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Cooperative Learning and the Academically Talented Student

Ann Robinson, Ph.D.
University of Arkansas at Little Rock
Little Rock, Arkansas

December 1991
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COOPERATIVE Learning

RESEARCH-BASED DECISION MAKING SERIES

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Cooperative Learning and the Academically Talented Student

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ABSTRACT

The research base on cooperative learning was examined for its applicability to academically talented students. Common types of cooperative learning are described with highlights of the model characteristics as they apply to academically talented students. The models include: Teams-Games-Tournament (TGT); Student Teams Achievement Divisions (STAD); Team Accelerated Instruction (TAI); Cooperative Integrated Reading and Composition (CIRC); Circles of Learning or Learning Together; Cooperative Controversy; Jigsaw and Jigsaw II; Group Investigation; Co-op Co-op and Cooperative Structures; Groups of Four; and Descubrimiento or Finding Out. Advantages and disadvantages of the various models for academically talented students were summarized. The weaknesses in the cooperative learning literature, as it relates to academically talented students, were also identified. Weaknesses fall into two broad categories which include: (a) lack of attention to academically talented students and (b) reliance on weak treatment comparisons to demonstrate the effectiveness of cooperative learning. In addition to an examination of the research base, two issues in practice were identified as important for academically talented students. These issues were: (a) curricular coverage and pacing and (b) group work and motivation. Finally, a series of recommendations for practice was included.

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EXECUTIVE SUMMARY

Cooperative learning has been recommended as effective in most school subjects across various groups of students measured on several cognitive and affective outcomes. However, controversy has arisen over the use of cooperative learning with academically talented students. The general research base on cooperative learning is extensive; over two hundred studies have been summarized by three research syntheses (Johnson, Maruyama, Johnson, Nelson, & Skon, 1981; Johnson, Johnson, & Maruyama, 1983; Slavin, 1990b). In contrast, the research base on cooperative learning, as it relates to gifted or academically talented students, is very limited (Robinson, 1990; Slavin, 1990a).

For example, a computer search of the PSYCHINFO data base from its inception in 1967 to September 1991 resulted in only two empirical studies which specifically examined the effects of cooperative learning on identified talented students. One study included 14 gifted elementary students (Smith, Johnson, & Johnson, 1982); the second, 48 "high ability" high school seniors and college freshmen attending a summer program (Johnson, Johnson, Stanne, & Garibaldi, 1990).

Despite the lack of attention to talented students in the literature, teachers and school administrators have been required to make instructional decisions about cooperative learning which affect academically talented students. Unfortunately, the research literature has been vulnerable to overgeneralization. Definitions of cooperative learning have been blurred recently to include other forms of small group or social learning like synectics or role playing (Bellanca & Fogarty, 1991; Joyce, 1991; Joyce & Weil, 1986). More substantively, several weaknesses in the research base on cooperative learning, as it relates to academically talented students, have been identified (Robinson, 1990). By examining specific cooperative learning models, reviewing their empirical literature, and noting the distinguishing features of each model, it is possible to acquire a more thorough understanding of the ways this research on cooperative learning should guide practice for academically talented students.

Cooperative Learning: A Definition

Cooperative learning is a set of instructional strategies "which employ{s} small teams of pupils to promote peer interaction and cooperation for studying academic subjects" (Sharan, 1980, p. 242). Students must work together to accomplish a common goal or to receive a common reward. Cooperative learning models recommend heterogeneous ability or achievement grouping strategies for the bulk of the instructional time. Most of the models include explicit guidelines for group composition in which a range of high, medium, and low achieving students is to be placed in each cooperative group (Johnson, Johnson, & Holubec, 1990; Slavin, 1980). Other cooperative models are less directive about the range of achievement in the groups, but do assume and encourage heterogeneity (Aronson, Blaney, Stephan, Sikes, & Snapp, 1978; Burns, 1987; Sharan & Sharan, 1976). Finally, peer tutoring or partner teaching is often a component of cooperative learning models. Aronson's Jigsaw, Teams-Games-Tournament (TGT), Student Teams Achievement Divisions (STAD), and Cooperative Integrated Reading and Composition (CIRC) explicitly include students tutoring one another within small groups. Although peer tutoring may consist of pairs of students who tutor or teach one another different materials, cooperative learning most often implies that students collaborate in groups larger than two and that they learn the same materials (Slavin, Leavey, & Madden, 1984, p. 410).

Common Models of Cooperative Learning

The most widely known models of cooperative learning were developed by three groups of advocates: (a) Slavin and associates, (b) the Johnsons, and (c) the Sharans and S. Kagan. Sharan and Sharan and Kagan do not collaborate directly, but both have developed group investigation types of cooperative learning models. Differences among these models include their relative emphasis on competition among the small groups, the use of external rewards, group versus individual grading practices, and general versus specific subject matter learning.

Teams-Games-Tournament (TGT)

TGT, originally developed by Edwards and De Vries (1972), is a generic strategy used in any subject matter area. Students are placed in four member heterogeneous teams. They receive a teacher directed lesson, help one another master the material, and compete in weekly tournaments with others of similar achievement (Slavin, 1986). Despite the temporary grouping of students by achievement level for tournaments in TGT, the lessons presented to the students, the materials completed by them, and the pace of instruction are the same for all students in the class. Worksheets are the primary instructional materials used in TGT. Slavin (1991) noted that TGT is best suited to basic skill instruction.

Student Teams Achievement Divisions (STAD)

STAD is a generic strategy used in any subject matter area. According to Slavin (1986), STAD works best with material that has single, correct answers and is most likely to be used in mathematics computation, spelling, language usage, and mechanics. As in TGT, students are placed in four member heterogeneous groups for teacher directed instruction and for assisting one another in mastering the basic material. The tournaments used in TGT are replaced with individually administered quizzes in which students do not assist one another. STAD like TGT was developed to provide grade level instruction in basic skill areas at the same general pace for all students.

Team Accelerated Instruction (TAI)

TAI (later renamed Team Assisted Individualization) was developed for pre-algebra mathematics instruction in grades three through six (Slavin, 1986). It includes specific TAI instructional materials on basic mathematics operations and topics: addition, subtraction, multiplication, division, numeration, fractions, decimals, ratio, percent, statistics, and algebra. Students are assigned to four or five member heterogeneous teams, are pretested, and enter the curriculum at the point designated by their pretest performance. They work through curriculum units which contain a guidepage reviewing the concepts, skill practice pages, formative quizzes, a 15-item unit test, and answer pages so that a student monitor may score the test. All students also take mathematics facts tests twice a week. The management functions of securing materials, checking student papers, and scoring tests are the responsibility of the students. After each three-week period of individualized instruction, the teacher conducts group-paced instruction for a week.

Cooperative Integrated Reading and Composition (CIRC)

CIRC was developed for grade level reading and writing instruction in the elementary grades. Research studies have been reported for grades 3-4 and grades 2-6 (Stevens, Madden, Slavin, & Farnish, 1987; Stevens, Slavin, & Farnish, 1991). Instruction is primarily based on basal readers and involves direct instruction in reading comprehension, integrated writing, and language arts using a writing process approach. Heterogeneous teams are composed of members of at least two different reading groups who read to one another, answer questions about the story, practice spelling and vocabulary words, and write on a topic related to the basal story. Team members receive points based on individual performance on quizzes and composition which are "added" to produce a team score. Achievement criteria are specified; teams that meet the criteria receive certificates.

Circles of Learning or Learning Together

Johnson and Johnson have emphasized group process in their generic model characterized by explicit and sustained teaching of structured social skills. Most of the research by the developers and their associates compared the cooperative goal structure (in which groups work together) with a competitive condition (in which teams or individuals compete with one another) and with an individualistic condition (in which students work alone on material). Heterogeneous groups of two to six students with maximum variation in levels of achievement are recommended. In addition, the Johnsons have suggested unmotivated students be placed in groups with on-task students. In some cases, students are permitted to work together to complete a single worksheet or product for a group grade (Johnson, Johnson, & Holubec, 1990).

Cooperative Controversy

Cooperative Controversy, also developed by the Johnsons, relies on the constructive use of conflict to increase learning (Johnson, Johnson, & Holubec, 1990). Heterogeneous groups of four students are given materials about a controversial topic—for example, the hunting of wolves in Northern Minnesota—and asked to debate. Two students take one side of the controversial issue, the remaining two team members argue the opposite view. Then the two pairs of students switch sides and argue the opposite points of view. Presumably, the same kinds of group products and group grades would be possible in this form of cooperative learning as in the original Circles of Learning or Learning Together.

Jigsaw and Jigsaw II

The Jigsaw models were developed for narrative materials in the core content areas like social studies, science, literature, and other school subjects in which the goal is to learn concepts rather than skills (Aronson et al. 1978; Slavin, 1986). Heterogeneous groups of students are given sections or chapters of material to read and teach "their topic" or a part of the text to others in their group. As is the case with TGT, STAD, Circles of Learning, and Cooperative Controversy, the Jigsaw models rely primarily on grade level texts and other printed materials.

Group Investigation

In contrast to the cooperative learning models which are largely structured around traditional texts and classroom materials, Group Investigation is an interest-based study of a topic selected by the teacher (Sharan & Sharan, 1976). Small groups of students select subtopics, develop and carry out a learning plan, and prepare a small group presentation for the entire class. Teachers and students evaluate group and individual contributions. Students work on group products, give group presentations, and receive group evaluations. However, individual achievement is assessed through examinations as well. Presumably, students have access to any materials including reference materials relevant to their subtopic. The most extensive research study on Group Investigation was conducted in Israel with problems in history and geography (Sharan & Shachar, 1988).

