Efficacy Of Cooperative Learning Among Malaysian Secondary School Students

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ABSTRAK

Kajian ini bertujuan mengkaji kelainan kesan antara pendekatan pembelajaran koperatif dengan pendekatan pengajaran tradisional terhadap prestasi ujian pelajar. Kajian selama 4 minggu telah dijalankan dengan menggunakan reka bentuk praujian-posujian dengan kumpulan kawalan. Peserta kajian terdiri daripada 80 pelajar Tingkatan 2 yang dibahagikan secara rawak kepada dua kumpulan: pembelajaran koperatif (n = 40) dan pembelajaran tradisional (n = 40). Ujian pencapaian bagi 3 mata pelajaran (Bahasa Inggeris, Matematik, dan Sains) telah diberikan kepada pelajar sebelum dan selepas kajian. Keputusan ujian t menunjukkan bahawa kumpulan pelajar yang diajar melalui pendekatan pembelajaran koperatif mencatat pencapaian yang lebih tinggi (dan signifikan) daripada kumpulan pelajar yang diajar melalui kaedah tradisional bagi ketiga-tiga mata pelajaran. Data tambahan yang diperoleh daripada temu bual yang tak formal dengan pihak pentadbir dan guru memberikan wawasan tambahan tentang pelbagai isu berkenaan pembelajaran koperatif di sekolah. Implikasi dapatan kajian ini serta saranan kajian masa depan turut dibincangkan.

INTRODUCTION

School administrators and other stakeholders are beginning to recognize that the educational system needs fundamental changes to keep pace with an increasingly complex global society. Some educational researchers and practitioners have called for a change from the traditional educational system that emphasizes individualistic learning to one that emphasizes interconnectedness, active learning, and shared decision making, arguing that traditional classroom competition is not healthy. How can teachers avoid the problems associated with classroom competition and motivate students to help one another learn and succeed? One suggested alternative is cooperative learning. Cooperative learning involves students working in groups to achieve specific educational goals (Slavin 1990). Students in such learning teams are responsible not only to maximize their own learning but also the learning of their teammates. Students are expected to (a) share ideas and materials; (b) support, encourage, and help one another; (c) explain and elaborate the material learned; (d) use appropriate interpersonal skills; (e) hold one another accountable for completing assigned tasks; and (f) process how effectively members are working together (Slavin 1989/90).

Typically, the cooperative learning process involves several steps. First, students receive instructions and objectives from their teacher. Second, the teacher assigns each student to a learning group, provides needed materials and facilities, and so forth.

Third, the teacher explains the task and the cooperative structure. Fourth, the teacher monitors the functioning of each team and intervenes as needed (e.g., to teach cooperative skills and assist in academic learning). Finally, the teacher evaluates the quality and quantity of each student's learning. If conducted properly, cooperative learning is believed to promote better relations among students, increase students' self-esteem, and improve student achievement.

Cooperative learning methods are not new; teachers have used them for many years in various forms, such as laboratory groups, project groups, and discussion groups. In recent years, however, researchers have developed systematic cooperative learning methods intended for use as the main mode of instruction, documented their effects, and applied them to a broad range of curricula. Although several advanced countries have implemented cooperative learning, this instructional approach has yet to be implemented successfully in Malaysia. The present educational system in Malaysia is still largely exam oriented with a strong emphasis on individual achievement. By implementing cooperative learning, Malaysian students, in addition to academic learning, will have the opportunity to develop interpersonal, teamwork, and leadership skills as they learn to work together, share ideas, and be accountable to one another. These are the same essential skills that are needed for successful functioning in the work environment.

Although several studies conducted in the Western context have demonstrated the efficacy of the cooperative learning approach for enhancing student achievement, there is a lack of such evaluative studies in Malaysia, particularly in an experimental field setting. Therefore, the main objective of this study was to determine whether a cooperative learning approach would produce higher test achievement among Malaysian secondary school students than the traditional form of instruction. Results from this study would provide further insight into this area, add to our knowledge on the efficacy of cooperative learning, and serve as a base for future research on curriculum development and teacher training in Malaysia.

