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The use of cooperative learning as a method of instruction for talented and gifted sixth-grade math students

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The use of cooperative learning as a method of instruction for talented and gifted sixth-grade math students

Abstract

In the 1980s, most teachers are striving to meet the diverse needs of all the students in their classroom. More emphasis is now being placed on developing programs and instructional methods for gifted and talented children. A recent mandate by the Iowa Department of Education states that every school district shall establish a program that meets the educational needs of identified talented and gifted students (State of Iowa Department of Education, 1988).

THE USE OF COOPERATIVE LEARNING AS A METHOD
OF INSTRUCTION FOR TALENTED AND GIFTED
SIXTH-GRADE MATH STUDENTS

A Graduate Project

Submitted to the

Department of Curriculum and Instruction

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts in Education

UNIVERSITY OF NORTHERN IOWA

by

Barbara Steele

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CHAPTER I

INTRODUCTION

In the 1980s, most teachers are striving to meet the diverse needs of all the students in their classroom. More emphasis is now being placed on developing programs and instructional methods for gifted and talented children. A recent mandate by the Iowa Department of Education states that every school district shall establish a program that meets the educational needs of identified talented and gifted students (State of Iowa Department of Education, 1988).

Some school districts develop special curriculum programs for the gifted and talented students; this is usually provided as an addition to their regular classroom experiences. One such program is a pull out type of experience with a designated gifted and talented teacher. Still many of these talented and gifted students are receiving the majority of their instruction in the regular classroom. It is difficult for the regular classroom teacher to meet the individualized instructional needs of these gifted students because there are other students in the classroom who also have special learning needs. Therefore, alternative instructional methods and techniques are needed. Cooperative learning is one special method being considered as a means of alleviating this problem.

Statement of the Problem

For some students, especially the adolescent learner, peer relationships easily become more important than the academic

learning needs. The gifted child needs to feel accepted by his/her peers. As educators strive to fulfill the needs of all students, they must find a method or technique that allows the gifted learner to learn academically as well as to belong socially.

The problem this study investigated was: Can cooperative learning serve as an acceptable method for teaching gifted sixth grade mathematics students in the regular classroom?

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

According to Johnson and Johnson (1974), there are basically three appropriate and effective types of instruction. They are cooperative, competitive, and individualistic.

A cooperative situation is one in which the individuals are helping each other; there is positive correlation between their working together and their attainment of goals. In a cooperative learning environment, the individual can reach his/her goal only if the other person to whom he is linked attains his/her goal. An example of this would be a basketball team winning a game. If one member wins, then everyone wins. The objective of this cooperative arrangement is to work toward an outcome that is beneficial to all participants.

A competitive situation results in a negative correlation between individual goals. In a purely competitive situation, an individual can reach his/her goal only if the other person involved does not reach his/her goal. An example of this would be a wrestling meet where the goal of both wrestlers in the match is to win. If one wrestler wins, then that individual attains the goal and the other wrestler fails to reach the goal. In competitive situations students strive to succeed while causing others to fail.

In an individualistic situation, the individual's goals are totally independent of another individual's effort. Whether one

individual succeeds has no bearing upon another's chances for success. The individual is seeking an outcome that is good for himself/herself.

Recent Research Studies

The following review presents a summary of the research on cooperative learning in the 1980s. The studies provide insight into different cooperative learning groups and the learning results that were achieved. A brief overview of the findings of the studies follows the individual reviews.

Johnson, Johnson, and Anderson (1983) offered evidence of the importance of cooperative learning to a student's positive relationship to peers and teachers. This study involved 85 students in grades 5 through 9. The students were selected from three areas of the United States, the East, the Midwest, and the Mountain area. Students who had infrequently used cooperative learning were compared with those who had worked in cooperative learning groups more often. A Likert scale was used to determine if attitudes and feelings toward teachers and peers had improved with increased use of cooperative learning. The study found cooperativeness and the frequency of participating in cooperative learning situations to be positively related to perceptions of support, help, and friendship from teachers and peers.