Co-op Co-op and Cooperative Structures

Like Group Investigation, Co-op Co-op is based on heterogeneous small groups studying a subtopic as part of a whole class investigation. Co-op Co-op encourages library research, interviewing, original data gathering, and creative products. Students are teacher and self evaluated on team presentations, their written products, and on their contributions to the team. Kagan (1989/1990) has also encouraged the use of short term cooperative structures developed by other educators as well as himself. Two examples of these structural cooperative strategies are Think-Pair-Share and Numbered Heads Together, which are variations of group discussion. Few published studies are available on the short term cooperative activities or on Co-op Co-op.

Groups of Four

Developed for elementary mathematics, Groups of Four is a collection of cooperative problem solving activities. In one study conducted by its originator, this approach resulted in improved problem-solving skills for students when compared with the traditional classroom (Burns, 1981). The author does not propose the model as a comprehensive mathematics curriculum. According to Slavin (1986), the research evidence on this application of cooperative learning has not been extensive or promising.

Descubrimiento or Finding Out

Descubrimiento was developed as a hands-on elementary science program for the bilingual classroom. Students work together on experiments to discover scientific concepts and principles. Materials are printed in Spanish and English (De Avila & Duncan, 1980) and an implementation manual has been developed (Navarette, Cohen, De Avila, Benton, Lotan, & Parchment, 1985). Little published research is currently available on Descubrimiento.

Applying Cooperative Learning Research to Academically Talented Students

Cooperative learning research has reported positive effects in cross-ethnic relationships (Johnson & Johnson, 1981; Warring, D. Johnson, Maruyama, & R. Johnson, 1985), in acceptance and achievement of students with intellectual or emotional handicaps (Johnson & Johnson, 1982; Salend & Sonnenschein, 1989; Slavin, 1984), and in basic skills achievement in the academic content areas (Slavin, 1980; Slavin, 1984). In a recent review, Slavin (1991) also listed improved self-esteem and self-concept as outcomes for those cooperative models he helped to develop. These are significant outcomes. However, the advantages of cooperative learning for academically talented students are tempered by the nature of the research base on cooperative learning and by the ways it has been translated into practice.

Problems of Definition and Sampling

Very few studies have been conducted with identified gifted or high ability students. Some studies have investigated high achieving students, but with limited information about their prior achievement. For example, high achieving may be defined by single measures of teacher-made classroom or basic skills standardized tests (Lucker, Rosenfield, Sikes, & Aronson, 1976; Webb, 1982) or by teacher judgment (Johnson & Johnson, 1981; Johnson, Johnson, Tiffany, & Zaidman, 1983). In one study, students were designated as high achieving if they scored above the median on a teacher constructed mathematics pretest (Mervasch, 1991). "High ability" as defined by single achievement measures of basic skills batteries, teacher constructed placement tests, or teacher judgment alone should not be used interchangeably with giftedness. The indicators are too crude to give us a "picture" of the kinds of students found in the high achieving groups and are difficult to generalize to the gifted.

Weak Comparisons

The most misleading characteristic of the research base on cooperative learning, as it relates to academically talented students, is its reliance on weak treatment comparisons. Specifically, these weak comparisons include: (a) the use of the traditional classroom as the control treatment, and (b) the use of an individualistic comparison which specifically discourages student discussion. In a recent review, Slavin (1991) commented that of the 67 cooperative learning studies which measured effects of student achievement all "compared the effects of cooperative learning to those of traditionally taught control groups" (p. 76). In most cases, achievement was defined as basic skills outcomes.

In the studies which compared cooperative with individualistic learning, students in cooperative groups were encouraged to communicate with one another and in some cases were permitted to turn in one assignment for the group. In the individualistic condition, students were directed not to talk and were required to complete the assignment on their own (Johnson, Johnson, & Stanne, 1985). In some cases, students in groups and students working *alone* were compared on the nature and frequency of their talk.

To summarize, the effects of cooperative learning on academically talented students are difficult to assess. First, they are not the population of interest. Few studies have explicitly identified them, described them adequately in the sample, or analyzed outcomes clearly. Second, the comparisons made in the literature are limited by the selection of the traditional classroom rather than educational provisions more suited to academically talented students as the control and by the individualistic comparison implemented as solitary seat work. In other words, cooperative learning in heterogeneous classrooms has not been compared with educational treatments of choice for academically talented students.

Issues in Practice

The weakness in cooperative learning research, as it relates to academically talented students, is a correctable problem. Subsequent studies can be designed to identify academically talented students in the sample and to include an appropriate test of cooperative learning as compared to a well supported treatment for these students.

However, for decision makers to evaluate the use of cooperative learning with academically talented students, two issues must be addressed in practice: (a) curricular coverage and pacing and (b) group work and motivation.

Curricular Coverage and Pacing

In the classroom, time is a fixed resource. If students are organized in cooperative learning groups studying grade level material for the majority of their school day at the pace of a heterogeneous group, their opportunity to master advanced material at their own pace is restricted. A substantial body of work over the past thirty years indicates that various kinds of acceleration produce consistent and positive achievement gains for talented students (Daurio, 1979; Kulik & Kulik, 1984, 1991; Rogers, 1991; Shore, Cornell, Robinson, & Ward, 1991). In fact, a recent study by Reis and Purcell (in press) indicates that elementary teachers report between 39-49 % of the curriculum in mathematics and 36-54% of the curriculum in language arts could be eliminated because gifted students demonstrated mastery of the material prior to instruction. Unfortunately, much of the educational community is wary of acceleration for academically talented students (Southern & Jones, 1991). Contrast the reluctance of educators to admit that curricular exposure has positive effects for academically talented students to support for the well-received argument on behalf of students confined to low tracks in public schools. It has been argued that one of the contributing factors to the low achievement of low achievers is the absence of challenging curricular fare (Oakes & Lipton, 1990). It is the argument of curricular access. If students are given the opportunity to learn from a challenging curriculum, very often they will do so. This logic applies to academically talented as well as to low achieving students. To restrict access to appropriately advanced curriculum and to retard the rate at which academically talented students move through that curriculum by organizing instruction in grade level cooperative learning groups for the majority of the school day is not defensible and may result in boredom and repetition for these students.

Group Work and Motivation

The success of group work depends in part on the availability of a student who understands the material being studied and who will explain the material to others if asked to do so (Bennett & Cass, 1988; Petersen, Janicki, & Swing, 1981; Webb, 1982). Although students who explain material to others benefit from this experience if the material is new to them as well, too many repeated explanations may result in constant review. Cooperative learning groups must be structured to eliminate the "free rider" effect that allows some students to carry the instructional burden and others not to contribute to the common goal. Two recent studies indicate that talented students perceive unequal responsibility and failure of teammates to contribute in heterogeneous groups as unfair and frustrating (Clinkenbeard, 1991; Matthews, in preparation).

Recommendations for Using Cooperative Learning with Academically Talented Students

Due to the lack of attention to academically talented students in the cooperative learning literature, research on educational practices effective with talented students also forms the basis for the recommendations which follow. Where noted, the recommendations are also based on an analysis of the various cooperative learning models along dimensions considered important for academically talented students.

RECOMMENDATION ONE: Cooperative learning in the heterogeneous classroom should not be substituted for specialized programs and services for academically talented students.

Discussion: Cooperative learning models have not been compared to special educational programs and services for academically talented students in the research literature. Thus, no clear superiority for cooperative learning in the heterogeneous classroom over specialized programs and services for academically talented students has been established. Even advocates of cooperative learning have acknowledged the need for separate course offerings for academically talented students (McPartland & Slavin, 1990).

RECOMMENDATION TWO: If a school is committed to cooperative learning, models which encourage access to materials beyond grade level are preferable for academically talented students.

Discussion: Cooperative learning models like Teams-Games-Tournaments (TGT), Students Teams Achievement Division (STAD), and Jigsaw which primarily use prepared grade level materials limit curricular access for academically talented students. Since Group Investigation encourages the use of reference materials, library and media resources, and other kinds of information gathering, this model may be less likely to restrict academically talented students to grade level curriculum.

RECOMMENDATION THREE: If a school is committed to cooperative learning, models which permit flexible pacing are preferable for academically talented students.

Discussion: This recommendation is related to the effectiveness of various forms of acceleration with academically talented students. In general, cooperative learning models require students to study the same materials and to master material at the group pace. However, Group Investigation allows students to research some information on their own. During such opportunities, presumably academically talented students would be able to read and study self-selected materials at their own pace. In mathematics, the Team Accelerated Instruction (TAI) model at the elementary level has some flexible pacing components in its individualized sequence. However, TAI may need to be combined with cross-grade grouping to accommodate mathematically talented students.

RECOMMENDATION FOUR: If a school is committed to cooperative learning, student achievement disparities within the group should not be too severe.

Discussion: When high, medium, and low achieving students are grouped together, high achieving students explain material to low achieving students, and medium achieving students have fewer opportunities for participation. Academically talented students report frustration when working in mixed ability groups with team members who are unwilling to contribute to the group goal. Placing students who are similar in achievement together continues to allow for heterogeneity in terms of ethnicity and gender in the groups. Slavin (1990) has suggested cooperative learning might be used with groups of high achieving students.