CONCEPTUAL BACKGROUND AND HYPOTHESES

Although all cooperative learning approaches involve students in groups to achieve certain educational goals, cooperative learning can take on many different forms in the classroom, and several models have been proposed by cooperative learning advocates and researchers. For example, David Johnson and Roger Johnson developed a *Learning Together* model built on five key elements: positive interdependence, face-to-face interaction, individual accountability, social skills (e.g., communication and conflict resolution), and group processing of goal achievement (c.f. Johnson & Johnson 1987). According to Johnson and Johnson, these elements must be present for small-group learning to be truly cooperative. Spencer Kagan, on the other hand, developed a *Structural Approach* model that emphasized content-free ways for organizing social interaction in the classroom (c.f. Kagan 1989/90, 1994). The structures proposed (e.g.,

Roundrobin, Numbered Heads Together) usually involve a series of steps with proscribed behavior at each step and are designed to be used repeatedly with almost any subject matter. Shlomo Sharan and Yael Sharan proposed a *Group Investigation* model that provides a general plan for organizing a classroom using a variety of cooperative strategies for several disciplines (c.f. Sharan & Sharan 1989/90). Finally, a less generic model is that of Robert Slavin's *Student Team Learning* (c.f. Slavin 1986) that has four permutations: Student Teams-Achievement Divisions (STAD), Teams-Games-Tournament (TGT), Team Assisted Individualization (TAI), and Cooperative Integrated Reading and Composition (CIRC).

Although cooperative learning methods differ in various ways, the more successful ones share some important characteristics including group goals, individual accountability, equal opportunities for success, and task specialization. Most cooperative learning methods use some form of group goals (e.g., group grades or some other form of recognition). As with individual goals, group goals operate to direct group members' attention and effort toward task achievement and performance (Locke, Durham, Poon & Weldon 1997). In addition, individual accountability is considered essential to avoid problems such as social loafing. Past research has shown that cooperative learning approaches that emphasized group goals and individual accountability were more effective than other forms of cooperative learning for increasing student achievement (e.g., Huber, Bogatzki & Winter 1982; Okebukola 1986; Slavin 1987). Individual accountability can be achieved by task specialization or rewarding groups based on the sum of their individual member's performance. Assessment methods should then ensure all students an opportunity to contribute to their teams and experience success.

Theoretical Explanations for Cooperative Learning

Why should students who work in cooperative learning groups learn more than those in traditionally organized classes? Researchers investigating this question have proposed various theoretical models to explain the presumed superiority of cooperative learning, including the motivational model and the cognitive model.

Motivational Model

The motivational perspective focused primarily on the reward or goal structures under which students operated (Deutsch 1949; Johnson, Maruyama, Johnson, Nelson & Skon 1981; Slavin 1977, 1983a). According to this perspective, the competitive grading and informal reward system of the traditional approach to instruction created peer norms that opposed academic efforts (Coleman 1961). Because one student's success reduces the chances that others will succeed, students are likely to express dysfunctional norms similar to the work restriction norms found in some workplaces (Vroom 1969). But when students work together toward a common goal, as they do when a cooperative

reward structure is in place, their efforts will be directed toward helping each other learn and succeed. In a cooperative learning climate, students are expected to develop and enforce norms favoring goal achievement and high academic performance.

Several studies have found that when students worked together to accomplish a group goal, they came to express norms in favor of doing whatever was necessary for the group to succeed (e.g., Deutsch 1949; Slavin 1978; Thomas 1957). For example, Slavin (1978) found that students in cooperative learning classes felt that their classmates wanted them to learn. Students' support for academic goals, in turn, has been found to be the most important predictor of their achievement after controlling for ability and social class (Brookover, Beady, Flood, Schweitzer & Wisenbaker 1979). In sum, past studies indicate that cooperative goals promoted pro-academic norms among students, and pro-academic norms have important effects on student achievement.

Cognitive Model

Whereas motivational theories of cooperative learning used cooperative goals for explaining student motivation to achieve, cognitive theories emphasized the effects of working together in itself as the mediating mechanism. According to the developmental perspective, interaction among children around appropriate tasks increased their mastery of critical concepts (Damon 1984). Students would learn from one another because in their discussion of the content, cognitive conflicts would arise, inadequate reasoning would be exposed, and higher quality understanding would result.

