Cooperative Learning Methods

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Many quite different cooperative learning methods have been developed and researched. The most extensively evaluated cooperative learning methods are described in the following sections.

Student Teams—Achievement Divisions (STAD) In Student Teams—Achievement Divisions (STAD) (Slavin, 1994a), students are assigned to four-member learning teams that are mixed in performance level, gender, and ethnicity. The teacher presents a lesson, and then students work within their teams to make sure that all team members have mastered the lesson. Finally, all students take individual quizzes on the material, at which time they may not help one another.

Students' quiz scores are compared to their own past averages, and points are awarded on the basis of the degree to which students meet or exceed their own earlier performance. These points are then summed to form team scores, and teams that meet certain criteria may earn certificates or other rewards. In a related method called Teams—Games—Tournaments (TGT), students play games with members of other teams to add points to their team scores.

STAD and TGT have been used in a wide variety of subjects, from mathematics to language arts to social studies, and have been used from second grade through college. The STAD method is most appropriate for teaching well-defined objectives with single right answers, such as mathematical computations and applications, language usage and mechanics, geography and map skills, and science facts and concepts. However, it can easily be adapted for use with less well-defined objectives by incorporating more open-ended assessments, such as essays or performances. STAD is described in more detail in the next Theory into Practice.

Student Teams—Achievement Divisions (STAD)

An effective cooperative learning method is called Student Teams—Achievement Divisions, or STAD (Slavin, 1994a, 1995a). STAD consists of a regular cycle of teaching, cooperative study in mixed-ability teams, and quizzes, with recognition or other rewards provided to teams whose members excel.

STAD consists of a regular cycle of instructional activities, as follows:

- **Teach:** Present the lesson.
- **Team study:** Students work on worksheets in their teams to master the material.
- **Test:** Students take individual quizzes or other assessments (such as essays or performances).
- **Team recognition:** Team scores are computed on the basis of team members' scores, and certificates, a class newsletter, or a bulletin board recognizes high-scoring teams.

The following steps describe how to introduce students to STAD:

1. Assign students to teams of four or five members each. Four are preferable; make five-member teams only if the class is not divisible by four. To assign the students, rank them from top to bottom on some measure of academic performance (e.g., past grades, test scores) and divide the ranked list into quarters, placing any extra students in the middle quarters. Then put one student from each quarter on each team, making sure that the teams are well balanced in gender and ethnicity. Extra (middle) students may become fifth members of teams.
2. Make a worksheet and a short quiz for the lesson you plan to teach. During team study (one or two class periods) the team members' tasks are to master the material you presented in your lesson and to help their teammates master the material. Students have worksheets or other study materials that they can use to practice the skill being taught and to assess themselves and their teammates.
3. When you introduce STAD to your class, read off team assignments.

    - Have teammates move their desks together or move to team tables, and allow students about 10 minutes to decide on a team name.
    - Hand out worksheets or other study-materials (two of each per team).
    - Suggest that students on each team work in pairs or threes. If they are working problems (as in math), each student in a pair or threesome should work the problem and then check with his or her partner(s). If anyone missed a question, that student's teammates have a responsibility to explain it. If students are working on short-answer questions, they might quiz each other, with partners taking turns holding the answer sheet or attempting to answer the questions.
    - Emphasize to students that they are not finished studying until they are sure that all their teammates will make 100 percent on the quiz.
    - Make sure that students understand that the worksheets are for studying—not for filling out and handing in. That is why it is important for students to have the answer sheets to check themselves and their teammates as they study.
    - Have students explain answers to one another instead of just checking each other against the answer sheet.
    - When students have questions, have them ask a teammate before asking you.
    - While students are working in teams, circulate through the class, praising teams that are working well and sitting in with each team to hear how the members are doing.

4. Distribute the quiz or other assessment, and give students adequate time to complete it. Do not let students work together on the quiz; at this point they must show what they have learned as individuals. Have

students move their desks apart if this is possible. Either allow students to exchange papers with members of other teams or collect the quizzes to score after class.

5. Figure individual and team scores. Team scores in STAD are based on team members' improvements over their own past records As soon as possible after each quiz, you should compute individual team scores, and write a class newsletter (or prepare a class bulletin board) to announce the team scores. If at all possible, the announcement of team scores should be made in the first period after the quiz. This makes the connection between doing well and receiving recognition clear to students, increasing their motivation to do their best. Compute team scores by adding up the improvement points earned by the team members and dividing the sum by the number of team members who are present on the day of the quiz.
6. Recognize team accomplishments. As soon as you have calculated points for each student and figured team scores, you should provide some sort of recognition to any teams that averaged 20 improvement points or more. You might give certificates to team members or prepare a bulletin board display. It is important to help students value team success. Your own enthusiasm about team scores will help. If you give more than one quiz in a week, combine the quiz results into a single weekly score. After 5 or 6 weeks of STAD, reassign students to new teams. This allows students to work with other classmates and keeps the program fresh.

