

Chapter 18:  
Learning in Groups

# TEACHING AT ITS BEST

*A RESEARCH-BASED RESOURCE  
FOR COLLEGE INSTRUCTORS*

SECOND EDITION

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**ANKER PUBLISHING**

# LEARNING IN GROUPS

# C H A P T E R 18

Every class conveys two lessons: one in the content and another in the teaching method. Student-active techniques send the message that with expert guidance, learners can actively discover, analyze, and use knowledge on their own. With this participatory "empowerment," students come to understand that they must assume responsibility for their own learning.

One particularly powerful student-active method is cooperative learning, defined as "a structured, systematic instructional strategy in which small groups of students work together towards a common goal" (Cooper et al, 1993). The lesson it conveys is that when people work together, they can accomplish much more than they can as individuals working apart—that is, two heads are better than one, three heads are better than two, and for some tasks, four or five heads are best.

## **Cooperative vs. Collaborative vs. Team Learning**

The teaching format in which students work on a task and learn in small groups has become popular enough to take on many labels. As used in the literature, different terms only reflect nuances in structure. Collaborative learning, the

label favored in the sciences, applies to a loosely structured coordination between or among students. Cooperative learning implies a more structured group effort (Millis and Cottell, 1998). Within this latter category, team learning is highly structured version that thrives more on mutual, positive interdependence than on any other characteristic of cooperative learning. Indeed, students take team as well as individual tests and are accountable individually because their course grades largely depend upon their team's grades (Michaelsen, 1997-98).

Two other labels in occasional use is peer instruction or peer tutoring, which usually involves a group or pair of students serving as a more knowledgeable resource to other students.

Cooperative learning is the term of choice here because 1) most of the group-learning research is on "cooperative learning" and 2) structure helps ensure success with the widest variety of students, including the young and the less motivated.

## **The Case for Cooperative Learning**

While cooperative learning is in common use now, it had a slow

start in higher education. By 1990, nearly 600 published studies dating back 90 years had compared the effectiveness of cooperative, competitive, and individual approaches to teaching. Many of these studies found overwhelming support for the superiority of cooperative learning, and even those that didn't find no detrimental effects to using it (Johnson, Johnson, and Smith, 1991). But old teaching paradigms and habits die hard. If *we* had no trouble learning with them when we were in college, we can't understand why our students do—which is why the best students can become the worst teachers.

In general, the research on the effects of cooperative learning has focused on three fundamental dimensions: achievement/productivity (i.e., learning), positive interpersonal relationships, and psychological health. Cooperation produces positive results on all of them (Johnson, Johnson, and Smith, 1991; Millis and Cottell, 1998). Astin (1993) studied the effects of 192 environmental factors on various educational outcomes of 27,064 students at 309 institutions. His results indicate that the top two influences on academic success and satisfaction are interaction among students and interaction between faculty and students, each a key component of cooperative learning strategies. In fact, both factors ranked significantly higher than curriculum and content variables. Light (1990, 1992) reported similar results in the Harvard Assessment Seminars.

Johnson and Johnson (1989) surveyed 193 studies comparing the effects of cooperative and traditional techniques on student productivity/learning. More than half the literature reported cooperative learning to have the stronger

impact, while only 10 percent found individualistic methods more powerful. In addition, cooperation enhanced interpersonal attraction in 60 percent of the studies, while competition did so in only three percent. A similar literature survey by Cooper et al (1993) indicated that cooperative learning is more effective than traditional methods in improving critical thinking, self-esteem, racial/ethnic relations, and prosocial behavior.

The superiority of cooperative learning seems to hold at all levels and across student backgrounds and extends as students mature into adulthood (Johnson et al, 1981). Disadvantaged students benefit as well. Frierson (1986) documented that minority nursing students who studied cooperatively for their board exams performed significantly better than those who studied alone. After instituting cooperative, out-of-class enrichment programs for calculus students at risk at UC Berkeley, Treisman (1986) found that black students in the program received course grades over one letter grade higher than their non-cooperative counterparts.

However, cooperative learning should not necessarily supplant lecture, whole-class discussion, experiential learning, and other methods. The world holds other lessons to learn besides critical thinking, problem solving, social relations, and self-esteem. Moreover, the research cited above indicates that cooperative learning need not be used all the time to have positive effects on student achievement.