Smith, Johnson, and Johnson (1982) studied the effect of cooperative instruction, when used with handicapped, regular, and gifted sixth-grade students. In this study, 55 students were chosen to participate in the study for 65 minutes a day for five

days. Two goal structures, one cooperative and one individualistic, were balanced with each group of four having a gifted student. Three of the groups in the study contained handicapped members. The content of the learning unit was nearly identical for each group; the unit involved studying conservation and land use. Results of the study indicated that students in the cooperative setting achieved higher scores on both the retention and the achievement tests than students working individually. Also students in the cooperative setting developed higher self-esteem than students working individually.

Slavin and Karweit (1981) suggest that having students work together is an effective approach to classroom learning. The type of cooperative effort that this study involved was student team learning. It consisted of students working in four- or five-member teams. The groups consisted of high, average, and low achievers. The subjects were 456 fourth and fifth-grade students. Pretests and posttests were used. The students were divided into a control group of ten classes and an experimental group of ten classes. Student team learning techniques were used for language arts, mathematics, and social studies for the experimental group. Students in the control group received regular teacher instruction. This study which lasted a semester, showed that students in team settings made greater gains than those in individual settings in the areas of self-esteem, the liking of school, and decreasing of non-friends.

Another study (Johnson, Johnson, & Stanne, 1986) addressed the use of cooperative learning in computer-assisted instruction. In this study, 74 eighth-grade students were chosen as the population for the study; they were divided into three groups, competitive, cooperative, and individualistic. A ten-day instructional unit on map reading and navigation was taught to each group with each group having the use of six computers. The study suggests that cooperative learning does more to maximize learning with computer-assisted tasks than do competitive and individualistic techniques.

Johnson and Johnson (1981) studied the effects of cooperative and individual learning experiences on inter-ethnic interaction. Fifty-one fourth-grade students were studied for cross-ethnic interaction during instructional and free-time periods. The results indicate that cooperative learning fosters positive relationships in desegregated classrooms.

Warring, Johnson, Maruyama, and Johnson (1985) studied the effects of different levels of cooperation on cross-sex and cross-ethnic relationships. This study was designed to determine if the relationships formed in cooperative settings had a greater carry-over into unstructured class activities, school activities and activities in the home than did those in competitive settings. The results indicated that inter-group cooperation promoted more positive relationships (cross-ethnic and cross-sex) than did intergroup competition.

What Is/Isn't Cooperative Learning

Not all strategies, even though they involve groups of students, are cooperative learning (Johnson & Johnson, 1989). One group activity that does not constitute cooperative learning is allowing students to sit side by side at a table and talk while they do their assignments. What they are doing is socializing while they are doing their own work; this is not a cooperative effort. Another practice that is not considered cooperative learning is the practice of having faster students help slow students. A final example of a group activity which is not cooperative learning is a situation in which one student does all the work for a group report and all members of the group take credit for the report. With cooperative learning all members of the team contribute equally.

Johnson and Johnson (1989) suggest five basic elements are necessary for cooperative learning techniques to succeed in a classroom. The first element is a positive interdependence. The students must believe that the members of the group can succeed only if they all succeed together. Thus, the group needs to be structured so that they agree with each other in a positive way.

In a cooperative lesson, face-to-face promotive interaction among students would be found. In the discussions students explain connections between present and past learning, use problem solving strategies, talk about the strategies and concepts to be learned, and explain their own knowledge to classmates. Much time for exchanging of ideas must be provided.

Individual accountability is the third element in cooperative learning. It is important that students receive both a group grade and an individual grade. Students should not be able to just "ride along" with the group nor should they automatically fail in a weak area. An individual quiz helps to keep individual learning in check.

The fourth group element that the Johnsons feel is important is social skills. This element entails the use of leadership behaviors, decision making skills, communication skills, and the building of a trust relationship. Students need to learn these skills because they may have never before worked cooperatively and because they will need to know how to do this in later life.

Group processes are also an integral part of a cooperative lesson. In all learning it is important to process what has taken place. This is the time in the lesson when the students see if their goals have been achieved and if their relationships have been effectively maintained. A review of how the group functioned needs to take place at the end of each lesson.