RECOMMENDATION FIVE: Academically talented students should be provided with opportunities for autonomy and individual pursuits during the school day.

Discussion: This recommendation targets educators who are sufficiently committed to group models that they may overuse cooperative learning. Academically talented students also need opportunities for autonomy and self-directed learning. Academically talented students voice a preference for independent (in contrast to individualistic) learning experiences and can profit from solitary absorption with a task or topic. Providing opportunities for independent study under competent supervision of the teacher is a supportable practice for academically talented students.

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Cooperative learning is a form of small group instruction. One of its earliest expressions, Jigsaw, was developed to increase cross-racial relationships in classrooms (Aronson, Blaney, Stephan, Sikes, & Snapp, 1978). Aronson hypothesized that by giving each student in a small group control over part of the information needed by the group to complete an assignment, the contacts between students of varying ethnicity would increase. In other words, the original goals of cooperative learning were social; later adaptations broadened the purpose to include academic achievement.

Cooperative Learning: A Definition

Cooperative learning is defined as a set of instructional strategies "which employ{s} small teams of pupils to promote peer interaction and cooperation for studying academic subjects" (Sharan, 1980, p. 242). According to Slavin (1980), "the term refers to classroom techniques in which students work on learning activities in small groups and receive rewards or recognition based on their group's performance" (p. 315).

In addition, cooperative learning models recommend heterogeneous ability or achievement grouping strategies for the bulk of the instructional time. Most of the models include explicit guidelines for group composition in which a range of high, medium, and low achieving students is to be placed in each cooperative group (Johnson, Johnson, & Holubec, 1990; Slavin, 1980). Other cooperative learning models are less directive about the range of achievement in the groups, but do assume and encourage heterogeneity (Aronson, et al; 1978; Burns, 1987; Sharan, 1980; Sharan & Sharan, 1976).

Finally, peer tutoring or partner teaching is often a component of cooperative learning models. Aronson's Jigsaw and Teams-Games-Tournament (TGT) and Student Teams Achievement Divisions (STAD) do explicitly include students tutoring one another within small groups. Although peer tutoring may also involve pairs of students tutoring or teaching one another different materials, cooperative learning most often implies that students collaborate in groups larger than two and that they learn the same material (Slavin, Leavey, & Madden, 1984, p. 410).

Small Group Work in the Education of the Gifted

Small group learning has a considerable history in gifted education. Many of the most widely adopted enrichment models actively encourage the use of group work with academically talented students. For example, the Osborn-Parnes creative problem solving model involves the use of group brainstorming and other forms of social interaction among participants (Isaksen & Treffinger, 1985). Principles of creative problem solving have also been adapted to serve as the basis for the Future Problem Solving Program, a team-based curriculum designed to enhance students' thinking about technological, social, and community problems (Torrance, as cited in Clark, 1992).

In Renzulli's (1986) *Systems and Models for Developing Programs for the Gifted and Academically Talented*, eight of the fifteen models specifically recommend group work for gifted students, and three others include group work implicitly. Most notably, the Enrichment Triad Model (Renzulli, 1977), the Purdue Three Stage Model (Feldhusen, 1980), and the Autonomous Learner Model (Betts & Knapp, 1980) have explicit group process components and devote considerable attention to the development of small group investigations with students.

Controversy Over Cooperative Learning

Given that educators of the gifted have an interest and commitment to group work and that cooperative learning is a group learning model, why is there controversy about the use of cooperative learning with academically talented students? The source of the controversy may lie in the focus of cooperative learning, the nature of the claims made by its advocates, and the implications for curricular access and the motivation to learn for academically talented students.

To understand these issues, it is necessary to have a working knowledge of the most common models of cooperative learning. The most widely known of them were developed by three groups of advocates: (a) Slavin and associates, (b) the Johnsons, and (c) the Sharans and S. Kagan. The Sharans and Kagan do not collaborate directly, but both have developed group investigation types of models. While there are areas in which the developers agree, there are areas in which the groups of advocates differ quite explicitly. Differences among these models include their relative emphasis on competition among the small groups, the use of external rewards, group versus individual grading practices, and general versus specific subject matter learning. The following section of the paper describes briefly several of the more popular cooperative learning applications. The descriptions highlight the characteristics of the models which have implications for academically talented students. A summary of the cooperative learning models is presented in Appendix A.

Common Models of Cooperative Learning

Teams-Games-Tournament (TGT)

Developed by Edwards and De Vries (1972), TGT is a generic, organizational strategy which can be used in any subject matter area. Students are placed in four member heterogeneous teams. They receive a teacher directed lesson, help one another master the material, and compete in weekly tournaments. The tournaments are organized by "tables" of three similarly achieving students from different four member teams. In other words, high achieving students are regrouped to compete with other high achieving students; low achieving students compete with other low achieving students. The winner of a tournament table earns points for his or her original four person team. High scoring teams receive team rewards like certificates or other group recognition. Despite the achievement grouping in TGT, the lessons presented to the students, the materials completed by them and the pace of instruction are generally the same for each student. Thus, no curriculum differentiation for the more able learners in the classroom appears likely. Worksheets are the primary materials used in TGT, and Slavin (1991b) noted that TGT is best suited to basic skill instruction.

Student Teams Achievement Divisions (STAD)

According to Slavin (1986), the generic STAD model works best with material that has single, correct answers and is most likely to be used in mathematics computation, spelling, language usage, mechanics, and grammar. As in the TGT model, students in STAD are placed in four member heterogeneous groups for teacher directed instruction. Following instruction, team members assist one another with mastery of the material. The tournaments of TGT are replaced by individually administered quizzes in which students do not assist one another. Points are calculated by comparing students' current quiz grades to their previous performance. In other words, students receive points based on improvement. Perfect papers are recognized with a maximum score. In general, STAD like TGT, was developed to provide group-paced, grade level instruction in basic skill areas.

Team Accelerated Instruction (TAI)

In contrast to TGT and STAD which are generic strategies, TAI was developed by Slavin and associates for pre-algebra mathematics instruction in grades three through six. It includes specific TAI instructional materials on basic mathematics operations and topics: addition, subtraction, multiplication, division, numeration, fractions, decimals, ratio, percent, statistics, and algebra. In TAI, students take a placement test and begin instruction at an appropriate place in an individualized mathematics sequence. Students may proceed at different rates and work on different units which contain a guide page reviewing the concepts, skill practice pages, formative quizzes, a 15-item unit test, and answer pages so that a student monitor may score the test (Slavin, 1986, 1990c).

TAI, which was renamed Team Assisted Individualization, uses the four member mixed ability team; however, students take final unit tests without the assistance of team members. Presumably, students who are more advanced are more likely to give assistance rather than receive it during cooperative seat work. Teams receive points on the basis of how many units are completed by members. Scores depend on the number of tests passed, perfect papers, and completed homework. Twice each week, students are also given mathematics facts tests in basic operations. After each three-week period of individualized instruction, the teacher conducts whole class instruction for one week.

Cooperative Integrated Reading and Composition (CIRC)

Slavin and his associates have also developed a cooperative learning model for reading and writing in the elementary grades. Research studies have been reported for grades 3-4 and grades 2-6 (Stevens, Madden, Slavin, & Farnish, 1987; Stevens, Slavin, & Farnish, 1991). Using basal readers, students are assigned to teams composed of members of different reading groups. Pairs of students from two different reading groups are recommended. According to Slavin (1986), "a team might be composed of two students from the top reading group and two from the low group" (p. 33). If the school has adopted a whole class reading program, and all students in the class are using the same basal, CIRC is implemented with heterogeneous groups. Teachers continue direct instruction with reading groups once a week while the remaining team members engage in a variety of activities like reading quietly to one another, making predictions, practicing spelling and vocabulary, and writing about what they have read. There are tests over the basal material which include a comprehension measure, original sentences composed with vocabulary words, and a word list the student reads aloud to the teacher. Teams receive their points from the individual scores received by students on tests and from writing assignments. Achievement criteria are specified; teams that meet the criteria receive certificates. CIRC also includes writers' workshops and parental supervision of trade book reading at home.

Johnsons' Circles of Learning or Learning Together

The Johnsons have emphasized group process and cooperation in contrast to competitive and individualistic learning in the classroom. They define cooperative learning as "the instructional use of small groups so that students work together to maximize their own and each other's learning" (Johnson, Johnson, & Holubec, 1990). Groups of two to six individuals are recommended; heterogeneity is encouraged. They suggest that high, medium, and low ability students be placed together for the maximum effect, and they recommend that unmotivated students be placed in a group with on-task students. The Johnson model of cooperative learning is characterized by interdependence (we all sink or swim together) and by the explicit and sustained teaching of structured social skills. They suggest several ways to build interdependence. Examples include:

1. assigning students particular roles to play in the small group, for example, the "reader "or the "checker" or the "noise monitor"
2. distributing one set of materials to a group
3. asking the group to complete a single group product, report, or paper.

Like TGT and STAD, the Johnsons' basic model is generic rather than subject specific. Circles of Learning or Learning Together differs from TGT and STAD in its avoidance of overt competition and in its use of group products for group grades.