According to Vygotsky (1978), collaborative activity among children promoted growth because children of similar ages were likely to be operating within the proximal zone of development of one another. Similarly, Piaget (1926) held that social-arbitrary knowledge—such as language, values, and symbol systems—could be learned only through interactions with others. Research in the Piagetian tradition had focused on the principle of *conservation*—the ability to recognize that certain characteristics of objects remained the same when other characteristics changed. Past studies have shown that when conservers and non-conservers of about the same age worked collaboratively on tasks requiring conservation, the non-conservers generally developed and maintained conservation concepts (e.g., Murray 1982), and even when both members of disagreeing non-conservers worked on conservation problems, they gained in conservation (e.g., Ames & Murray 1982).

Another cognitive explanation for cooperative learning effects is that provided by cognitive elaboration models. Research in cognitive psychology has found that if information was to be retained in memory and related to information already in memory, the learner must engage in some sort of cognitive restructuring or elaboration of the material (Wittrock 1978). One effective means of elaboration is explaining the material learned to another person; when students are passive learners or when they study alone, the important cognitive processes usually do not occur. Webb (1985), for

example, found that students who gained the most from cooperative activities were those who provided elaborated explanations to others. Dansereau and his colleagues (c.f. Dansereau 1985), in a series of studies, also found that students who received elaborated explanations learned more than those who worked alone, but not as much as those who served as explainers. Finally, Johnson et al. (1981), in a meta-analysis of studies on cooperation, concluded that one of the most promising mediating variables was the cognitive rehearsal resulting from an oral discussion of the material learned.

In sum both developmental and cognitive elaboration theories suggest that an interaction among students on learning tasks would in itself result in improved student achievement.

Effects of Cooperative Learning

Studies investigating the effects of cooperative learning on student achievement have generally found students taught using a cooperative learning approach to outperform those taught using traditional instruction (for reviews, see Davidson, 1985; Johnson et al. 1981; Newmann & Thompson 1987; Slavin 1989/90, 1991). Although researchers, in general, agree that cooperative learning can have positive effects on student achievement, there is still no consensus regarding the conditions under which cooperative learning will be most effective. Slavin (1989/90), for example, in a review of 60 studies concluded that cooperative learning can be an effective means of increasing student achievement, but only if group goals and individual accountability are incorporated into the cooperative learning approaches. Similarly, Newmann and Thompson (1987), in a review of the achievement effects of cooperative learning in secondary schools, concluded that group rewards, individual accountability, and group competition are important boundary conditions. Davidson (1985), however, has questioned whether group goals and individual accountability are necessary at the college level and cited some studies in which cooperative learning at the college level was successful even in the absence of group goals or individual accountability. Finally, there is also disagreement as to whether or not cooperative learning can be effective at all grade levels.

Cooperative learning has been found also to have an impact on areas other than academic achievement, such as intergroup relations (see Johnson, Johnson & Maruyama 1983 for a review) and social acceptance of academically handicapped students (e.g., Madden & Slavin 1983). Other cooperative learning outcomes include better student attendance, gains in self-esteem, and more positive affect towards the school and the subjects being studied (Slavin 1990).

Study Hypotheses

On the basis of theory and evidence of related research discussed in the earlier sections, we hypothesize that students taught using a cooperative learning approach (cooperative learning group) will outperform students taught using a traditional instruction approach (control group). Specifically, we propose that:

1. The cooperative learning group will score higher on an English test than will the control group.
2. The cooperative learning group will score higher on a Mathematics test than will the control group.
3. The cooperative learning group will score higher on a Science test than will the control group.

METHOD
Participants and Study Design

Participants comprised 80 Form 2 students of an urban, all-male school with a student population of more than 2,000. The ethnic composition was as follows: 8% Malays, 50% Chinese, 40% Indians, and 2% others. The students were randomly divided into two groups of equal size: an experimental group that received cooperative learning instruction and a control group that received traditional instruction.

The independent variable of this between-subjects design was instructional approach (cooperative learning vs. traditional instruction), and the dependent variable was student achievement as measured by test scores. A pretest-posttest control group design was used; this true experimental design served to control for some of the major threats to internal validity such as history, maturation, selection, testing, regression toward the mean, and instrumentation effects (Campbell & Stanley 1966).

