Cooperative Learning Structures Can Increase Student Achievement

Jeanie M. Dotson
Culminating Project

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Abstract:

This study compares achievement scores of sixth-grade social studies students who participated in classes using Spencer Kagan's Structures of Cooperative Learning with students who did not. Heterogeneous grouping of students is essential to the use of cooperative learning structures and the groupings involved consisted of students with varying abilities, from mentally impaired to gifted. The measures were curriculum-based assessments and the mean scores of each class were compared.

Article At-A-Glance

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Introduction

Cooperative Learning is a teaching arrangement that refers to small, heterogeneous groups of students working together to achieve a common goal (Kagan, 1994). Students work together to learn and are responsible for their teammates' learning as well as their own. The basic elements are:

1. Positive Interdependence - occurs when gains of individuals or teams are positively correlated.

2. Individual Accountability - occurs when all students in a group are held accountable for doing a share of the work and for mastery of the material to be learned.

3. Equal Participation - occurs when each member of the group is afforded equal shares of responsibility and input.

4. Simultaneous Interaction - occurs when class time is designed to allow many student interactions during the period.

Hundreds of studies have been undertaken to measure the success of cooperative learning as an instructional method regarding social skills, student learning, and achievement across all levels from primary grades through college. The general consensus is that cooperative learning can and usually does result in positive student outcomes in all domains (Johnson & Johnson, 1999). However, very few studies have been published that specifically target the use of Spencer Kagan's Structures of Cooperative Learning (Kagan, 1994) as teaching methods to increase student achievement.

Therefore, the purpose of this study is to test the hypothesis: Sixth-grade Social Studies students at Dunbar Middle School who participate in Kagan's cooperative learning structures will gain higher curriculum-based assessment scores than students who do not use this method of learning.

Literature Review

Cooperative learning is generally defined as a teaching arrangement in which small, heterogeneous groups of students work together to achieve a common goal. Students encourage and support each other, assume responsibility for their own and each other's learning, employ group related social skills, and evaluate the group's progress. The basic elements are positive interdependence, equal opportunities, and individual accountability. Human beings are social creatures by nature and cooperation has been used throughout history in all aspects of our lives. Therefore, it follows that cooperative learning groups in schools would be used as a logical teaching method.

For decades cooperative learning has been implemented in classrooms with diverse populations primarily as a means of fostering positive student interactions. In the United States, cooperative learning was first viewed as an approach to facilitate racial integration.

During the 1960s specific cooperative learning methods began to be developed and evaluated in a wide variety of teaching contexts. In an historic overview (Johnson & Johnson, 1999) nine methods of cooperative learning are listed. Johnson and Johnson developed Learning Together and Alone and Constructive Controversy, DeVries & Edwards created Teams-Games-Tournaments (TGT), Sharan & Sharan developed Group Investigation, Aronson developed the Jigsaw Procedure, Slavin created Student Teams Achievement Divisions (STAD), Team Accelerated Instruction (TAI) and Cooperative Integrated Reading and Composition (CIRC), and Kagan developed Cooperative Learning Structures.

A synthesis of research about cooperative learning finds that cooperative learning strategies improve the achievement of students and their interpersonal relationships. In 67 studies of the achievement effects of cooperative learning 61% found significantly greater achievement in cooperative than in traditionally taught control groups. Positive effects were found in all major subjects, all grade levels, in urban, rural, and suburban schools, and for high, average, and low achievers (Slavin, 1991).

Johnson, Johnson, & Stanne (2000) summarize that cooperative learning strategies are widely used because they are based on theory, validated by research, and almost any teacher can find a way to use cooperative learning methods that are consistent with personal philosophies. In a meta-analysis of 158 studies, Johnson & Johnson report that current research findings present evidence that cooperative learning methods are likely to produce positive achievement results. The studies included eight methods of cooperative learning: Learning Together and Alone, Constructive Controversy, Jigsaw Procedure, Student teams Achievement Divisions (STAD), Team Accelerated Instruction (TAI), Cooperative Integrated Reading & Composition (CIRC), Teams-Games-Tournaments (TGT), and Group Investigation. No studies were found that specifically investigate Kagan's Cooperative Learning Structures. In each case, the achievement levels were significantly higher when cooperative learning methods were used as compared to individualistic or competitive methods of learning.