Cooperative Controversy

Cooperative Controversy, a later adaptation of the Johnsons, relies on the constructive use of conflict to increase learning (Johnson, Johnson, & Holubec, 1990). Heterogeneous groups of four students are given materials about a controversial topic—the Johnsons initially developed learning packets concerning the hunting of wolves in Northern Minnesota. The learning group is structured somewhat like a simple form of debate. Two students take one side of the controversial issue, the remaining two team members argue from the opposite side. Then the two pairs of students switch sides and argue the opposite points of view. After the "debates," the group is asked to achieve consensus. Presumably, the same kinds of group products or group grades would be possible in this form of cooperative learning as in the original Circles of Learning or Learning Together. In the research studies conducted on Cooperative Controversy, students were apparently limited to the materials distributed to the group as background for the debate and consensus activity (R. Johnson, Brooker, Stutzman, Holtman, & D. Johnson, 1985).

Jigsaw and Jigsaw II

The early Jigsaw model developed by Aronson and associates (1978) was designed to be used with narrative materials in the core content areas like social studies, science, literature, and other school subjects in which the goal is to learn concepts rather than skills. In the original Jigsaw, members of heterogeneous groups were given individual sections of material. Thus, each member of the group possessed unique knowledge and an individual's contribution was necessary to the group's successful completion of the learning task. According to Slavin (1986), the original Jigsaw was difficult to manage because sections of content texts rarely make sense on their own without the preceding or subsequent sections. Thus, students were asked to read "disembodied" materials or teachers were required to rewrite the materials so that textual passages could stand alone.

To address these problems, Slavin (1986) developed Jigsaw II. In Jigsaw II, heterogeneous groups of students are assigned chapters or sections of narrative material to read. Presumably, these would be grade level materials if the groups are heterogeneous, and all students are reading the same materials. Each student is given an "Expert Sheet" which focuses his or her reading on a particular subtopic embedded in the text. After the students have finished reading the material, they regroup from teams into expert groups, so that students who have been reading for the same purpose have the opportunity to discuss their subtopic. It is also recommended that the expert groups be composed of high, medium, and low achieving students. The expert groups then disband; members return to their original heterogeneous groups and teach their particular subtopic to other team members. Thus, each member serves as the teacher for one portion of the material. Students complete brief quizzes (a minimum of eight questions or two questions per subtopic) over all topics and their teams receive scores based on the improvement of each member. As is the case with TGT, STAD, TAI, and Cooperative

Controversy, the Jigsaw models rely primarily on grade level printed materials which can be mastered by all students.

Group Investigation

In addition to the cooperative learning models which are largely structured around traditional texts and classroom materials, there are two cooperative learning applications characterized by an interest-based, investigative approach. The early version, Group Investigation, was developed in Israel by Sharan and Sharan (1976). A similar model, Co-op Co-op developed by Kagan (1985), is reviewed in the following section. The two cooperative learning group investigation models share some characteristics with the group and independent study recommended for academically talented students.

Characterized as cooperative group inquiry, the Sharans' Group Investigation model involves academically and ethnically heterogeneous groups of students in the study of specific topics. Sharan and Sharan (1989/1990) suggest a six step process.

1. Small groups of two to six students select specific subtopics from an area or problem proposed by the teacher.
2. Students and teachers plan the activities and goals relevant to their subtopics. At this stage, small groups also select one member of the group to serve on the steering committee.
3. Students carry out the learning plan with assistance from the teacher. The plan allows for division of labor so that students may work individually to locate and learn their portion of the group assignment.
4. Students share, analyze, and evaluate the information with respect to preparing a group presentation to all classmates. The teacher meets with the steering committee to coordinate each group's presentation for the whole class.
5. Groups present their topics via a final report to the class.
6. Teachers and students evaluate the contribution of each group to the class. Evaluations may be group, individual or both. Y. Sharan (1990) also suggests the use of individual tests which include both higher and lower level items.

Although heterogeneity is encouraged, students may select which subtopic or interest group they wish to join. Presumably, students have access to any materials, including reference materials and other library resources relevant to their subtopic. The most extensive research study on Group Investigation was conducted in Israel with problems in history and geography (Sharan & Shachar, 1988).

Co-op Co-op

Developed by Kagan (1985) for college students, a key feature of Co-op Co-op is its student orientation. In this regard, Co-op Co-op has much in common with the interest based elements of the Enrichment Triad Model (Renzulli, 1977). Co-op Co-op students begin with a whole class discussion in some subject area to be covered in the curriculum. Through the discussion, the teacher and the students discover what topics or subtopics interest them. The group activities are centered around these emergent topics.

As with all of the previous cooperative learning applications, students involved in Co-op Co-op are assigned to heterogeneous teams. The four or five member teams are allowed to select their own topics with teacher guidance. Within each of the heterogeneous groups, individual students select a mini-topic which contributes to the overall topic of the group. According to Kagan (1985), it is predictable and acceptable that some students with greater abilities and interests may contribute more to the effort. However, all students should make some contribution.

Individual students now prepare mini-topic presentations through various kinds of information gathering activities. Like the preparation for independent projects common to programs for gifted students, Co-op Co-op encourages library research, interviewing, original data gathering, or creative products. Individuals present their mini-topic to their team members; teams present an integrated group project to other teams in the classroom. Co-op Co-op also includes an evaluation component. Teachers evaluate a written product for each mini-topic, team members evaluate one another for contributions to the team, and the class evaluates the team presentations. To date, limited empirical research has been published on Co-op Co-op.

Structural Approach to Cooperative Learning

In addition to Co-op Co-op, Kagan (1989/1990) has also recommended several short term cooperative activities termed "structures." Several of these are types of group discussion or simple sharing activities. In Numbered Heads Together, the teacher asks a question and students discuss the answer among group members. The teacher then asks one child to give the answer. Kagan also recommends structures developed by other educators such as Think-Pair-Share in which pairs of students discuss a question or topic and then share their thinking with the class (Lyman, as cited in Kagan, 1989/1990).

Groups of Four

Two other cooperative learning models appear to have a discovery approach. The first of these was developed for mathematics by Burns (1981). Emphasizing a cooperative problem-solving approach to learning, the research evidence on this application has not been extensive or promising (Slavin, 1986). In one study conducted by its originator, Groups of Four resulted in improved problem-solving skills for the students when compared with the traditional classroom (Burns, 1981). Classroom materials with appealing activities have been developed for students in the elementary grades (Burns, 1987); however, the author does not propose the model as a comprehensive mathematics curriculum.

Descubrimiento or Finding Out

The second discovery approach application is an elementary school hands-on science program primarily developed for bilingual classrooms. Students work together at learning stations on experiments to discover specific scientific concepts and principles. Students may not move from station to station until all members of their heterogeneous group have completed the activities or mastered the concepts. Materials are printed in English and Spanish (De Avila & Duncan, 1980). The work has been generalized to treat status differences among groups of children (Cohen, 1986; Cohen, Lotan, & Catanzarite, 1990). Descubrimiento encourages heterogeneity in groups and recommends various strategies for equalizing the status of group members so that high status (high achieving) children with advanced knowledge or with leadership skills do not dominate low status children in the group. Little research beyond the work of the developers has been published on Descubrimiento; however, one study reported decreasing achievement disparities between high and low achieving children (Cohen, Lotan, & Catanzarite, 1990). As reported in Cohen (1986), some curriculum materials have been developed (Navarrette, Cohen, De Avila, Benton, Lotan, & Parchment, 1985).

Applying Cooperative Learning Research to Academically Talented Students

Cooperative learning research has investigated the effects of various types of cooperative strategies on a broad range of outcomes: academic achievement, affective and or attitudinal measures, and race relations. The research reports consistent, positive effects in cross-racial relationships (Johnson & Johnson, 1981; Warring, D. Johnson, Maruyama, & R. Johnson, 1985), in acceptance, and achievement of students with intellectual or emotional handicaps (Johnson & Johnson, 1982; Madden & Slavin, 1983; Salend & Sonnenschein, 1989; Slavin, 1984), and in basic skills achievement in the academic content areas (Slavin, 1980). In a recent review, Slavin (1991b) also listed improved self-esteem and self-concept as outcomes for those cooperative models he has helped to develop (Slavin, 1990a; Slavin and Karweit, 1981; Slavin, Leavey, & Madden, 1984). These are all worthy and significant outcomes. However, the advantages of cooperative learning for academically talented students are tempered by the nature of the research base on cooperative learning itself and by the ways it has been translated into practice.

Sins of Omission

One of the most difficult problems in investigating the effectiveness of cooperative learning for academically talented students is that these students are not the population of interest in the research base. A recent computer search of the PSYCHINFO data base from its inception in 1967 to December 1989 resulted in 181 entries on cooperative learning (Robinson, 1990). Only two of these examined giftedness (Chance & Chance, 1987; Smith, Johnson, & Johnson, 1982). A similar ten year search of ERIC yielded only three out of 295 entries. Two of these three alluded briefly to the desirability of cooperation and did not report data on the effectiveness of cooperative learning (Adams & Wallace, 1988; Clifford, 1988). The third ERIC citation is a description of academically talented students engaging in problem solving not specifically characterized as cooperative learning (Willard, 1989).

