like to do a report with	2.84			1.95					$t = 1.77^*$

Note. When the Baseline condition ($\bar{X} = 76.14$) was compared with the combined Cooperative conditions (2, 3, 4, & 5), ($\bar{X} = 82.16$) on Achievement, $t(18) = 4.15^{***}$, and $t(3) = 4.80, p < .05$.

^a 1 = Baseline 1; 2 = Positive Goal Interdependence; 3 = Academic Group Contingency 1; 4 = Academic and Collaborative-Skills Group Contingencies; 5 = Academic Group Contingency 2; 6 = Baseline 2; 7 = Postcheck 1; 8 = Postcheck 2.

* $p < .10$.

** $p < .05$.

*** $p < .01$.

In this study the conditions were implemented in vocabulary study time on Thursday of each week. On Tuesday of each week, however, students were given the choice of studying together or alone for 20 minutes to complete a nonvocabulary instructional task. Observation data were taken during the Tuesday free-choice study period. The observation data indicated the extent to which behaviors directly encouraged during the vocabulary study time generalized to a free-choice situation in which no interdependence or contingency was implemented. During the nonvocabulary studying time in which students could choose to work by themselves or with up to three classmates, the frequency with which the targeted students chose to be alone without interacting with peers decreased considerably with the addition of positive goal interdependence, and even more dramatically when the combination of academic and collaborative-skills group contingencies were introduced, $F(7, 21) = 39.60, p < .01$. The voluntary association with nonhandicapped peers dropped somewhat after the students were returned to the baseline condition but then increased again 9 weeks after the treatment had ended. The targeted students made more task statements after the positive goal interdependence was added and considerably more task statements after the combination of academic and collaborative-skill group contingencies was added, $F(7, 21) = 9.00, p < .01$. Although there was a relative drop in the frequency of task statements when the collaborative-skills group contingency was dropped and when the students were returned to the baseline condition, the students engaged in considerably more task statements even after 6 weeks following the end of the study than they did in original baseline condition. More maintenance statements were made after the addition of the positive goal interdependence, $F(7, 21) = 2.29, p < .10$. Six weeks after the study had ended the target students were still voluntarily praising, supporting, encouraging, and actively listening to their nonhandicapped peers at a level much higher than in the original baseline condition. Off-task and negative statements decreased from an average of 11 in the baseline condition to less than 1 in the positive goal interdependence condition, and to 0 in the subsequent conditions, $F(7, 21) = 33.10, p < .01$.

The targeted students were nominated as classmates one would "least like to do a report with" less frequently after the combined academic and collaborative-skills condition than after the initial baseline condition, $t(18) = 1.77, p < .10$. No significant differences were found on the frequency with which the target students were nominated as "most like to do a report with."

DISCUSSION

This study investigated the impact of opportunity to interact with classmates, positive goal interdependence, an academic group contingency, and a collaborative-skills group contingency on the following:

1. The achievement of all students and four socially withdrawn and isolated students.
2. The interpersonal attraction between socially withdrawn/isolated students and their classmates.
3. The frequency with which socially withdrawn/isolated students voluntarily and spontaneously use collaborative skills.

There is disagreement as to whether the superior achievement found within cooperative (compared with competitive, individualistic, and "traditional") learning situations (Johnson, Maruyama, Johnson, Nelson, & Skon, 1981) is due to the opportunity to interact with peers, positive goal interdependence, positive reward interdependence, or a combination of positive goal and reward interdependence plus a collaborative-skills group contingency. This issue was addressed by comparing the impact of these four components on the achievement of an entire sixth-grade reading class and on the achievement of four low-performing socially isolated/withdrawn students. The results of this study indicate that for the class as a whole, it was the combination of positive interdependence and academic and collaborative-skills group contingencies that significantly increased achievement, and for the four low-achieving and socially withdrawn target students, the implementation of positive interdependence was sufficient to raise their achievement, and an academic group contingency increased their achievement even more (as did the further addition of a collaborative skills group contingency). Although an alternative explanation is that the operationalizations of positive goal and reward interdependence were not strong enough to produce the hypothesized effects, the results for the entire class failed to support either the Deutsch/Johnson position or the Hays/Slavin position. In this study, the addition of cooperative skills was necessary before the impact of positive goal and reward interdependence was found. All three types of interdependence were helpful in increasing the achievement of the four social isolates, supporting both positions.