Grouping is essential to cooperative learning. The most widely used team formation is that of heterogeneous teams, containing a high, two middle, and a low achieving student and having a mix of gender and ethnic diversity that reflect the classroom population. The rationale for heterogeneous groups argues that this produces the greatest opportunities for peer tutoring and support as well as improving cross-race and cross-sex relations and integration. Occasionally, random or special interest teams could be formed to maximize student talents or meet a specific student need (Kagan, 1994).

While many cooperative learning training packages exist, one study found that most teachers who use these methods have been self-taught (Sparapani, Abel, Easton, Edwards, & Herbster, 1997) and that teachers are likely to use a combination of methods. This resulted in very few activities that involved higher-level thinking skills and most of the observations were of drill and review or routine activities. The reason for lack of teacher training is given as lack of funding and/or administrative support. Another study (Nath & Ross 1996) of teachers using Student Teams-Achievement Divisions (STAD) found that if teachers did not strictly adhere to the framework of cooperative learning, the method was unsuccessful and students spent more time on disagreements or conflict management than they did on academic tasks. Sapon-Shevin and Schniedewind (1989/1990) assert that teacher buy-in is an essential factor for success and that cooperative learning needs to be embraced as a teaching philosophy and a set of principles rather than as a teaching gimmick if it is to reach its full potential.

Factors contributing to achievement effects of cooperative learning are group goals and individual accountability. Providing students with an incentive to help each other and encourage each other to put forth maximum efforts increases the likelihood that all group members will learn. As well as individual grades and evaluations there is strong evidence that group grades and team rewards are most successful for motivation (Slavin, 1995). Others argue that the group grades and team rewards allow for the free rider effect of students who do not participate to the fullest extent of their abilities (Joyce, 1999 and Cohen, 1998). Also, it is argued that group grading de-emphasizes the importance of hard-work, personal ability, and perseverance (Kagan, 1995).

Cooperative learning enhances social interaction, which is essential to meet the needs of at-risk students (Slavin, Karweit, & Madden, 1989; Johnson, 1998). Within the framework of cooperative learning groups, students learn how to interact with their peers and increase involvement with the school community. Positive interactions do not always occur naturally and social skills instruction must precede and concur with the cooperative learning strategies. Social skills encompass communicating, building and maintaining trust, providing leadership, and managing conflicts (Goodwin 1999).

In two studies (Nelson & Johnson, 1996; Prater, Bruhl, & Serna, 1998) researchers found that students with behavior disorders who did not receive social skills instruction performed better with direct instruction methods rather than cooperative group methods and that students who did receive social skills instruction performed better with cooperative group methods.

Cooperative learning has been found to be a successful teaching strategy at all levels, from pre-school to post secondary. The developmental characteristics of middle school students make cooperative learning a good fit of teaching strategy for the needs of the students. Young adolescents need to socialize, be a part of a group, share feelings, receive emotional support, and learn to see things from other perspectives. Cooperative learning groups do not separate students on the basis of class, race, or gender and the goals of middle schools are consistent with the goals of cooperative learning theories. It is a peer-centered pedagogy that promotes academic achievement and builds positive social relationships (Sapon-Shevin, 1994).

Social Studies classes lend themselves to cooperative learning methods due to the skills and values within the curriculum. Students may use their thinking, communication, and information-sharing skills to increase their content knowledge as well as their interpersonal skills. Several suggestions were given by Karnes and Collins (1997) to implement cooperative learning structures within the social studies context.