It may be helpful, then, to consider cooperative learning a *supplementary* technique (Millis, 1990) and a *format* for various classroom activities. As a *supplement*, it can serve as a student-active break between segments of a

lecture (see Chapter 14) or a jump-start for class discussion (see Chapters 15 and 16). As a *format*, it is useful for social and subject-matter icebreakers (see Chapter 7), experiential learning activities (see Chapter 17), case debriefing (see Chapter 23), problem-based learning (see Chapter 24), mathematical problem solving exercises (see Chapter 25), science laboratories (see Chapter 26), classroom assessment exercises (see Chapter 27), and help and review sessions (see Chapter 29).

### Changing Methods, Changing Roles

Cooperative learning requires role shifts for both students and instructors (MacGregor, 1990; Johnson, Johnson, and Smith, 1991; Rhem, 1992; Millis and Cottell, 1998). Students must move:

- from passive listeners and note-takers to active problem solvers, discoverers, contributors, and transformers of knowledge;
- from low/moderate to high expectations of preparation for class;
- from a low-risk, private presence to a high-risk public presence;
- from personal responsibility for attendance to community expectation and responsibility;
- from individualistic competition among peers to collaboration among group members whose success depends upon one another;
- from formal, impersonal relationships with peers and instructors to genuine interest in one another's learning and overall well-being;
- from viewing instructors and texts as sole authorities to seeing themselves, their peers, and their community as

important sources of knowledge.

Young freshmen, in particular, can have a hard time making the adjustment, as they may have developed negative associations around cooperation in high school. There, cooperating with authority may have denoted blind or deferential obedience; cooperating with peers may have led to uneven work loads, and group work may have been mismanaged (MacGregor, 1990).

The instructor's role changes, too. No longer is it focused on sorting, classifying, and screening out students. The primary goal is to develop students' competencies and talents. Cooperative learning also recasts the instructor as "a guide on the side" instead of "the sage on the stage." In other words, the role shifts from expert/authority figure to facilitator/coach, one who unobtrusively circulates, observes, monitors, and answers questions (Millis, 1990). Instructors often have what Finkel and Monk (1983) colorfully term an "Atlas complex": they feel wholly responsible for the success of the course and their students. Cooperative techniques call for placing much of the responsibility for learning squarely on the students' shoulders. Of course, relinquishing control can be difficult at first for an instructor.

### Crucial Elements of Cooperative Learning

Cooperative learning techniques share a number of essential features that you must ensure are built into or provided for in the way you assemble groups, design tasks, manage activities, and determine grades (Feichtner and Davis, 1984-85; Kagan, 1988; Millis, 1990; Johnson, Johnson, and Smith,

1991; Cooper et al, 1993; Smith, 1993; Michaelsen, 1997-98; Millis and Cottell, 1998; Felder and Brent, 2001).

***Positive interdependence.***

For a group to function effectively, each member must feel a sense of personal responsibility for the success of his or her teammates. In addition, each member's success must depend at least in part on the group's success. In brief, members must feel they need one another.

To ensure this element, you can do one or more of the following: assign a group product on which all members sign off and are given a group grade (you can also separately grade individual contributions); give group (as well as individual) quizzes and exams which count toward each member's individual grade; allocate essential resources or pieces of information across group members, requiring them to share (materials interdependence); assign each member a different part of the total task (task interdependence); randomly select students to speak for their group; require that all members edit one another's work using MS Word's "Track Changes" feature (under Tools); and/or assign group members different roles.

Among the possible group roles are recorder, spokesperson, researcher, summarizer, checker/corrector, skeptic, organizer/manager, spy (on the progress of other groups), observer, writer, timekeeper, conflict resolver, and runner/liaison to other groups or the instructor.

***Individual accountability.***

All members must be held responsible for their own learning as well as for the learning of other group members. At the same time, no

member should feel that he or she is giving more (or less) than an equal share of effort to the group task. In other words, no freeloaders or hitchhikers allowed.