Updates of the PSYCHINFO and ERIC searches from January 1990 to September 1991 indicate that attention to academically talented students in the empirical research on cooperative learning has not increased substantially. The updated PSYCHINFO search resulted in twenty-three entries, but only one study investigated the effects of cooperative learning on students identified as high ability (Johnson, Johnson, Stanne, & Garibaldi, 1990). The updated ERIC search produced six relevant entries. Two of these entries are rebuttals to an article commenting on the positive effects of ability grouping for gifted students (Joyce, 1991; Slavin, 1991a). Two others debated the advantages and disadvantages of cooperative learning for bright students (Robinson, 1990; Slavin, 1990). And, two are discussions of the reform movement as it relates to gifted students (Schatz, 1990; Sicola, 1990). Following these searches, an additional study which included academically talented students only and which investigated cooperative versus competitive learning was uncovered (Kanevsky, 1985).

Policies and Practices Ahead of the Data

While it is certainly within the right of cooperative learning researchers not to investigate its effects on gifted students, the omission has produced some unfortunate translations into the world of practice. Overgeneralization is one of them. For example, an *Educational Leadership* article states *in headlines* that "cooperative learning can benefit all students, even those who are low achieving, gifted, or mainstreamed" (Augustine, Gruber, & Hanson, 1990, p. 4). No specific support is cited for the statement as it relates to gifted students, although the article provides an example of gifted students who benefitted from "learning to get along with others."

Other advocates of cooperative learning, have written articles or advice columns for their proponents about what to say to parents of bright children who are concerned about their child's achievement and motivation in cooperative learning groups (Johnson & Johnson, 1989, 1991). The Johnsons suggest that the concerns or objections voiced by parents or educators of academically talented children may not be rational and allude to unidentified research studies to support their position that academically talented students are better off in cooperative learning groups.

Finally, with increasing frequency, districts may assert that the needs of their academically talented students are best met by helping others through cooperative learning settings in the heterogeneous classroom. On that basis and to cope with the politically sensitive issue of tracking in secondary schools, some districts may cease to offer advanced courses. Such policies are implemented in the face of the evidence that advanced classes which offer subject matter acceleration produce clear, consistent positive effects for academically talented students (Kulik, 1992; Kulik & Kulik, 1984; Rogers, 1991b). Further, other strategies such as homogeneously grouped instruction designated for academically talented students and accompanied by changes in the curriculum permit them to achieve better and to express more positive attitudes toward school (Kulik & Kulik, 1991; Shore, Cornell, Robinson, & Ward, 1991).

The practice of substituting cooperative learning for other learning opportunities that are demonstrably effective with academically talented students is all the more distressing because it is made on the basis of research findings which are difficult to generalize to academically talented students, which fail to make crucial comparisons among treatments, and which do not investigate several outcomes considered important for academically talented students.

Problems of Definition and Sampling

Very few cooperative learning studies with identified gifted or high ability students are available in the published literature. Of the five citations found in the combined search of PSYCHINFO and ERIC, only one reports outcome data (Smith, Johnson, & Johnson, 1982), and it illustrates the difficulty in evaluating the applicability of the research base to academically talented students. Although Smith, Johnson, and Johnson (1982) compared handicapped, regular, and gifted students, no specific descriptive information about the gifted students nor the identification procedures used by the district to select them were included in the report. In addition, the sample was small—only 14 students identified as gifted were included. In the Kanevsky study (1985), 40 highly gifted (IQ above 145) third and fourth grade students were investigated in cooperative and competitive conditions. Students were randomly assigned to one of three conditions for learning basic math facts: computer-assisted instruction (CAI) with a cooperative goal structure, computer-assisted instruction (CAI) with a competitive goal structure, and a traditional condition in which students were drilled with flash cards. Students in the CAI conditions outperformed the traditional control; however, there were no differences between the CAI cooperative and competitive conditions on measures of achievement or socialization (i.e., their desire to work alone or in groups).

Defining Giftedness by Single Achievement Measures

It is unreasonable to limit this review of the research base to the two published empirical studies which explicitly investigated students labeled as gifted (Kanevsky, 1985; Smith, Johnson, & Johnson, 1982). Other studies have investigated the differential effects of cooperative learning on students defined as high, medium, and low achieving. One might assume that the results reported for high achieving groups within these studies are directly applicable to academically talented students.

However, caution is advised; the ways in which the achievement or ability groups are defined is fraught with difficulty. For example, in two studies comparing the effects of mixed ability and uniform ability cooperative learning groups, Webb (1982a) defines ability as the average of the mathematics and reading stanines on the Comprehensive Tests of Basic Skills (CTBS). Unfortunately, the only data reported are the mean stanines for the sample as a whole. No ranges or means are reported by "ability" group.

In a second study, Webb (1982b) reports that the schools from which the data were collected define ability as performance on a 40 item mathematics measure designed by the teachers as a mathematics placement test. A range of 20 to 38 and a mean of 31 are reported for the full sample. Again, however, no descriptive data specific to the "ability" sub-groups are provided.

In other examples, Lucker, Rosenfield, Sikes, and Aronson (1976) defined high and low ability groups by the top 25% and the bottom 25% on an unidentified measure of reading level, expressed presumably in grade equivalents. Mervasch (1991) reported two studies in mathematics in which high and low achieving groups were defined as scoring above and below the median on a teacher made placement test. Again, the descriptions of the students are not sufficiently detailed to permit generalizations of the results to academically talented students.

Researchers often designate high, medium, and lower achieving groups by the top, middle, and lower one third of the classroom on an achievement measure. In other words, the high achieving group includes the top 33% of the students. In contrast, most programs for academically talented children serve 15-20% of the students identified by multiple measures. Thus, the high achieving groups are not congruent with identified academically talented children. In a later analysis, perhaps in response to these criticisms of the cooperative research base, Slavin (1991a) reported effects for high achieving students. However, he continued to define groups on the basis of single achievement measures with no ranges reported.

Defining Giftedness by Teacher Judgment

Other studies define ability or achievement designations solely on teacher judgment (Johnson & Johnson, 1981; Johnson, Johnson, Tiffany, & Zaidman, 1983). What information was available to the teachers, what factors they considered, or how they made decisions is not provided. Gifted underachievers, less likely to be teacher nominated, might be embedded in the medium and low achieving groups further obscuring our understanding of the effects of cooperative learning on academically talented students. Finally, a few studies which discuss subgroups do not define ability levels at all (Johnson, Johnson, & Stanne, 1986; Johnson, Skon, & Johnson, 1980). It is not that gifted students don't exist in these samples. Most surely, by chance alone, they do. However, the descriptions of the students are not detailed enough nor are the analyses performed in such a way to examine the effects of cooperative learning closely for these students.

Not to belabor the point, these examples of cooperative learning studies demonstrate the difficulty in generalizing their results to gifted students and the danger in subsequently deriving educational implications and policy statements from them. "High ability" as defined by single achievement measures of basic skill achievement batteries, teacher constructed placement tests, or teacher judgment alone should not be used interchangeably with giftedness. The indicators are too crude to give us a "picture" of the kinds of students included in the high achieving groups.

Missing Comparisons Among Groups

An additional difficulty in interpreting studies of differential effects on subgroups of students involves the kinds of comparisons made by the researchers. Return to the Webb (1982b) study for an illustration. In an investigation of the mediating variables in cooperative learning groups, Webb (1982b) compared mixed ability groups (1 high student, 2 medium students, 1 low student) with uniform ability groups (3 to 4 medium students). Although the students' individual differences were described, no comparison between high ability students in both kinds of grouping arrangements was possible. In fairness to Webb, she clearly states that her population of interest is medium ability students. This example is simply offered to illustrate that not all studies, even those which include and describe students of differing ability or achievement levels, make outcome comparisons necessary to fully understand the effects of cooperative learning on academically talented students.

Problems of Weak Comparisons

Perhaps the most misleading characteristic of the research base on cooperative learning is its reliance on weak treatment comparisons. Two of these comparisons account for most of the claims of superiority by cooperative learning advocates: (a) the traditional classroom and (b) the individualistic goal structure. Each of the weak comparisons will be discussed as they relate to educational practice for academically talented students.

The Traditional Classroom as a Weak Comparison

At present, the most common treatment comparison in the cooperative learning research base is the traditional classroom, characterized by large group, teacher driven direct instruction and individual seatwork. In Sharan's (1980) review, all four studies investigating Jigsaw compared that cooperative learning model to the traditional classroom. Slavin (1980) summarized ten studies investigating Teams-Games-Tournament (TGT) and six studies of Student Teams-Achievement Divisions (STAD) which reported many positive effects for cooperative learning. Several, although not all, of these studies used the traditional classroom as the control or comparison. In a more recent review, Slavin (1991b) commented that of the 67 cooperative learning studies which have measured effects on student achievement, all "compared the effects of cooperative learning to those of traditionally taught control groups" (p. 75). In approximately 60% (41 out of 67) of these studies, students in the cooperative learning condition outperformed students in the traditional classroom.

Unfortunately, educators of academically talented students rarely suggest that the traditional classroom is the educational treatment of choice for these learners. In fact, the gifted education movement is primarily one born out of the resistance to placing academically talented students in lock-step, grade level traditional classrooms. That cooperative learning presents some advantage over the lock-step grade level traditional classroom is hardly news. Neither is it enough. The case for cooperative learning will be compelling to educators interested in talent development only when comparisons are made with classroom practices which are successful with academically talented students. For example, the cumulative research base of the last thirty years repeatedly demonstrates that subject matter acceleration permits increased achievement for academically talented students (Daurio, 1979; Kulik & Kulik, 1984, 1991; Lynch, 1990; Petersen, Brounstein, & Kimble, 1988; Rogers, 1991; Shore, Cornell, Robinson & Ward, 1991). The conservative and telling test of the superiority of cooperative learning for academically talented students requires, at least, comparisons with various types of acceleration.