The amount of research suggests that many have studied the effects of cooperative learning and found positive results. In a search for studies that specifically explored Kagan's Structures of Cooperative Learning and/or the use of cooperative learning in social studies classes only a few were located. One study (Maheady, Mallette, Harper, & Sacca, 1991) compared the effects of Numbered Heads Together to a whole-group questioning strategy on social studies tests scores with third graders. Students always performed better when Numbered Heads Together was used and on-task rates were approximately twice as high using this structure. The purpose of this study is to investigate the effects of Kagan's cooperative learning structures as a teaching method to increase student achievement in social studies classes with sixth graders.

Methodology

Design

The study is of a quasi-experimental design, due to the fact that the participants were chosen as a convenience, cluster sample. Non-Equivalent Groups, Posttest Only is the design style of the study with one group receiving treatment (cooperative learning instructional method) and the other (control) group receiving more traditional lecture/discussion teaching method.

Participants

Dunbar Middle School is located in Fairmont, West Virginia. While West Virginia is mostly rural, the school is

considered to have some characteristics of an inner city population. The students in the study, chosen as a convenience, cluster sample, are fifty 6th graders, eleven or twelve years old. There are a wide range of SES levels, from homeless children to children of professional, upper-class parents. The students are a mix of abilities, gender, and race, with 12% minority population, who were randomly placed in two (out of seven) Social Studies class periods. Each class period has five to eight students who currently receive special education services. The teacher in the study is an experienced veteran of twenty-five years, who has taught 6th grade at Dunbar Middle School for nine years. This is her seventh year of Social Studies instruction.

Measures of Assessment Instruments

Curriculum Based Assessments are teacher made or textbook published instruments specifically designed to measure mastery of material presented. Mastery is considered to mean that students will score at least 80% on each assessment. Various formats have been used such as multiple choice, matching, short answer, essay, and map completion. The textbook used was World: Adventures in Time and Place, published by Macmillan/McGraw-Hill in 1997. The assessment instruments are considered to be field-tested, have face validity, and were peer-reviewed by other social studies teachers. All assessments were based on 100%; scores indicating the percentage of correctly answered items. Sample assessment instruments are included in the appendix.

Each class received the same material and the same assessments. Achievement was measured by the percentage of correct responses on teacher made and textbook published assessments and the mean score for the group of students in each class period was computed. Comparisons were made between classes that received instruction using cooperative learning strategies and classes that did not use this method.

Procedures

The study took place during the first nine weeks grading period of the school year. The students received instruction about working in cooperative groups and practiced before the study began. For each block of material, one class used the cooperative learning structures and the other did not receive instructions in this manner. The group not receiving cooperative learning structures as a teaching method was involved in the traditional lecture/demonstration method with individual assignments. Student achievement was measured through curriculum based assessment instruments designed by the teacher. The assessments were quantitatively compared.

Cooperative Learning Structures are methods of organizing the interaction of individuals in a classroom. Step-by-step procedures are used to present, practice, and review material. Some regulate interaction between pairs, some are best for teamwork, and others involve the entire class. The following examples illustrate a few of these instructional methods used. Sample lesson plans for selected structures are included in the appendix.

Think-Pair-Share - The teacher poses a question to the class and the students think about their response. Then students pair with a partner to talk over their ideas. Finally, students share their ideas with the class.

Rallytable - Students are working in pairs, within their teams. Students will take turns writing on one piece of paper or completing a task.

Numbered Heads Together - Students within the team number off from 1-4. The teacher poses a question and the students put their heads together to discuss the answer. The teacher randomly calls a number and from each team the student with that number writes the answer on the team response board.

Showdown - Each student writes his answer on his individual response board. When everyone in the group is ready, the leader says "Showdown" and team members compare and discuss their answers.

Teammates Consult - Students all have their own copy of the same worksheet or assignment questions. A large cup is placed in the center of each team, and students begin by placing their pencils in the cup. With pencils still in the cup, they discuss their answers to the first question. When all team members are ready, they remove their pencils from the cup and write their answers without talking. They repeat this process with the remaining questions.