You can build in this element in several ways, some of which overlap with those above: base final grades predominantly on individual quizzes, tests, papers, and other assignments; count the team grades only for students who are passing individual quizzes, tests, and written assignments; randomly select students to speak for their group; assign group members different roles; assign group members primary responsibility for different parts of the team project, and grade them on their part (e.g., one member conducts the research, another does the write-up, etc.); give teams time early in the semester to discuss and agree on what they will do to sanction non-contributing members; allow teams to "fire" a non-contributing member (after a verbal and a written warning, of course); allow a member to "resign" from a poorly performing team and seek membership in another; and/or base a significant portion of the final grade on peer performance evaluations.

This last strategy deserves elaboration. It can be used only when groups have stable memberships over several weeks or months. At the end of the semester or the group-work unit, have each team member assign each of their teammates a letter grade for group contributions and/or allocate a limited number of points across their teammates. If you use points, you may want to forbid students to allocate points equally across teammates.

It is essential that you give students a list of criteria on which to grade their peers, such as

attendance, preparation, promptness, leadership, quality of contributions, quantity of contributions, and social skills. These criteria and your peer evaluation policies and procedures merit explanation on the first day of class. The peer portion of the final grade should reflect the amount and importance of group work in the course—at least ten to 20 percent but no more than 60 percent.

How valid and accurate are peer performance evaluations? Students often give their teammates almost uniformly high evaluations. Does this tendency reflect the fact that cooperative learning motivates students to prepare and perform more effectively than most other formats, as cooperative learning enthusiasts claim? Or are students merely covering up for the poor contributors, as some instructors suspect?

You have to make the call based on your own experience at your particular college or university. If your students are also merciless in penalizing freeloaders, slackers, sandbaggers, control freaks, ego-trippers, bullies, whiners, martyrs, and saboteurs, chances are that their positive performance evaluations are valid and accurate. Indeed, earlier studies found this to be the case (Ferris and Hess, 1984-85; Murrell, 1984-85; Jalajas and Sutton, 1984-85).

But if you have reason to suspect that freeloaders and other group-pathological types are getting off easy, try this strategy: Have students write peer performance evaluations two, three, or four times during the semester, and schedule them right after major project sections are due. This way any anger or frustration toward errant group members will come out in the heat of the moment. Another

way to counter cover-ups is to say you will toss out any peer performance evaluations that give As to all teams members.

**Appropriate group composition, size, and duration.** Heterogeneous groups in terms of ability, race, gender, and other characteristics help develop students' social skills and foster understanding among individuals of differing social backgrounds. Research also finds that heterogeneous groups help all students learn the material better (also Heller et al, 1992; Heller and Hollabaugh, 1992). When group composition is diverse, specifically in ability and/or knowledge background, the slower students learn from the quicker ones—often better than they do from traditional methods because students seem to speak one another's language. The quicker ones in turn benefit because, by teaching the material, they learn it all the better. (Of course, very slow students can also hold back the very gifted.)

Depending upon your course, it may be more important that you maximize heterogeneity on some variable other than ability and/or background. For example, if you want your teams to debate ideas and critically examine their own, you might consider finding out students' views the first week of class and assigning teams based on varying opinions and value systems.

Expediency may also have to take priority. If you want teams to meet face-to-face outside of class, you may have to consider students' schedules in assigning groups.

The research indicates that students should not form their own long-term groups. Such a composition only reinforces existing cliques and encourages discussion of extra-

curricular topics. On the other hand, it also reduces intra-group conflict.

Optimal group size varies with the open-endedness of the task. Several cooperative activities described later in this chapter and in Chapter 14 rely on pairs. But most other activities require groups of three to five to ensure lively, broad participation and to prevent freeloading. A threesome seems to be optimal for mathematical and scientific problem-solving tasks that involve alternative means to one correct answer (Heller and Hollabaugh, 1992). Four or five is best for tasks with multiple respectable answers involving brainstorming, interpretation, and problem solving of a "focal" or "playground" nature (see Chapter 16). Still, teams of up to seven members can function effectively and offer the added benefit of greater diversity (Michaelsen, 1997-98).

It may be wisest to avoid mixing females with a male majority. Heller and Hollabaugh (1992) found that males tend to dominate and overshadow the female(s) when in the majority.

Ideal group duration also depends on the task. Long-term group assignments facilitate major projects and ongoing tasks, since duration fosters group loyalty and refines members' cooperative skills. On the other hand, students can get acquainted with more classmates if groups change with each short-term project or every several weeks. What often happens, however, is that students develop group loyalties quickly and plead to keep the same groups throughout the term.