The Problem of Low-Level Outcome

One reason the traditional classroom is a weak comparison for academically talented students is its emphasis on basic skills. The basic skills focus is characteristic of many cooperative learning studies as well, and the majority of these studies have used basic skills measures to define student achievement. Several of the studies report subtests of basic skills batteries like the Comprehensive Tests of Basic Skills (CTBS) (Slavin, 1984; Slavin & Karweit, 1985; Slavin, Madden, & Leavey, 1984) or teacher made content tests of factual knowledge (Kanevsky, 1985, Lucker, Rosenfield, Sikes, & Aronson, 1976; Yager, Johnson, Johnson, & Snider, 1986).

The content areas represented by these studies include spelling (Widaman & Kagan, 1987), language mechanics (Slavin, 1978), vocabulary (Stevens, Madden, Slavin, & Farhish, 1987), and mathematics (Slavin & Karweit, 1985). A closer examination of these is instructive. In the case of mathematics, significant differences in favor of cooperative learning occur more frequently in basic computation than in mathematics concepts and applications (Slavin & Karweit, 1985). In a study comparing handicapped and nonhandicapped youth, no measures of concepts or applications were reported (Slavin, 1984).

In fairness to cooperative learning researchers, not all studies define achievement as basic skills. Some have defined achievement outcomes in ways more relevant to academically talented students. They do, however, present mixed results (Robinson, 1990). The most promising effects on higher level outcomes are reported in one lengthy and well designed study of the Group Investigation model (Sharan & Shachar, 1988). Three hundred and fifty-one eighth grade students of mixed ethnicity were taught either through the Whole-Class or Group Investigation method. Although the primary focus of the study was to assess the effects of cooperative learning on students' language behavior in multi-ethnic groups, a test of academic achievement which included both high and low level items, favored the classrooms using the Group Investigation method. It should be noted that Group Investigation closely resembles the group project work recommended by educators of the gifted for academically talented students.

Individualistic Learning as a Weak Comparison

A second type of treatment comparison is individualistic learning, in which each student's achievement is independent of others in the classroom. Because the literature in gifted education is filled with recommendations for independent study as a means of accommodating the learning needs of bright students, this comparison is of particular interest. However, in order to evaluate the applicability of studies comparing individualistic and cooperative learning, it is necessary to describe both conditions and their outcome measures carefully. Most of these studies have been conducted by Johnson and Johnson and their associates who operationalize the conditions in the following way:

> In the cooperative condition students were instructed to work together as a group, completing one set of papers as a group while ensuring that all group members

> giving their ideas and suggestions, and with the teacher praising and rewarding the group as a whole....In the individualistic condition, students were instructed to work on their own, avoiding interaction with other students, and with the teacher praising and rewarding each student individually. (Johnson, Johnson, Tiffany, & Zaidman, 1983, p. 191)

In general, students in both conditions are given teacher-selected self-contained packets of material (Jones & Steinbrink, 1989). Two studies presented material as computer assisted instruction (Johnson, Johnson, & Stanne, 1985, 1986). In the cooperative condition, children were encouraged to communicate with one another and were permitted to *turn in one assignment* for the group. In the individualistic condition, students were asked not to talk and were required to complete and to turn in the assignment on their own. In at least two of these studies, the outcome measures included comparisons of the frequency with which students working in groups and students directed to work alone talked with their classmates (Johnson, Johnson, & Stanne, 1985, 1986). Greater frequency scores were offered as evidence of the effectiveness of cooperative learning. The difficulty with the individualistic learning comparison as the Johnsons have defined is that it bears little resemblance to the real classroom, even the teacher centered traditional classroom. Few teachers demand no student interaction, pass out self-contained packets of materials for students to digest alone and in silence, and refrain from direct teaching. The more conservative test of cooperative learning for the basic model by the Johnsons would be to compare it with other kinds of classroom settings which permitted students to interact with one another.

Summary of Research: Applicability to Academically Talented Students

To summarize, the effects of cooperative learning on academically talented students are difficult to assess. First, they are not the population of interest. Thus, few studies have explicitly identified them, described them adequately in the sample, or analyzed outcomes by clearly defined achievement subgroups. Second, the comparisons in the literature are weak. Many studies, particularly those by Slavin and associates, rely on the traditional classroom as the control and emphasize basic skills outcomes. Other studies include the individualistic comparison in which students are directed not to talk and to complete written assignments on their own, often without direct instruction from the teacher. Thus, the comparisons made in the literature are weakened by: (a) the selection of the traditional classroom with an emphasis on basic skills outcomes and (b) the implementation of the individualistic learning condition as lonely and punishing. Assertions by advocates of cooperative learning that theirs is a superior instructional model for academically talented students are not currently supported by the research literature. Failure to make crucial tests weakens their position. In other words, cooperative learning in heterogeneous classrooms has not been compared with educational treatments of choice for academically talented students.

Issues in Practice

Cooperative learning presents challenges to decision makers concerned with the education of academically talented students. While the weakness in cooperative learning research as it relates to academically talented students is a correctable problem, adding to the research base on academically talented students will take time. Unfortunately, decision makers are faced with the need to make decisions now. To make well-informed decisions for academically talented students, two issues in practice must be addressed: (a) curricular coverage and pacing and (b) group work and motivation.

Curricular Coverage and Pacing

A substantial body of work over the past thirty years indicates that access to advanced material, acceleration, produces consistent, positive achievement gains (Brody & Benbow, 1987; Daurio, 1979; Kulik, 1992; Kulik & Kulik, 1984 & 1991; Rogers, 1991; Shore, Cornell, Robinson, & Ward, 1991). For example, Kulik and Kulik (1984) conducted a meta-analysis of 26 controlled studies in which elementary and secondary accelerated students were compared with comparable nonaccelerated students. Accelerants moved ahead of nonaccelerants by nearly a full grade level. In a comprehensive review of various kinds of acceleration, Rogers (1991) reported that several different accelerative strategies, including for example, curriculum compression and subject acceleration, resulted in significant achievement gains for academically talented students. Reis and Purcell (in press) noted that elementary teachers reported between 39-49% of the curriculum in mathematics and 36-54% of the curriculum in language arts could be eliminated because gifted students demonstrated mastery of the material prior to instruction. Finally, the extensive evaluations of Talent Search participants demonstrate that adolescents taking college-level courses consistently demonstrate knowledge gains (Brody & Benbow, 1987; Lynch, 1990; Petersen, Brounstein, & Kimble, 1988).

An examination of the cooperative learning models reveals that some restrictions to curricular coverage and pacing are "built into" the models. For example, in Descubrimiento, students have opportunities to investigate novel problems at various learning centers in the classroom. In the early implementation of the model, students were permitted to move freely from station to station as they acquired concepts and skills and then moved to other centers to learn new information and skills. However, Cohen, Lotan, and Catanzarite (1990) noted that high status (generally defined as high achieving) students continued to learn more than the low achieving students in the group. Subsequently, the model was adapted so that no student could move on to a new learning center until all members of the heterogeneous group had learned the material at the current learning station. Such a practice may inhibit an academically talented student from accelerating his or her own learning.

Regrettably, the educational community is wary of acceleration for academically talented students (Southern & Jones, 1991). Some believe that only a minority of students will be able to benefit from accelerative opportunities (Slavin, 1988). Others believe that such opportunities constitute "pushing" and may result in an array of personal and social problems for these students (Southern, Jones, & Fiscus, 1989). Still others see such accelerative opportunities for academically talented students as dangerous because they may enhance disparities in achievement.

Contrast the reluctance of the educational community to admit that curricular exposure and accelerated pacing has positive and powerful effects for academically talented students to the well received argument on behalf of children confined to low "tracks" in public schools. It has been argued that one of the contributing factors to the low achievement of low achievers is that they are not given challenging curricular fare (Gamoran, 1990; Oakes & Lipton, 1990). It is the argument of curricular access. If students are given the opportunity to learn more, very often they will do so. This forceful logic applies to arguments on behalf of academically talented students as well. To restrict access to advanced curriculum and to retard the rate at which academically talented students progress through the curriculum by organizing instruction in grade level cooperative learning groups for the majority of the school day is not defensible and may result in boredom and repetition for these students.

To address the issue of curricular coverage and pacing, decision makers may wish to consider the relative benefits of models which are less likely to restrict access for academically talented students. These models include the group inquiry models, Group Investigation and Co-op Co-op and the "individualized learning" model, TAI. Group Investigation and Co-op Co-op encourage students to use multiple sources, pursue background reading, and place fewer limits on students' efforts to acquire information. TAI utilizes placement tests and opportunities for individualized pacing in mathematics.

Group Work and Motivation

The second issue which must be addressed in practice is the motivation of academically talented students in cooperative learning groups. Specifically, how do academically talented students feel about cooperative learning? What cooperative learning conditions are most likely to affect motivation positively for these students?

Voices From the Classroom

Remarkably absent from much of the research literature and from much of the discussion about cooperative learning is rich information about academically talented students' feelings toward cooperative learning. Although exploratory, two recent studies provide insights into the experiences of academically talented students with group learning.