4S Brainstorming - Students in the group have roles: Speed Captain (prompts more ideas), Super Supporter

(encourages/recognizes all ideas), Synergy Guru (encourages members to build upon one another's ideas), and Recorder (writes ideas). Members carry out their respective roles while the team generates a variety of possible responses.
Analysis

The mean for each group's (control and treatment) scores was calculated to find the standard mean deviation effect size and compared using the t-Test for Independent Samples. An effect size was derived to provide an estimate of the magnitude of the results independent of sample size. This gives an indication of practical, rather than statistical, significance.

Results

The purpose of the study was to determine if sixth-grade Social Studies students at Dunbar Middle School who participated in cooperative learning structures would gain higher curriculum-based assessment scores than students who did not use this method of learning.

Student scores from each assessment were recorded and a class period mean was calculated. Table 1 shows the mean percent correct on each assessment for the control and treatment groups. Figure 1 shows this information in graph form and Figure 2 shows the overall group averages of the control and treatment groups.

Table 1

Assessment mean scores

Assignment	Control Group	Treatment Group
#1	76.80	83.65
#2	78.64	88.38
#3	76.88	95.15
#4	84.00	88.46
#5	74.00	77.81
#6	80.83	82.38
#7	75.00	85.73
#8	69.52	82.16
#9	76.80	87.40
#10	76.56	83.58
Class Mean	76.92	85.47

A one-tailed, unpaired t test was calculated using the computer software Stat View on the difference between the two class periods. The results are statistically significant at .04 probability level.

Table 2

Unpaired t-test

Class Period	Count	Mean	Variance	Std. Dev.	St. Err.

Control	**25**	**76.916**	**314.667**	**17.739**	**3.548**
Treatment	**25**	**85.931**	**145.435**	**12.060**	**2.412**

	Mean Diff.	**DF**	**t-value**	**P-value**
Control/Treatment	**-9.015**	**48**	**2.102**	**.0409**

A standardized mean difference effect size was calculated by dividing the difference between the mean of the treatment group (period 2) and the control group (period one) to provide an estimate of the magnitude of difference, which is an indicator of practical significance. The result is a moderate to large effect size in educational research.

$$\frac{\text{Mean 2-Mean 1}}{\text{Pooled SD}} = \frac{9.015}{14.8995} = .60$$

Another question was raised when examining the results: What were the effects of cooperative learning structures on the achievement scores of sixth-grade Social Studies students with disabilities or special needs at Dunbar Middle School? No statistical analysis was calculated specifically on the mean scores of students with special needs, due to the small number involved, but the scores are reported in Table 3. In each case and for each exceptionality, the students with special needs in the treatment group scored higher than the students with special needs in the control group. Figures 3-6 illustrate this information in graph form.

Table 3

Students that are mentally impaired	
Control	**36.6**
Treatment	**59.1**
Students with learning disabilities	
Control	**63.6**
Treatment	**74.9**
Students with 504 plans	
Control	**66.7**
Treatment	**74.5**
Students that are gifted	
Control	**92.4**
Treatment	**95.9**