Cooperative Integrated Reading and Composition (CIRC) Cooperative Integrated Reading and Composition (CIRC) (Stevens & Slavin, 1995a) is a comprehensive program for teaching reading and writing in the upper elementary grades. Students work in four-member cooperative learning teams. They engage in a series of activities with one another, including reading to one another, making predictions about how narrative stories will come out, summarizing stories to one another, writing responses to stories, and practicing spelling, decoding, and vocabulary. They also work together to master main ideas and other comprehension skills. During language arts periods, students engage in writing drafts, revising and editing one another's work, and preparing for publication of team books. Three studies of the CIRC program have found positive effects on students' reading skills, including improved scores on standardized reading and language tests (Stevens et al., 1987; Stevens & Slavin, 1991, 1995a).

Jigsaw In Jigsaw (Aronson, Blaney, Stephen, Sikes, & Snapp, 1978), students are assigned to six-member teams to work on academic material that has been broken down into sections. For example, a biography might be divided into early life, first accomplishments, major setbacks, later life, and impact on history. Each team member reads his or her section. Next, members of different teams who have studied the same sections meet in expert groups to discuss their sections. Then the students return to their teams and take turns teaching their teammates about their sections. Since the only way students can learn sections other than their own is to listen carefully to their teammates, they are motivated to support and show interest in one another's work. In a modification of this approach called Jigsaw II (Slavin, 1994a), students work in four- or five-member teams, as in STAD. Instead of each student being assigned a unique section, all students read a common text, such as a book chapter, a short story, or a

biography. However, each student receives a topic on which to become an expert. Students with the same topics meet in expert groups to discuss them, after which they return to their teams to teach what they have learned to their teammates. The students take individual quizzes, which result in team scores, as in STAD.

Learning Together Learning Together, a model of cooperative learning developed by David Johnson and Roger Johnson (1999), involves students working in four- or five-member heterogeneous groups on assignments. The groups hand in a single completed assignment and receive praise and rewards based on the group product. This method emphasizes team-building activities before students begin working together and regular discussions within groups about how well they are working together.

Group Investigation Group Investigation (Sharan & Sharan, 1992) is a general classroom organization plan in which students work in small groups using cooperative inquiry, group discussion, and cooperative planning and projects. In this method, students form their own two- to six-member groups. After choosing subtopics from a unit that the entire class is studying, the groups break their subtopics into individual tasks and carry out the activities that are necessary to prepare group reports. Each group then makes a presentation or display to communicate its findings to the entire class.

Cooperative Scripting Many students find it helpful to get together with classmates to discuss material they have read or heard in class. A formalization of this age-old practice has been researched by Dansereau (1985) and his colleagues. In it, students work in pairs and take turns summarizing sections of the material for one another. While one student summarizes, the other listens and corrects any errors or omissions. Then the two students switch roles, continuing in this manner until they have covered all the material to be learned. A series of studies of this cooperative scripting method has consistently found that students who study this way learn and retain far more than students who summarize on their own or who simply read the material (Newbern, Dansereau, Patterson, & Wallace, 1994). It is interesting that while both participants in the cooperative pairs gain from the activity, the larger gains are seen in the sections that students teach to their partners rather than in those for which they serve as listeners (Spurlin, Dansereau, Larson, & Brooks, 1984). More recent studies of various forms of peer tutoring find similar results (Fuchs & Fuchs, 1997; King, 1997, 1998).

Research on Cooperative Learning

Cooperative learning methods fall into two broad categories (Slavin, Hurley, & Chamberlain, 2003). One category might be called group study methods (Slavin, 1996b), in which students primarily work together to help one another master a relatively well-defined body of information or skills—what Cohen (1994b) calls “well-structured problems.” The other category is often called project-based learning or active learning (Stern, 1996). Project-based learning methods involve students working in groups to create a report, experiment, mural, or other product (Webb & Palinscar, 1996). Project-based learning methods such as those described by Blumenfeld, Marx, Soloway, and Krajcik (1996); Cohen (1994a), Palincsar, Anderson, and David (1993); and Sharan and Sharan (1992) focus on ill-structured problems, which typically have less of a clear expected outcome or instructional objective. Methods of this kind are often referred to as collaborative learning methods (Webb & Palinscar, 1996).