Materials and Procedure

Prior to conducting the experiment, the first author had (a) obtained permission from the school principal to carry out the study as a pilot project for the school, and (b) conducted several training sessions for the participating teachers. The teachers were provided with teaching manuals and samples of prepared lesson plans along the lines of Slavin's *Student Team Learning* approach and Kagan's *Structural* approach.

Students in the study, who had been taught using the traditional method of instruction prior to the study, were randomly divided into two classes and placed into classrooms that had similar facilities. The same subject teacher who used the same textbook and workbook taught both classes (experimental group and control group). Also, the two groups were exposed to the same audiovisual aids and given similar homework

problems. (These steps were taken to ensure that other extraneous factors did not confound the results of the study.) However, while the control group were taught using the traditional method of instruction (lectures, individual homework exercises and textbook assignments) members of the experimental group were grouped into 10 teams of 4 members each and taught using a cooperative learning approach. Although lectures were still given, class exercises and related studying were accomplished in class through peer tutoring among team members. To achieve team heterogeneity, efforts were made to ensure that each team consisted of one high achiever, two average achievers, and one low achiever.

The cooperative learning program was conducted for 4 weeks with each subject being taught for 5 periods (40 minutes a period) a week. Prior to this, a pretest (a standardized monthly test) was administered to both the experimental and control groups for each of three subjects: English, Mathematics, and Science. At the end of the 4-week experimental intervention, a posttest that was similar in format and content to the pretest was administered. The respective subject teachers constructed these tests (worth 100 points each).

Finally, the first author conducted informal interviews with the school administrators and the teachers who participated in the study. The purpose was to (a) assess the effectiveness of the cooperative learning approach as perceived by teachers, (b) identify any problems that the teachers might have encountered while using the cooperative learning approach, and (c) obtain the views of teachers and administrators regarding the factors that determine the successful implementation of cooperative learning in schools.

RESULTS

Table 1 shows the intercorrelation matrix for the pretest and posttest measures. The results indicated high intercorrelations among the variables. As expected, pretest scores were positively and significantly related to posttest scores. In addition, test scores for the three academic subjects were highly intercorrelated implying that performance on one subject can be used to predict performance on the other subjects.

Table 1

Intercorrelation Matrix for the Pretest and Posttest Measures ($N = 80$)

Variables	1	2	3	4	5	6
1. English Pretest	1.00					
2. English Posttest	.95	1.00				
3. Mathematics Pretest	.67	.67	1.00			
4. Mathematics Posttest	.63	.66	.96	1.00		
5. Science Pretest	.73	.73	.88	.86	1.00	
6. Science Posttest	.75	.78	.86	.87	.95	1.00

Note. All correlations were significant at the .001 level of significance.

Preliminary *t* tests on pretest scores for the three subjects indicated no significant differences between the two groups on their initial test performance. This provided some assurance that the two groups were equivalent in academic or cognitive ability prior to the study intervention. To test the study hypotheses, we conducted *t* tests for independent samples on gain scores (posttest minus pretest scores) for each of the three subjects. The results (see Table 2) indicated a significant difference in average gain scores between the experimental group and the control group. The experimental group had higher average gain scores than the control group on all three subjects tested. Specifically, the results indicated that the two groups differed significantly on the posttest minus pretest for (a) English ($t = 2.92$, df $= 67.79$, $p < .01$), (b) Mathematics ($t = 5.60$, df $= 59.96$, $p < .001$), and (c) Science ($t = 4.86$, df $= 78$, $p < .001$). Students in the experimental condition achieved higher gains (i.e., learned more) than did students in the control condition for English ($M = 7.85$ vs. $M = 3.20$), Mathematics ($M = 12.10$ vs. $M = 5.00$), and Science ($M = 8.30$ vs. $M = 2.08$). Therefore, the hypotheses that students in the cooperative learning condition will outperform those in the traditional learning group on tests of English, Mathematics, and Science were supported.

Table 2
Test Results on Gain Scores

Posttest - Pretest	Cooperative Learning		Traditional Learning			
	Mean	*SD*	Mean	*SD*	*t*	*p*
English	7.85	8.41	3.20	5.58	2.92	<.01
Mathematics	12.10	7.06	5.00	3.81	5.60	<.001
Science	8.30	5.95	2.08	5.48	4.86	<.001

Data obtained through informal interviews indicated that teachers, in general, were enthusiastic about adopting the cooperative learning approach. They were excited about the gains in achievement outcomes, believed that interpersonal relations among students improved as a result of cooperative learning, and perceived less disciplinary problems than before. They did, however, highlight a number of problems with this instructional approach. Table 3 summarizes some of these problems as well as the factors that teachers and school administrators believed would determine whether or not cooperative learning could be successfully implemented.