Figure 1

Figure 2

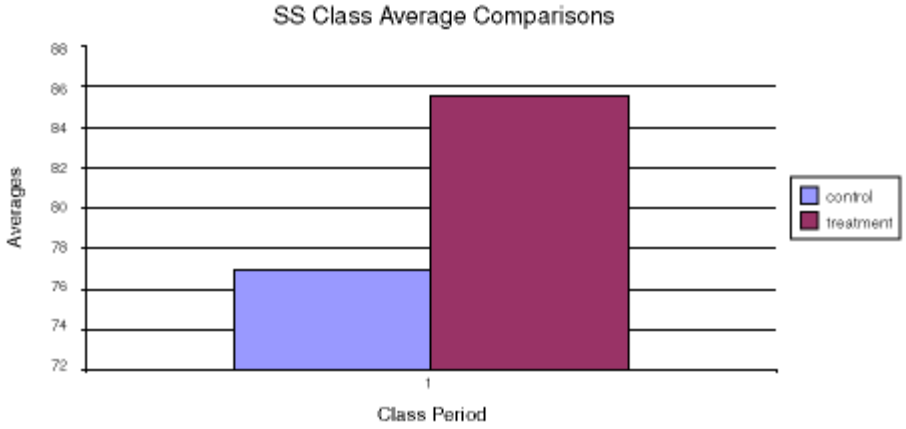


Figure 3

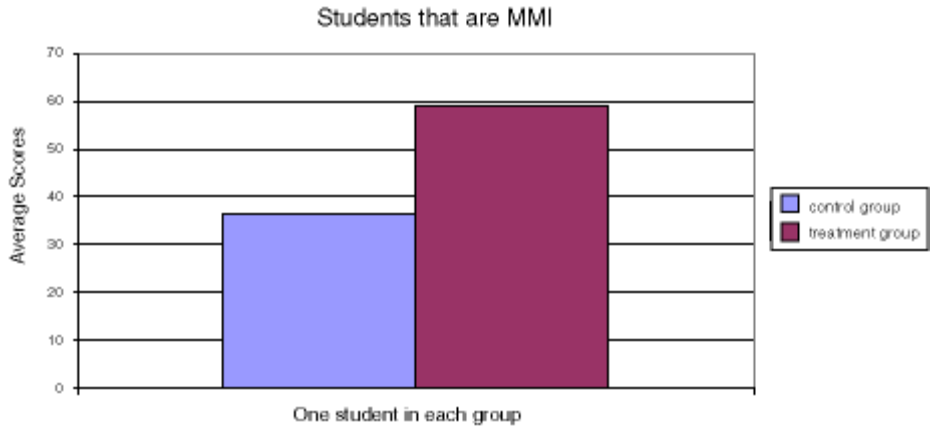


Figure 4

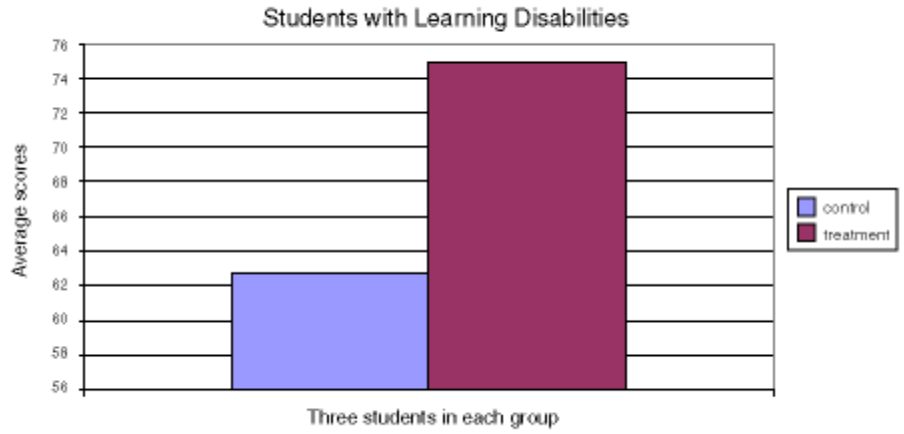


Figure 5

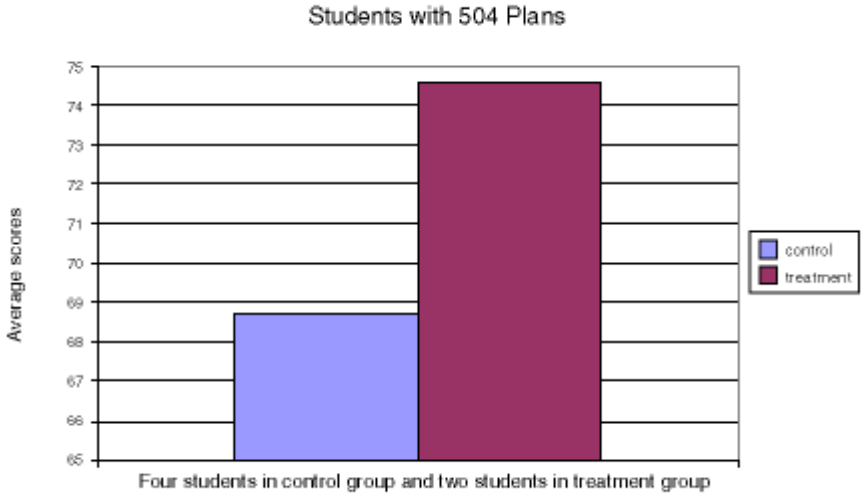
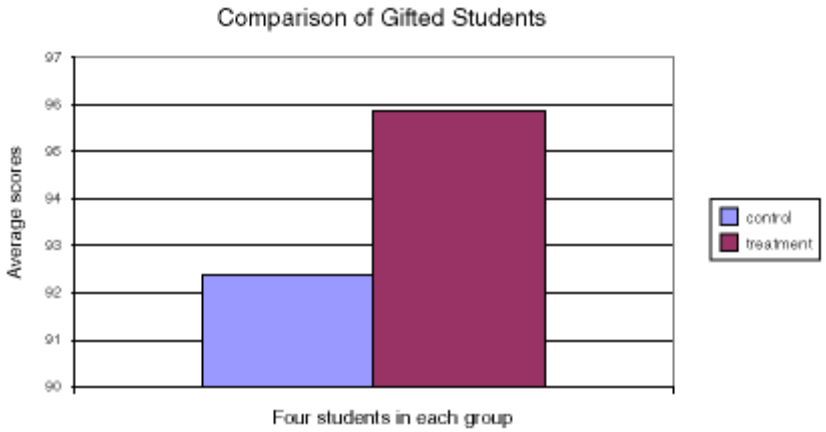


Figure 6



Discussion

The primary goal of this study was to measure student achievement for those using Kagan's cooperative learning structures as a method of instruction and to compare that achievement with those using a traditional lecture/independent style of instruction. For each assessment the assumption that using cooperative learning structures would result in higher achievement was proven. The results were consistent with those of earlie r studies comparing other cooperative learning methods against lecture/independent styles of instruction (Slavin, 1991;

Johnson & Johnson, 2000).

Although the intent did not focus on measuring achievement for students with disabilities, the results indicate that cooperative learning structures can be used successfully for students of diverse abilities. The students in the study presented a wide variety of abilities and functioning levels; including mildly mentally impaired (MMI), learning disabilities (LD), attention deficit (ADD), obsessive compulsive (OCD), English as a second language (ESL), and gifted (GT). All students with special needs in the treatment group were more successful than those in the control group

A goal of placing students with disabilities in an inclusive setting is to foster acceptance and increase social interaction. Kagan's structures and other methods of cooperative learning address this issue due to the inherent nature of the heterogeneous groupings (Kagan, 1994). While not measured, this goal was reached according to the teacher's observations of social interactions within the groups. One of the students in the treatment class was a non-English speaking student. The social context of the group helped avoid the isolation that this student could have felt beginning school in a new country. The students in his group certainly aided in his acquisition of English, as well as social studies content. Other students with disabilities reported that they felt more comfortable working with classmates than working independently.

There were no students with behavior disorders included in the population of this study. Other studies (Nelson & Johnson, 1996; Prater, Bruhl, & Serna, 1998) have found that the social skills needed for cooperative learning should be taught prior to beginning cooperative learning lessons. While social skills are included in Kagan's structures, this pre-teaching of skills for students with behavior disorders would enhance the success of the method.

These findings have relevance to the general classroom teacher faced with implementing inclusion of students with special needs. Cooperative learning structures can be easily used as a modification to instruction with no extra time or effort required of the teacher. One lesson plan using cooperative learning structures has built in peer tutoring and support within the heterogeneous class groupings, which eliminates the requirement for several different plans to meet the needs of all students. Because structures are content free, this method of cooperative learning could be adapted to any curricular area and any level. In this study the sixth grade social studies textbook was the foundation for instruction.