Implementing Cooperative Learning in a Mathematics Classroom

Research indicates (Johnson & Johnson, 1989) that if teachers want students to enjoy school more, like each other more, learn more, and have higher self-esteem they should use cooperative learning in their classes. Five basic elements of cooperative learning can be implemented in the mathematics classroom in the following ways:

1. To achieve positive interdependence the students are each placed in a group of three and given a role to play; they will be either a reader, a checker, or an encourager. The reader reads the problem to the group. The checker is in charge of making sure every member can explain the problem correctly. The encourager is in charge of encouraging everyone to share their ideas.

2. Face-to-face promotive interaction among students can occur only when students explain to each other how to solve the problems. The teacher in the mathematics classroom must provide time to allow these discussions to take place.

3. Individual accountability can be achieved in the math classroom. While group scores are taken, the teacher may also give a daily quiz to assure that all members of the group are participating and achieving success.

4. Social skills also can be taught by the math teacher. Positive praise, by the teacher, to groups who are using leadership and conflict management is very important to the success of cooperative learning. It is important for the teacher to develop procedures or strategies for teaching social skills in the mathematics classroom.

5. Group processes are important in the mathematics classroom. At the end of the math class, students should be encouraged to focus their attention on the group's effectiveness by asking: (a) What is one thing each member did that was

helpful to the group? and (b) What is something each member could do to make the group better next time?

Summary

A key to a successful group effort is to allow enough time for students to make clear their expectations. This will give students time to make suggestions for improvement.

Many studies have suggested that cooperative learning is a method to promote positive self-esteem and positive peer relationships between students. Johnson, Johnson, and Anderson (1983) and Slavin and Karweit (1981) conducted studies which measured growth in the area of peer relationships and self-esteem. Future studies are needed to determine if cooperative learning is a viable means to meet the educational needs of students in the regular classroom. This is especially true of the gifted students; in the past, their needs have too frequently been ignored.

CHAPTER III
DESIGN OF THE STUDY

The Subjects

Students at this particular school are placed in the gifted program when they are in the top three percent of the school population. These students are chosen by teacher recommendation, class performance, and the results of the Iowa Tests of Basic Skills (Hieronymous, Lindquist, & Hoover, 1986).

Four sixth-grade students were chosen to participate in this study. Each student ranked above the 90th percentile on mathematics composite scores on the 1989 Iowa Test of Basic Skills (Hieronymous, Lindquist, & Hoover, 1986) as a fifth grader.

These students exemplified many of the qualities of the gifted learner as described by Barbara Clark (1983). These qualities are necessary to build leadership skills conducive to cooperative learning. Clark believes gifted learners have:

1. an unusually large quantity of information and an unusual ability to retain the information,
2. advanced comprehension,
3. varied interests and usual curiosity,
4. superior language development,
5. high verbal ability,
6. extraordinary ability for processing information,
7. flexible thinking,

8. large capacity for seeing diverse or unusual relationships, and

9. persistence and goal-direction.

The four subjects were in two different class settings. Subject 1 and subject 2 received regular group instruction while subject 3 and subject 4 were in the classroom where cooperative learning took place.

Setting

The four week study was conducted in the regular sixth grade classroom. This rural middle school is departmentalized so all students have the same mathematics teacher. There were two sixth grade sections each containing 18 students. Each section contained two gifted students.

Design

The research design was quasi-experimental in design. The situation did not allow full experimental control using random selection. Therefore, nonrandomized comparison control groups were established and pretests and posttests administered to allow the researcher to make a judgment regarding acceptable progress. The investigator arbitrarily set the mean gain score for the "group" as an acceptable standard for the gifted students. Students reaching or exceeding the mean gain score for their group were determined to be making acceptable progress.

In this study cooperative learning was used as the independent variable. The dependent variable was the mean gain on the posttest.

Behavior Measured

The behavior measured was the difference between the score on a pretest and the posttest and is reported as the gain score.

Procedures

Before placing students from the experimental group in cooperative groups, a 29-item pretest was given to both groups. After studying the results of the experimental group's pretest, students in that group were placed in groups of three according to similar abilities.

The aforementioned five basic elements of cooperative learning (Johnson & Johnson, 1989) were made a part of the class environment for this classroom of students. Also, the following group rules were applied:

1. All three students in each group must agree that they have a question before consulting the teacher.
2. Respect others' ideas.
3. Everyone is responsible for explaining the material.
4. Everyone receives a group grade as well as an individual grade.