Table 3
Summary of Selected Interview Data

Problems Experienced in Using Cooperative Learning	Factors that Influence the Successful Implementation of Cooperative Learning
Not all students got along initially as team members differed in race as well as academic ability.	Peer coaching that enables teachers to learn new teaching techniques together and assist one another.
High achievers whose progress was held back by their less able team members felt frustrated.	Systematic planning in which teachers are required to (a) set goals, (b) plan strategies, and (b) prepare instructional materials.
Students had to learn in a noisy environment.	Cooperation among school administrators, teachers, and parents.
Some students did not put in as much effort as their team members.	Participation and voice of parents and other relevant community members.

DISCUSSION

The main purpose of this study was to contribute to existing knowledge regarding the efficacy of cooperative learning, particularly for Malaysian secondary school students. The cooperative learning program in this study was found to have a positive impact on student test achievement, providing some evidence that Malaysian students benefited academically from participating in heterogeneous cooperative learning groups. Overall, the results indicated that students taught using a cooperative learning approach outperformed students taught using a traditional instruction approach on achievement tests; thus, the general hypothesis of the study was supported.

The above findings are generally consistent with findings of past evaluative studies in other school settings and cultures (e.g., Slavin 1983b). Furthermore, informal interviews with teachers who participated in the study produced similar positive results. The teachers reported that cooperative learning not only led to better academic performance but was also instrumental in reducing disciplinary problems and improving interpersonal relations among students. In conclusion, the results of this study suggest that the cooperative learning approach (as implemented in this study) should be given serious consideration as an alternative strategy for teaching English, Mathematics, and Science. However, to ensure its success, (a) teachers must be given adequate training and support materials, (b) appropriate steps must be taken to ensure that problems, such as social loafing, do not arise or are quickly resolved, and (c) factors that can impact on the implementation process (e.g., parental resistance) must be given due consideration.

Implications

The findings of this study have some important implications for classroom learning and practice. First, the findings suggest that classroom instruction that incorporates cooperative learning (a) can foster learning and the development of positive attitudes among students, (b) can be successfully implemented in Malaysian schools, and (c) is well received by teachers. Therefore, efforts should be directed toward incorporating more cooperative learning principles in the classroom. Second, given that the cooperative learning program in this study worked for both quantitative and non-quantitative subjects, the cooperative learning method can be applied to a variety of academic disciplines. Third, cooperative learning was effective in enhancing student performance even though the teachers involved in the program received only some training on the use of this approach. Cooperative learning programs that provide teachers with more intensive and rigorous training should yield even greater performance accomplishments.

A final implication of this study relates to cooperative effects other than academic achievement. If students are able to cooperate when performing school assignments and activities, they are likely to fit well into self-managed work teams—work innovations that are becoming increasingly prevalent in the workplace. Cooperative learning has an added advantage in that students are getting trained in communication, leadership, group decision making, and conflict management skills—skills that are critical in the workplace. Through such skill acquisition as well as the opportunity to learn in a helpful, non-threatening environment, a student's self-efficacy for learning is likely to be enhanced also. Students who feel efficacious or have a high sense of perceived control over their learning are likely to (a) experience positive emotions (e.g., interest and enthusiasm), (b) exert more effort and try out new strategies when performing school work, and (c) persist in the face of learning difficulties (Bandura 1986; Skinner 1995).

Study Limitations and Suggestions for Future Research

The primary limitation of this study pertains to generalization. Because the data in this study were collected from Form 2 students in an urban, all-male school, it is not certain to what extent the results will generalize to other populations and settings. In addition, the present findings may be limited to the particular cooperative program used and the academic subjects assessed. Therefore, more replication studies that investigate the cooperative learning phenomenon under different conditions (e.g., in different types of schools, at various education levels, with varying group sizes and composition) need to be done before more meaningful generalizations can be made.