In a qualitative study of a middle school classroom, Clinkenbeard (1990, 1991) sought to uncover the experience of being labeled gifted and placed in a special class. As part of the observational study, students were asked to write an essay comparing and contrasting "being in a class with kids who are all about as smart as you as compared to a class where you're the smartest." In the analysis of the written products, one of the four major themes to emerge was related to group work. Recall that Clinkenbeard's observational work was not a study of cooperative learning; rather a descriptive study of life in the classrooms for these students. Excerpts from their essays are telling.

> Many times when our teachers put us in a group work situation, it never works out. The gifted students always end up doing all the work. After it's over, the other kids were mad at us for doing that. Weird uh? (Clinkenbeard, 1991, p. 6)

> One more thing that's different from gifted class is group work. When doing group work in a regular class, most of the time the gifted student ends up doing all the work and the others get all the credit. In gifted classes doing group work, everyone takes part and everyone gets a fair grade for whatever they do to help the project, report, etc. (Clinkenbeard, 1991, p. 6)

> I think my worst problem is the group work. I think that group work in your own gifted class is fine, but in other classes the other kids expect you to do all the work. In one instance, I was in a group and we did a major project but one kid didn't do anything even though he had said he would. And so he brought our grade down and he got an 88! (Clinkenbeard, 1990)

> Once I had to move to a different period social studies. The teacher gave me two people from a group that wasn't doing {?} for a report. He said 'You are smart y'all should be able to do something very good.' When we got our report grade back they had same grade I had and he knew I had done all the work. (Clinkenbeard, 1990)

What academically talented students appear to find objectionable is not group work itself, but compensatory group work forced on them by poorly motivated team members and with the knowledge of the teacher. While it might be easy to dismiss these complaints as simply the isolated by-product of a poorly implemented cooperative program, such a dismissal does not correct the problem.

Similar "voices" were raised in a pilot survey of academically talented students' attitudes toward cooperative learning (Matthews, in preparation). Academically talented students do not appear to object to learning in cooperative groups, particularly if those groups are composed of equally contributing members, but they do find the role of motivation monitor an uncomfortable fit.

Extrinsic Rewards and Intrinsic Motivation

One of the areas in which there is least agreement among cooperative learning advocates is the use of rewards, an issue which has implications for academically talented students. One of the assumptions underlying cooperative learning is that positive interdependence is necessary for an appropriately functioning group. However, experts differ on the best ways to induce such interdependence among students. Slavin and associates have opted for competitive opportunities among teams and for rewards such as team scores composed of individual achievements. Other less academic rewards are also suggested: certificates, recognition in a class newsletter, extra recess, a "super team" label. The Johnsons de-emphasize competition, accept group products and group grades, and also suggest rewards like stickers, stars, or a valued classroom activity. The Sharans incorporate group presentations, but with unique and identifiable contributions from individual members and with the safety net of individual exams for the purpose of assigning grades. The Sharans do not appear to emphasize stickers, certificates, or other extrinsic rewards for team recognition.

Cooperative learning has been criticized by some of its strongest advocates for its reliance on extrinsic motivators rather than on instrinsically motivating tasks (Kohn, 1991). Kohn's concerns are especially relevant to educators concerned with academically talented students. He suggests that the reliance on group grades, certificates, awards, and other rewards undermines the intrinsic interest students may develop in the learning task. Citing the work of leading researchers on motivation like Deci and Ryan (1985) and Lepper and Green 1978), Kohn (1991) cautions that the prominence of reward structures in many of the cooperative learning models may inhibit creativity and task involvement, and suggests that a reward driven student will be less likely to play with ideas and more likely to select tasks which are the easiest to complete, thereby giving one a chance to acquire more rewards.

Slavin (1991c) disagrees, and the examples he uses in his arguments are revealing. He takes issue with Kohn's interpretation of the literature on extrinsic rewards and points out that rewards do increase motivation "when the task involved is one that students would not do on their own without rewards". He goes on to state,

> I don't know many students who would put away their Nintendo games to do complex math problems, to write reports on the economy of Brazil, to write essays comparing Shakespeare and Moliere, or to learn to use the subjunctive case in French. (p. 90)

In fact, there are students who would do complex math problems simply for the pleasure of doing them, and there are students who would write because it provides a sense of accomplishment. Perhaps one of the reasons that external rewards are so crucial to the Slavin models is that less emphasis has been spent on developing interesting curriculum materials for the TGT, STAD, TAI, and CIRC applications than on developing elaborate management and scoring systems.

The key point to be made about rewards rests with the kinds of tasks students are asked to do cooperatively. If academically talented students are engaged in basic skills learning in cooperative groups, they may be more alert than they were in the traditional classroom, but they are still receiving the same curricular fare. Task involvement occurs only when a student is challenged and "gripped" by the task. In order for this most valuable kind of educational engagement, the academically talented student has to reach intellectually for content and skills they *do not know or do not have*. Intrinsic motivation for these students is not likely to occur for lengthy periods of time unless they are challenged and it is *unlikely* they will be challenged by grade level materials undertaken at a pace that assures all students in the group will complete them to a prespecified criterion. Unless there is an avenue for these students to get their hands on advanced materials, to encounter new information at a suitable pace, and to follow individual interests, they will be no more intrinsically motivated in cooperative learning groups than they were in traditional classrooms.

Grading and the Politics of Interdependence

Grading is a special case in the reward structure of cooperative learning. Some models suggest that cooperative learning groups may work together to submit a single product (Johnson, Johnson, & Holubec, 1990). In many, but not all cases, this group product then functions as the source of performance evaluation. In other words, individual grades may be assigned on the basis of the group product. Presumably, all team members receive the same grade for a group product unless the teacher is given information that one or more team members have not contributed to its completion. Given that children and adolescents rarely violate the norm of "not ratting on a mate," group products may result in the same grade for all students, regardless of their contribution.

Cooperative learning models which employ group grades for group products should be avoided for academically talented students. Under these kinds of conditions, these students are more likely to carry more than their share of the instructional burden. As Clinkenbeard (1990, 1991) indicates, these students may find unequal effort from team members distressing.

At least two, perhaps more, dynamics may be at work in this cooperative learning situation. First, many academically talented students have very high standards for themselves and for others. Completing a product which does not meet these internally imposed standards may be exceedingly worrisome to such students. For some perfectionistic children, the problem exists even when they have total control over their own product. If they are also concerned about the standards of a group product, the distress may be even more serious because they may perceive that they have less control over the outcome.

It would be easy to state that group products are just what these children need to learn how to compromise. However, compromising one's standards of excellence hardly constitutes a positive step in cooperation. Such a compromise, which may violate the child's own sense of what is the "right" level of care and concern over one's school work is more likely to induce resentment. Worse, it may result in a defeatest attitude that one cannot possibly do one's best and therefore, one should disengage from ownership of the product.

If group products are used at all with academically talented students, they should be organized in a manner which allows for the individual contribution of a student to be recognized. Two group investigation models lend themselves to group products with "individual" components. The Sharans' Group Investigation apparently evaluates group products although achievement is also monitored through safety net of individual test scores. In Co-op Co-op, students are graded on their own mini-topic performance, and this individual performance or product is then integrated into a group presentation. Group presentations are also evaluated in Co-op Co-op. Presumably not all students in the group receive exactly the same grade in all cases although it certainly might occur if all student presenters reached an agreed-upon criterion. In both Group Investigation and Co-op Co-op, there is an evaluation of each person's contribution by other group members. Although students are unlikely to "tell on" team mates, they may be able to give reasonable evaluations for individual students if the activity is handled carefully by the teacher and the group.

In summary, the motivation of academically talented students in cooperative learning groups is likely to be affected by the kind of task given them (is it sufficiently challenging?) and the degree to which all students in the group demonstrate effort to complete a shared product (are there "free rider" effects?).

Recommendations for Implementing Cooperative Learning With Academically Talented Students

Because cooperative learning demonstrates positive effects in race relations, basic skills achievement for some groups of students, and in a variety of social interaction and attitudinal variables, how might decision makers reconcile their concerns about cooperative learning for academically talented students with its benefits? What recommendations might be made? Which of the many cooperative learning models are likely to be most effective for academically talented students? What cautions ought to be kept in mind by decision makers?

This section includes five recommendations related to using cooperative learning most effectively with academically talented students. Where possible, the recommendations are research based. Due to the lack of attention to academically talented students in the cooperative learning literature, research on the educational practices most effective with academically talented students has also been cited to support the recommendations. Attempts have been made to identify areas in which the purposes, goals, or evidence from the two literatures may inform one another. Where noted, the following recommendations are also based on an analysis of the various cooperative learning models with respect to key issues which are important for academically talented students.

RECOMMENDATION ONE: Cooperative learning in the heterogeneous classroom should not be substituted for specialized programs and services for academically talented students.

Discussion: Cooperative learning should not be implemented as a substitute for a district's gifted program. First, the two programs have different purposes and goals. Second, cooperative learning models have not been compared to special educational programs and services for academically talented students in the research literature. Thus, no clear superiority for cooperative learning in the heterogeneous classroom over specialized programs and services for academically talented students has been established. McPartland and Slavin (1990) acknowledge that it may be necessary to retain separate offerings for academically talented students, particularly at the secondary level.

RECOMMENDATION TWO: If a school is committed to cooperative learning, models which encourage access to materials beyond grade level are preferable for academically talented students.