The study lasted for four weeks. A geometry unit taken from Mathematics Unlimited (1987) was the topic of instruction during the study. Daily lessons and teacher-made quizzes were used with both of the groups.

Description of the Instrument

The instrument used to determine student progress (posttest) consisted of a 29-item test. These items were taken from the

Chapter 9 Pretest and Chapter 9 Posttest from Mathematics Unlimited (Fennell, Reys, Reys, & Webb, 1987). The pretest contained 32 items of similar difficulty to those on the posttest.

CHAPTER IV

RESULTS OF THE STUDY

In order to determine whether gifted learners make acceptable progress, in mathematics while being instructed in a cooperative learning setting, three comparisons were made:

Comparison 1: Progress of all students in the cooperative learning setting was compared to the progress of all students in the regular instructional setting by comparing the mean gain scores of these two groups of students. Gifted students in the cooperative learning setting were placed in cooperative groups of three students; they received direct teacher instruction and worked in cooperative learning groups. Gifted students in the regular classroom setting also received direct teacher instruction, but were required to work by themselves.

Comparison 2: Progress of gifted subjects taught mathematics via a cooperative education mode was compared to the overall progress of the class by comparing the gain score of gifted students receiving instruction in a cooperative education setting to the mean gain score of the entire class.

Comparison 3: Progress of gifted students taught mathematics via a regular classroom mode was compared to the overall progress of the class by comparing the gain score of gifted students receiving instruction in a regular classroom setting to the mean gain score of the entire class.

Findings

Comparison 1: A pretest/posttest was given to determine the average gain in each classroom. The cooperative learning classroom had a mean pretest score of 7.10 and a mean posttest score of 16.61. This resulted in a mean gain score of 9.51. The regular instruction classroom had a mean pretest score of 6.47 and a mean posttest score of 15.70. This resulted in a gain score of 9.23. The difference in the mean gain scores was .28. The cooperative learning classroom had a slightly higher mean gain score (9.51) than the regular instruction classroom (9.23).

Comparison 2: Subjects 3 and 4 were gifted students in a cooperative learning setting. Subject 3 had a pretest score of 16 and a posttest score of 26. This resulted in a gain score of 10; the mean gain for this group was 9.51. Subject 4 had a pretest score of 11 and a posttest score of 25. This resulted in a gain score of 14; this was well above the mean gain score of this group.

Comparison 3: Subjects 1 and 2 were gifted students in a regular instructional setting. Subject 1 had a pretest score of 8 and a posttest score of 21. This resulted in a gain score of 13, above the mean gain score of 9.23. Subject 2 had a pretest score of 7 and a posttest score of 20. This resulted in a gain score of 13; this is also above the mean gain score for the group (9.23).

Summary

The study showed the difference between the results of instruction provided to gifted children in a cooperative learning setting and that provided in a classroom where regular instruction is given was minimal. Gifted students in both settings made above average gains. Therefore, using cooperative learning with gifted children was determined to be an acceptable technique for mathematics instruction.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The findings of this study were consistent with previous research on cooperative learning. The implications of this study are that gifted and talented students can make acceptable progress in cooperative learning situations in a mathematics classroom. Therefore, the teacher of mathematics should consider cooperative learning to be a viable instructional method for meeting the educational needs of talented and gifted students in the regular classroom.

Conclusions

Through cooperative learning experimentation and a review of literature, the researcher concluded:

1. Subjects 3 and 4 made acceptable progress while being in a cooperative learning setting.
2. Subjects 1 and 2 made acceptable progress with regular instruction.
3. There was minimal difference between the results of cooperative learning and regular instruction.
4. Cooperative learning and regular instruction are both viable procedures for teaching the gifted student.

Recommendations

The following recommendations are based on the literature review, testing, and follow-up work:

1. Follow-up studies should be conducted in order to ascertain what effect cooperative learning has on gifted and talented students' achievement in other content areas.
2. More studies in the mathematics area with larger sample sizes need to be conducted.
3. The long-term impact of cooperative learning needs to be investigated. A longitudinal study of cooperative learning should be conducted to determine if it yields similar results.

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