Ever-changing *ad hoc* groups or pairs based solely on seating proximity may be sufficient for occasional problem-solving and discussion assignments. In large

classes where space is tight and chairs are immobile, you may feel limited to these *ad hoc* groups. But you can overcome such limitations by assigning seats.

#### **Face-to-face interaction.**

Cooperative learning requires that instructors allocate class time to team meetings. However, experience shows that you cannot rely on students to meet and collaborate face-to-face outside of class. Otherwise, group members divide the labor and go their separate ways, defeating the whole cooperative purpose and its benefits. Of course, virtual interaction over email, chat rooms, or discussion boards can and sometimes must substitute for face-to-face meetings. Sometimes you can keep better track of virtual than face-to-face meetings.

**Genuine learning and challenge.** The cooperative task must make students *learn* something, not just *do* something. It should demand higher-order thinking processes (application, analysis, synthesis, evaluation) and group synergy to complete because it goes beyond what the students have learned in the course thus far. It should require alternative means to an answer and/or multiple answers and pose a genuine challenge that only more than one mind is likely to meet within the given time limit. In brief, it should be a harder task than you'd assign to students working alone.

**Explicit attention to collaborative social skills.** Working together effectively requires certain behaviors of all the individuals involved: listening actively, taking turns in talking, not interrupting, encouraging others, cooperating, sharing resources, being open-

mindful, giving constructive feedback, tactfully defending one's views, compromising, and showing respect for others.

Most cooperative learning proponents view these as acquired skills that you must explicitly foster in at least some of the following ways: modeling them yourself; praising them when you see or hear them practiced; having the class brainstorm and discuss them; including them among your objectives for group work; including them among your peer evaluation criteria; and, especially, allowing students time to reflect upon and process the quality of the day's or week's group interactions. Processing may be individual, group, or class and can include questions such as these: How well did I listen? How well did I play my assigned role? Did we include all group members in our discussions? How high quality was our task performance? How could we accomplish our task more effectively? How could we function as a group more smoothly?

Team learning supporters maintain that students intuitively know from their life experience what defines a good (and bad) team member, and they don't need time to group-process beyond writing peer performance evaluations. If they encounter internal conflicts and inequities, they must resolve them on their own without instructor intervention (which may include firing the offending member). After all, the work world will not be interested in their interactional problems and preferences, and one of your jobs is to prepare them to deal with this world.

### Management Tips

Beyond the essential elements above are several standard

operating procedures that help ensure success and make the management of group activities easier and more predictable for you (Feichtner and Davis, 1984-85; Millis, 1990; Johnson et al., 1991; Cooper et al., 1993; Smith, 1993).

First and foremost, **start small**. Begin by trying out a small-scale, pre-tested technique (like those in the next section) in the class where you feel the most confident. Expect it *not* to work perfectly—any technique can fall short the first time tried—and plan for your time allocation to be off one way or another. A safe launching pad is an optional help or review session.

Second, **use cooperative learning only with a criterion-referenced grading system** (see Chapter 30). Grading on a curve, or "norm-referenced grading," undercuts the spirit of cooperation and the prospect of group success on which cooperative learning relies. An absolute grading scale gives all students an equal chance to achieve.

Third, **introduce the activity to your class by explaining your rationale for using it**. Without getting technical, mention some of the research that documents its superior effectiveness. Perhaps list the crucial elements of cooperative learning and your objectives for the group work. Also reassure your students that they will not jeopardize their grades nor be accused of cheating by helping each other.

Fourth, **give groups a very specific, structured task that requires a written product to show at the end**. The major reasons for group-work failure are the lack of organization and specificity in the assignment and the students' confusion over its purpose and expectations. The written end-product may be no



more formal than handwritten notes for the group's verbal report at the end of the group session. It may be a problem solution, a team exam answer sheet, or notes for a group presentation. Or it may be a major team project for which students meet for weeks to complete.

A word of warning is in order, however. Feichtner and Davis (1984-85) present evidence that large-scale, formal group assignments are more problematic than smaller-scale and less formal ones. Specifically, they caution against assigning more than one major group presentation and more than three written papers or reports per semester. Otherwise, students are more likely to report having a negative group experience. Team exams, however, tend to generate positive experiences.