A number of researchers have hypothesized that cooperative learning groups will be effective only to the extent to which members engage in the required collaborative skills. In most studies it is assumed that the students have mastered the required collaborative skills and are in fact utilizing them. The results of this study indicated that this assumption is least valid for socially withdrawn and isolated students who do not voluntarily interact with their peers.

Students who are socially isolated and withdrawn from their peers, especially if they are also low-performing students, are at risk for serious adjustment problems in later life (Hartup, 1983; D. W. Johnson, 1980; Putallaz & Gottman, 1982). Within regular classrooms, interventions are needed that (a) provide entry to situations where constructive interaction between socially isolated/withdrawn students and their nonhandicapped classmates can take place, (b) create friendships between socially isolated/

withdrawn students and their nonhandicapped peers that are strong enough to generalize to free-choice situations in which students can choose to work by themselves or with classmates, (c) teach the socially isolated/withdrawn students the collaborative skills they need to work effectively with their peers, and (d) give the socially isolated/withdrawn students the confidence to engage in the collaborative skills spontaneously and voluntarily in unstructured situations. The findings of this study indicated that all four of these criteria were met when a combination of positive goal interdependence and academic and collaborative-skills group-contingencies were implemented.

In this study, positive relationships that generalized to free-choice study time were built between the socially withdrawn/isolated students and their classmates. There are three criteria for constructive peer relationships: increased acceptance, decreased rejection, and longevity. During free-choice situations in which students could choose with whom they wished to study, the socially withdrawn and isolated students worked collaboratively with their classmates. These results demonstrated increased acceptance. Even 9 weeks after the students were returned to the individualistic baseline condition, the voluntary association between the socially withdrawn/isolated students and their classmates continued. These results demonstrated longevity. The behavioral nature of these measures adds to their validity. The sociometric results indicated that the socially withdrawn and isolated students were nominated less frequently for undesired work partners, that is, they were rejected less frequently. These findings provided strong evidence that the combination of being assigned to heterogeneous learning groups, positive goal interdependence, positive reward interdependence, and a group contingency for the performance of collaborative skills resulted in entry into instruction situations in which positive relationships between the socially withdrawn/isolated students and their classmates could develop and mature.

The socially isolated and withdrawn students spontaneously and voluntarily engaged in task and maintenance collaborative skills while avoiding off-task and negative comments. The socially isolated and withdrawn students became highly supportive and encouraging in their interaction with their nonhandicapped peers even 9 weeks after the positive interdependence and group contingencies for doing so had been eliminated. These results supported the conclusion that the socially withdrawn and isolated students learned the collaborative skills required to work effectively with their classmates and developed sufficient self-confidence to use the skills spontaneously and voluntarily.

The results of this study suggest that it may be worth teachers' time to strengthen the collaborative skills of students. Though the efficacy of social skill training has been demonstrated by behavioral psychologists in clinical settings (e.g., Goldstein, 1981; Kelly, Wildman, Urey, & Thurman, 1982),

there have been very few applications that could realistically be incorporated into a regular classroom setting. One suggestion has been to train students in collaborative skills for a two-week period at the beginning of each semester (Aronson, Blaney, Stephan, Sikes, & Snapp, 1978), but investing time away from lessons is often resisted by teachers. The procedures used in this study did not require teachers to invest much time away from academic lessons, yet resulted in students mastering and applying collaborative skills.

Much of the previous research on cooperative learning has been short-term studies lasting a few days or weeks. There has been some question as to whether the results for these short-term studies would be corroborated by longer term studies. This study lasted for over 5 months. Its findings provided further validation of the results of the shorter term studies on the impact of cooperative learning on achievement and interpersonal attraction (Johnson, Johnson, & Maruyama, 1983; Johnson, Maruyama, Johnson, Nelson, & Skon, 1981).

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