A limitation of the study could be the differences in students within each class period. Although efforts were made to ensure that each class period contained students of comparable abilities, the group make-up could have affected the outcomes. The control group did score lower on each assessment. If the control group would now receive instruction with cooperative learning structures, would they increase their scores? Due to time restraints, this information is not included in this report but is the focus of a follow-up study now being conducted.

The teacher involved in this study was an experienced teacher with an interest and background in cooperative learning that received continual support and feedback from trainers and other teachers using the cooperative learning structures. Sapon-Shevin and Schniedewind (1989/1990) found that teacher buy-in is essential to the success of cooperative learning which was evident during this study. The results could be quite different if the teacher were inexperienced, not committed to using structures, or did not receive support.

Implications for further study would be to explore the success of cooperative learning structures in school wide versus isolated classrooms settings and long-term usage of the methods. In this study the approach was a novel one for the students, as this was their first exposure to using structures in their classes.

While this study focused on sixth-grade social studies students using cooperative learning structures, others have found the method to be successful across all levels. Positive effects were found in all major subjects, all grade levels, in urban, rural, and suburban schools, and for high, average, and low achievers (Slavin, 1991). Perhaps future studies will concur with these findings.

References

Cohen, E. G. (1998). Making cooperative learning equitable. Educational Leadership, 56, 18-22.

Goodwin, M. W. (1999). Cooperative learning and social skills: What skills to teach and how to teach them. Interventions in School & Clinic, 35, 29-34.

Johnson, D. W. & Johnson R. T. (1999). Learning Together and Alone: Cooperative, Competitive, and Individualistic Learning (5th ed.). Boston: Allyn and Bacon.

Johnson, D. W., Johnson, R. T., & Stanne, M. B. (2000). Cooperative learning methods: A meta-analysis. Retrieved July, 2000 from the World Wide Web: http://www.clcrc.com/pages/cl-methods.html

Johnson, G. M. (1998). Principles of instruction for at-risk learners. Preventing School Failure, 42, 167-181.

Joyce, W. B. (1999). On the free-rider problem in cooperative learning. Journal of Education for Business, 74, 271-274.

Kagan, S. (1994). Cooperative Learning. San Clemente, California: **Kagan Publishing**.

Kagan, S. (1995). Group grades miss the mark. Educational Leadership, 52, 68-72.

Karnes, M. & Collins, D. (1997). Using cooperative learning strategies to improve literacy skills in social studies. Reading & Writing Quarterly, 13, 37-52.

Maheady, L., Mallette, B., Harper, G.F., & Sacca, K (1991). Heads together" A peer-mediated option for improving the academic achievement of heterogeneous learning groups. Remedial and Special Education, 12, 25-33.

Nath, L. R. & Ross, S. (1996). A case study of implementing a cooperative learning program in an inner-city school. Journal of Experimental Education, 64, 117-137.

Nelson, J. R. & Johnson, A. (1996). Effects of direct instruction, cooperative learning, and independent learning practices on the classroom behavior of students with behavioral disorders: A comparative analysis. Journal of Emotional & Behavioral Disorders, 4, 53-63.

Prater, M. A., Bruhl, S. & Serna, L. A. (1998). Acquiring social skills through cooperative learning and teacher-directed instruction. Remedial and Special Education, 19, 160-172.

Sapon-Shevin, M. (1994). Cooperative learning and middle schools: What would it take to really do it right? Theory Into Practice, 33, 183-190.

Sapon-Shevin, M. & Schniedewind, N. (1989/1990). Selling cooperative learning without selling it short. Educational Leadership, 47, 63-65.

Slavin, R. E. (1995). Cooperative Learning. Boston: Allyn and Bacon.

Slavin, R. E., Karweit, N. L. & Madden, N. A. (1989). Effective Programs for Students At Risk. Boston: Allyn and Bacon.

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