The successful application of cooperative learning in schools depends partly on how well teachers (and students) are trained in the use of such an instruction technique. Presently, there is relatively little research attention given to this aspect. Therefore, future research directed at developing a systematic training module and new curriculum materials that are suitable for the Malaysian context is well directed.

Finally, it is important to continue research on mediating and moderating processes that impact upon the efficacy of cooperative learning. That is, it is important to determine why cooperative learning works and under what conditions it will work best. Although scholars in this area believe that the primary mechanisms by which a cooperative learning intervention influences learning and other outcomes is through its effects on motivation and cognition, there is still little understanding regarding the specific variables that mediate the relationship. For example, are cognitive variables (e.g., cognitive engagement and sustained mental effort) more important than motivational variables (e.g., goals, social facilitation, and self-efficacy) in determining cooperative learning success? Among the cognitive or motivational variables, which variables have more predictive power? Research addressing mediation processes will facilitate further progress toward the development of a comprehensive theory of cooperative learning.

With regard to moderating processes, some research questions that have yet to be answered are:

1. What are the key boundary conditions for achieving cooperative learning effects?

2. How important are operating factors such as individual accountability and reward structures in influencing achievement (and other cooperative learning outcomes) relative to individual factors such as ability and personality?

3. Will the cooperative learning approach interact with other factors—such as group size, group composition, type of learning tasks, teacher-student relationship, and teacher attributes—to influence cooperative learning outcomes?

Clearly, it is important for researchers to continue their efforts towards examining interaction effects in this area of research so that the cooperative learning approach can be more fully understood and its potential as an instructional intervention maximized.

CONCLUSION

The Malaysian school system is focused very much on individual effort and achievement; cooperative learning as a mode of instruction in Malaysian schools is relatively new. Studies in more developed countries, however, have demonstrated the efficacy of the cooperative learning approach for enhancing student learning and achievement. Cooperative learning also enables students to develop skills that are required for future career success including communication, interpersonal, and leadership skills. Given the lack of systematic evaluative studies on cooperative learning interventions in Malaysia, this study sought to compare a cooperative learning approach with the current mode of instruction (traditional instruction approach) using an experimental field design. The study results indicated that secondary school students taught using the cooperative learning approach outperformed students taught using the traditional instruction approach on achievement tests in English, Mathematics, and Science. These findings suggest that cooperative learning can be successfully implemented in Malaysian schools to enhance students' learning of both quantitative and non-quantitative subjects.

Although this study has some limitations and many questions remain to be answered, it represents a first step toward the development of an alternative mode of instruction in Malaysian schools. The study also underscores the importance of adequate training, support, and commitment for ensuring the successful implementation of such an instructional approach. Before a more comprehensive and useful model of cooperative learning can be developed, future research directed at examining mediating and moderating mechanisms is needed.

REFERENCES

Ames, G. I. & Murray, F. B. 1982. When two wrongs make a right: Promoting cognitive change by social conflict. *Developmental Psychology* 18: 894-897.

Bandura, A. 1986. *Social foundations of thought and action: A social-cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Brookover, W., Beady, C., Flood, P., Schweitzer, J. & Wisenbaker, J. 1979. *School social systems and student achievement.* New York: Praeger.

Campbell, D. T. & Stanley, J. C. 1966. *Experimental and quasi-experimental designs for research.* Chicago: Rand McNally.

Coleman, J. 1961. *The adolescent society.* New York: Free Press.

Dansereau, D. F. 1985. *Thinking and learning skills: Relating instruction to basic research.* Hillsdale, NY: Erlbaum.

Damon, W. 1984. Peer education: The untapped potential. *Journal of Applied Developmental Psychology* 5: 331-343.

Davidson, N. 1985. Small-group learning and teaching in Mathematics: A selective review of the research. In R. E. Slavin, S. Sharan, S. Kagan, R. Hertz-Lazarowitz, C. Webb & R. Schmuck (Eds.), *Learning to cooperate, cooperate to learn* (pp. 211-230). New York: Plenum.

Deutsch, M. 1949. A theory of cooperation and competition. *Human Relations* 2: 129-152.

Huber, G. L., Bogatzki, W. & Winter, M. 1982. *Cooperation: Condition and goal of teaching in classrooms.* Tubingen, West Germany: Arbeitsberich Pedagogische Psychologie der Universitat Tubingen.