Discussion: One of the most serious limitations of cooperative learning models for academically talented students is the same limitation posed by an unresponsive traditional classroom—reliance on grade level materials which limit curricular access for academically talented students. Because the group investigation models and routinely encourage the use of reference materials, library and media resources, and other kinds of information gathering, these models are less likely to restrict academically talented students to grade level curriculum. The Sharan's Group Investigation model has the most compelling research support; however, it has been investigated only for history and geography content with junior high students in Israel (Sharan & Shachar, 1988).

RECOMMENDATION THREE: If a school is committed to cooperative learning, models which permit flexible pacing are preferable for academically talented students.

Discussion: This recommendation is related to the effectiveness of various forms of acceleration with academically talented students. In general, cooperative learning models require students to study the same materials and to master material at the group pace. Two models appear to present some relief for academically talented students in terms of instructional pacing: (a) Group Investigation in history and geography and (b) Team Accelerated Instruction (TAI) in mathematics.

Group Investigation allows students to research some information on their own. During such opportunities, presumably academically talented students would be able to read and study self-selected materials at their own pace. Although the students continue with a specific investigation until the class as a whole is ready to move on to other topics, academically talented students would be able to engage in the independent research for their subtopic at their own pace.

According to the description and materials accompanying TAI, students are pretested and given an individualized entry point in the upper elementary mathematics curriculum. Students may work through the units at their own pace for at least two weeks. Then they must stop and join a whole class unit for one week. While this solution is not perfect for academically talented mathematics students, it does allow them some flexible pacing. If mixed with computer access and some opportunities to engage in other forms of group problem solving with materials and topics not generally covered in the traditional mathematics curriculum, TAI would be less likely to inhibit the achievement of academically talented students than Student Teams Achievement Divisions (STAD), Teams-Games-Tournament (TGT), or other generic models applied to traditional mathematics texts and workbooks. To be most effective for these students, TAI may need to be implemented with cross-grade grouping.

RECOMMENDATION FOUR: If a school is committed to cooperative learning, student achievement disparities within the group should not be too severe.

Discussion: If the district is committed to cooperative learning in heterogeneous classrooms, there appear to be benefits for all students if the initial achievement disparities are not too severe. For example, a cooperative learning group comprised of high and medium achieving students or a group composed of medium and low achieving students may have the optimal chance for success. This suggestion is based, in part, on the studies of cooperative learning groups composed of a high, medium, and low achievers reviewed by Webb (1985). She found that in such groups, the high achiever tended to spend most of the group's time answering questions posed by the low achieving member or explaining material to the low achiever. The medium achieving student had fewer opportunities for discussion in groups where the broader range of achievement was represented. Achievement differences will be less disparate in high and medium achieving cooperative groups, and medium achieving students may benefit from the more challenging interactions characteristic of high achieving groups.

Finally, Slavin (1990a) observed that cooperative learning could be implemented with groups of academically talented students—that achievement differences among members might be relative rather than absolute. While there are no extensive studies of cooperative learning among groups of gifted students, support for Slavin's suggestion is found in two studies which included small numbers high ability students in homogeneous cooperative groups. In one study, the groups with the greatest achievement were those composed of high ability members (Bennett & Cass, 1988). In the second study, academically talented students working cooperatively in homogeneous groups expressed positive attitudes toward the experience (Rogers, 1992).

RECOMMENDATION FIVE: Academically talented students should be provided with opportunities for autonomy and individual pursuits during the school day.

Discussion: This recommendation targets educators who are sufficiently committed to group models that they may overuse cooperative learning with academically talented students. First, these students need the opportunities to develop self-direction as learners. Several of the most widely known models in gifted education are anchored by the use of student interests and student choice as key elements in an appropriately differentiated program for academically talented students (Renzulli, 1977; Treffinger, 1986). An interest-based curriculum provides students with the opportunity to make choices about what they learn, to have a greater stake in the choices they make, and to seek out educational experiences at an appropriate level of sophistication. Such autonomy in terms of individual interests is not always possible in group learning.

Second, academically talented students voice a preference for independent learning experiences (Boultinghouse, 1984; Dunn & Griggs, 1985). Like many creative adults, academically talented students may have a desire for quiet pursuits, solitary absorption with a task or topic, and opportunities for introspection. These needs also are not met in cooperative learning groups.

Many children need, desire, and can profit from solitary experiences in the school day. A student can make a quiet oasis even in a noisy classroom, a buzzing computer lab, or a busy library if he or she is permitted to do so. The apocryphal stories of creative adults who spent time alone and were rewarded with inspiration and productivity because of it are too numerous to dismiss. Decision makers need to assure time for academically talented children to engage in independent pursuits.

Perhaps one of the greatest challenges cooperative learning poses for academically talented students concerns the extent to which cooperation is confounded with conformity. Working cooperatively with others is *one* valuable goal of schooling. Developing one's personal identity and intellectual independence is another. School decision makers must keep both goals in mind as they set policies for teachers and students.

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Appendix A

Overview of Cooperative Learning Models

Appendix A: Overview of Cooperative Learning Models

Cooperative Learning Model	Author/ Developer	Recommended Grade Level	Recommended Subject/Level	Evaluation Procedures	Advantages/Disadvantages for Academically Talented Students
TGT Teams-Games Tournament	Edwards & De Vries	all grades	all subjects; basic skills	prior achievement used to establish homogeneous teams for tournaments-high scoring teams receive team rewards, i.e, certificates or privileges	**Advantages:** • None evident; no research on gifted students **Disadvantages:** • lessons and materials are the same for each student, primarily worksheets • group-paced
STAD Student Teams Achievement Divisions	Slavin	all grades	all subjects; basic skills, best with material which has single, correct answer	individual student points based on improvement; improvement judged from individually administered unassisted quizzes	**Advantages:** • None evident; no research on gifted students **Disadvantages:** • lessons and materials are the same for each student, primarily worksheets and quizzes • group-paced
CIRC Cooperative Integrated Reading and Composition	Slavin	elementary grades, primarily 2 through 5	reading, writing	teams receive points from individual scores on tests and writing assignments	**Advantages:** • opportunities for trade book reading and writer's workshops **Disadvantages:** • emphasizes grade level basal instruction for students who are likely to be above grade level in achievement

Appendix A: Overview of Cooperative Learning Models (continued)

Cooperative Learning Model	Author/ Developer	Recommended Grade Level	Recommended Subject/Level	Evaluation Procedures	Advantages/Disadvantages for Academically Talented Students
TAI Team Accelerated Instruction, also Team Assisted Individualization	Slavin	3-6	mathematics	individualized placement in a mathematics sequence; individuals receive points based on unassisted final unit tests; teams receive points based on number of units completed, number of tests passed, perfect papers, completed homework	**Advantages:** • placement according to mathematics achievement • flexible pacing possible **Disadvantages:** • not clear how far ahead the student is allowed to advance • TAI materials emphasize basic operations • students are responsible for paperwork management which reduces instructional time and time on academic task
Circles of Learning or Learning Together	Johnson & Johnson	all grades	all subjects; emphasis on social skills training	group grades are possible; students may be rated on their ability to work in a group	**Advantages:** • encourages student interaction **Disadvantages:** • group produces for group grades may encourage "free rider" effects • does not address curriculum content

Appendix A: Overview of Cooperative Learning Models (continued)

Cooperative Learning Model	Author/ Developer	Recommended Grade Level	Recommended Subject/Level	Evaluation Procedures	Advantages/Disadvantages for Academically Talented Students
Cooperative Controversy	Johnson & Johnson	none specified, possibly all grades	controversial topics	unclear, possibly students are evaluated on a final written product	**Advantages:** • opportunity for debate **Disadvantages:** • materials are the same for all students
Jigsaw and Jigsaw II	Aronson De Vries Slavin	all grades, students must be able to read	core content- where concepts rather than basic skills are the goal	For Jigsaw individual exams or products For Jigsaw II teams receive scores based on the improvement of individuals on quizzes	**Advantages:** • encourages discussion **Disadvantages:** • materials (generally grade level text passages) are same for all students in Jigsaw II
Group Investigation	Sharan & Sharan	all grades	most often social studies	individual and/or group contributions to a presentation evaluated by teachers and student; may also use individual exams	**Advantages:** • access to enriched materials possible • some flexible pacing possible • student choice of subtopic **Disadvantages:** • group evaluation not clear • group products or presentations may encourage "free rider" effects

Appendix A: Overview of Cooperative Learning Models (continued)

Cooperative Learning Model	Author/ Developer	Recommended Grade Level	Recommended Subject/Level	Evaluation Procedures	Advantages/Disadvantages for Academically Talented Students
Co-op Co-op	Kagan	developed for college students, recommended all grades	topics based on student interest with teacher guidance	teacher evaluation of individual written products for mini-topics; team members evaluate each other for contributions to the team; class evaluation of team presentations	**Advantages:** • student interest • access to enriched materials possible **Disadvantages:** • group products may encourage "free rider" effects
Groups of Four	Burns	elementary grades	mathematics	not clear, may depend on specific activity	**Advantages:** • appealing math activities • discovery approach **Disadvantages:** • not a comprehensive curriculum • research support limited
Descubrimiento or Finding Out	De Avila, Duncan, Cohen	elementary grades	science and mathematics for bilingual classroom	not clear, may depend on specific activity	**Advantages:** • discovery approach • use of learning centers **Disadvantages:** • materials not widely available • not a comprehensive curriculum • students must remain at learning center until all members of the group have completed the activity or mastered the material

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