Most research comparing cooperative learning to traditional teaching methods has evaluated group study methods such as STAD, Jigsaw II, CIRC, and Johnson's methods. More than 100 studies have compared achievement of students in such methods to that of students in traditional classrooms over periods of at least 4 weeks (Slavin, 1995a). The results have consistently favored cooperative learning as long as two essential conditions are met. First, some kind of recognition or small reward must be provided to groups that do well so that group members can see that it is in their interest to help their groupmates learn (O'Donnell, 1996). Second, there must be individual accountability. That is, the success of the group must depend on the individual learning of all group members, not on a single group product. For example, groups might be evaluated on the basis of the average of their members' scores on individual quizzes or essays (as in STAD), or students might be individually responsible for a unique portion of a group task (as in Group Investigation). Without this individual accountability there is a danger that one student might do the work of the others, or that some students might be shut out of group interaction because they are thought to have little to contribute (O'Donnell & O'Kelly, 1994; Slavin, 1995a).

Studies of cooperative learning methods that incorporate group goals and individual accountability show substantial positive effects on the achievement of students in grades 2 through 12 in all subjects and in all types of schools (Ellis, 2001b; Rohrbeck et al., 2003; Slavin, 1995a; Slavin, Hurley, & Chamberlain, 2003). A review of group learning with technology also found positive effects for well-structured methods (Lou, Abrami, & d'Apollonia, 2001). Effects are similar for all grade levels and for all types of content, from basic skills to problem solving (Qin, Johnson, & Johnson, 1995). Cooperative learning methods are usually used for only a portion of a student's school day and school year (Antil, Jenkins, Wayne, & Vadasy, 1998), but one study found that students in schools that used a variety of cooperative learning methods in almost all subjects for a 2-year period achieved significantly better than did students in traditionally organized schools (Stevens & Slavin, 1995b). These effects were particularly positive for the highest achievers (compared to equally high achievers in the control group) and for the special-education students. Other studies have found equal effects of cooperative learning for high, average, and low achievers and for boys and girls (Slavin, 1995a). There is some evidence that these methods are particularly effective for African American and Latino students (Boykin, 1994; Calderón et al., 1998; Hurley, 2000; Slavin, Hurley, & Chamberlain, 2003). A review of peer assisted learning by Rohrbeck and colleagues (2003) found that effects were strongest on younger, urban, low-income, and minority students. More informal cooperative learning methods, lacking group goals and individual accountability, have not generally had positive effects on student achievement (Chapman, 2001; Klein & Schnackenberg, 2000; Slavin, 1995; Slavin et al., 2003).

In addition to group goals and individual accountability, a few classroom practices can contribute to the effectiveness of cooperative learning. For example, students in cooperative groups who are taught communication and helping skills (Fuchs, Fuchs, Kazdan, & Allen, 1999; Webb & Farrivar, 1994) or are given specific structured ways of working with each other learn more than do students in cooperative groups without these enhancements (Baker, Gersten, & Lee, 2002; Emmer & Gerwels, 2002; Mathes et al., 2003). In addition, students who are taught metacognitive learning strategies (Fantuzzo, King, & Heller, 1992; Friend, 2001; Hock, Terwel, & van den Eeden, 1997; Jones et al., 2000; Kramarski & Mevarech, 2003) learn more than do students in usual cooperative groups. For example, King (1999) taught students generic question forms to ask each other as they studied, such as "compare and contrast _____ and _____ ," or "how

does _____ affect _____?" Students in classes that used these discourse patterns learned more than students using other forms of cooperative learning. A great deal of research has shown that students who give extensive explanations to others learn more in cooperative groups than do those who give or receive short answers or no answers (Nattiv, 1994; Webb, 1992; Webb, Trooper, & Fall, 1995).

There is less research on the effects of project-based forms of cooperative learning focused on ill-structured problems; but the studies that do exist show equally favorable results of cooperative methods designed for such problems (Blumenfeld et al, 1996; Lazarowitz, 1995; Thousand & Villa, 1994). In particular, a study by Sharan and Shachar (1988) found substantial positive effects of the Group Investigation method on higher-order objectives in language and literature, and studies by Cohen (1994a) have shown that the more consistently teachers implement her Complex Instruction program, the better children achieve.

In addition to boosting achievement, cooperative learning methods have had positive effects on such outcomes as improved intergroup relations (Slavin, 1995b), self-esteem, attitudes toward school, and acceptance of children with special educational needs (Schmuck & Schmuck, 1997; Shulman, Lotan, & Whitcomb, 1998; Slavin, 1995a; Slavin et al, 2003). Studies find that cooperative learning is very widely used (e.g., Antil et al., 1998; Puma et al., 1997), but the forms of cooperative learning most often used are informal methods lacking group goals and individual accountability. If this method is to achieve its full potential, educators will need to focus on more research-based strategies.