Johnson, D. W. & Johnson, R. T. 1987. *Learning together and alone: Cooperative, competitive, and individualistic learning.* Englewood Cliffs, NJ: Prentice-Hall.

Johnson, D. W., Johnson, R. T. & Maruyama, G. 1983. Interdependence and interpersonal attraction among heterogeneous and homogeneous individuals: A theoretical formulation and a meta-analysis of the research. *Review of Educational Research* 53: 5-54.

Johnson, D. W., Maruyama, G., Johnson, R. T., Nelson, D. & Skon, L. 1981. Effects of cooperative, competitive, and individualistic goal structures on achievement: A meta-analysis. *Psychological Bulletin* 89: 47-62.

Kagan, S. 1989/90. The structural approach to cooperative learning. *Educational Leadership* 47(4): 12-16.

Kagan, S. 1994. *Cooperative learning.* San Juan Capistrano, CA: Kagan Cooperative Learning.

Locke, E. A., Durham, C. C., Poon, J. M. L. & Weldon, E. 1997. Goal setting, planning, and performance on work tasks for individuals and groups. In S. L. Friedman & E. K. Scholnick (Eds.), *The developmental psychology of planning: Why, how, and when do we plan?* (pp. 239-262). Mahwah, NJ: Erlbaum.

Madden, N. A. & Slavin, R. E. 1983. Effects of cooperative learning on the social acceptance of mainstreamed academically-handicapped students. *Journal of Education* 17: 171-182.

Murray, F. B. 1982. Teaching through social conflict. *Contemporary Educational Psychology* 7: 257-271.

Newmann, F. M. & Thompson, J. 1987. *Effects of cooperative learning on achievement in secondary schools: A summary of research.* Madison, WI: University of Wisconsin, National Center on Effective Secondary Schools.

Okebukola, P. A. 1986. Impact of extended cooperative and competitive relationships on the performance of students in science. *Human Relations* 39: 673-682.

Piaget, J. 1926. *The language and thought of the child.* New York: Harcourt, Brace.

Sharan, Y. & Sharan, S. 1989/90. Group investigation expands cooperative learning. *Educational Leadership* 47(4): 17-21.

Skinner, E. A. 1995. *Perceived control, motivation, & coping.* Thousand Oaks, CA: Sage.

Slavin, R. E. 1977. Classroom reward structure: An analytical and practical review. *Review of Educational Research* 47: 633-650.

Slavin, R. E. 1978. Student teams and comparison among equals: Effects on academic performance and student attitudes. *Journal of Educational Psychology* 70: 532-538.

Slavin, R. E. 1983a. *Cooperative learning.* New York: Longman.

Slavin, R. E. 1983b. When does cooperative learning increase student achievement? *Psychological Bulletin* 94: 429-445.

Slavin, R. E. 1986. *Using student team learning.* Baltimore: John Hopkins University, Center for Research on Elementary and Middle Schools.

Slavin, R. E. 1987. Cooperative learning: Where behavioral and humanistic approaches to classroom motivation meet. *Elementary School Journal* 88: 29-37.

Slavin, R. E. 1989/90. Research of cooperative learning: Consensus and controversy. *Educational Leadership* 47(4): 52-54.

Slavin, R. E. 1990. *Cooperative learning: Theory, research, and practice.* Englewood Cliffs, NJ: Prentice-Hall.

Slavin, R. E. 1991. Synthesis of research on cooperative learning. *Educational Leadership* 48(5): 71-82.

Thomas, E. J. 1957. Effects of facilitative role interdependence on group functioning. *Human Relations* 10: 347-366.

Vroom, V. H. 1969. Industrial social psychology. In G. Lindzey & E. Aronson (Eds.), *The handbook of social psychology* (Vol. 5, 2nd ed.). Reading, MA: Addison-Wesley.

Vygotsky, L. S. 1978. *Mind in society.* Cambridge, MA: Harvard University Press.

Webb, N. 1985. Student interaction and learning in small groups: A research summary. In R. E. Slavin, S. Sharan, S. Kagan, R. Hertz-Lazarowitz, C. Webb & R. Schmuck (Eds.), *Learning to cooperate, cooperate to learn* (pp. 147-172). New York: Plenum.

Wittrock, M. C. 1978. The cognitive movement in instruction. *Educational Psychologist* 13: 15-29.