Fifth, **set and enforce tight time limits and deadlines for task completion**, even for short tasks that pairs or groups can complete in a couple of minutes. It is helpful to bring a timer or stopwatch with you to all cooperative class sessions. For tasks of five to 50 minutes, you might give appropriate ten-minute or two-minute warnings. Larger-scale assignments call for firm deadlines for completing the various subtasks (prospectus, data collection, data analysis, outline, first draft, etc.). It is best to schedule all final product deadlines comfortably in advance of the end of the term. Tight time limits and deadlines help keep teams on task.

Sixth, **ensure the assignment of individual roles within each group**. Many possible roles were listed above in the section on positive interdependence. At the very least, each group of three or more needs a recorder/spokesperson. Role assignments should

rotate at least weekly among the members of stable groups. You can make the first role assignments randomly, or use the following technique for assigning roles in *ad hoc* groups: After breaking students into groups, tell them to point to one fellow member on the count of three. Assign the student receiving the most "points" the task of appointing the recorder/spokesperson and any other necessary roles. The element of surprise makes this technique humorous.

Seventh, **set the rule of "three before me."** That is, you can insist that students take their questions to each other first and not to you until they have asked at least three other students. Or accept only group, not individual, questions.

Eighth, **set rules to control noise levels and maintain order**. Among the most popular ones are "no unnecessary talkin'" and "only one group member talking at one time." Another helpful hint is to bring the classroom to silence by informing students that you will signal when time is up by raising your hand. They should then stop talking and raise *their* hands as soon as they see yours up. This technique enables you to silence a huge lecture hall in seconds.

Ninth, to ensure that groups have a genuine learning experience, **conclude each group session with a means of assessing students' progress or mastery of the material**. You might ask for a brief presentation or progress report from each group. Or you can administer a quick quiz or classroom assessment exercise (see Chapter 27). If a quiz, you should set a high standard of mastery that all team members must meet before any of them can leave class. Alternatively, you can select a

member from each group at random to take the quiz for the group.

### **Tried and True Cooperative Learning Strategies**

If you are interested in trying out or extending cooperative learning in your courses, consider experimenting with some of the proven formats below. While the levels of success and usefulness vary by discipline and instructor, you can adjust them or create your own versions to serve your needs. The following sampler comes from several sources, including Kagan (1988), Millis (1990), Johnson, Johnson, and Smith (1991), Cooper et al. (1993), Smith (1993), and Millis and Cottell (1998). Many work well between lecture segments as a student-active break (see Chapter 14), and some double as a classroom assessment technique (see Chapter 27). Although a few may sound adolescent, they have all been used effectively at the post-secondary level.

**Think-Pair-Share.** Give students a question or problem and ask them to think quietly of an answer or solution. Have them discuss their responses with their neighbor, then share them with the class. Set a time limit of one or two minutes for the pair exchange.

**Pairs Check.** Partners coach each other on worksheet problems and/or check notes for completeness and accuracy. This two-minute activity is similar to *Pair and Compare* in Chapter 14.

**STAD (Student Teams-Achievement Divisions).** After a lecture, video, demonstration, etc., teams of three or four receive a worksheet to discuss and complete.

When members feel that they have reached acceptable solutions, you give a brief oral or written quiz to the group, a representative, or each individual member to assess their mastery of the material.

**Jigsaw.** Each member of a "base group" is assigned a minitopic to research. Students then meet in "expert groups" with others assigned the same minitopic to discuss and refine their understanding. The base groups reform, and members teach their minitopics to their teammates.

**Structured/Academic Controversy.** Pairs in a group of four are assigned opposing sides of an issue. Each pair researches its assigned position, and the group discusses the issue with the goal of exposing as much information as possible about the subject. Pairs can then switch sides and continue the discussion.

**Group Investigation.** Assign each group or let each group choose a different topic within a given subject area. Groups are free to organize their work and research methods and even to determine the form of the final product (e.g., a video, play, slide show, demonstration, presentation, paper, etc.).

**Numbered Heads Together.** Each member of a team of four is assigned a number. Pose a thought question or problem, and allow a few minutes for discussion. Call out a number, designating only students with that number to act as group spokesperson. This exercise promotes individual accountability.

**Talking Chips.** This method ensures equal participation in discussion groups. Each group

member receives the same number of poker chips (or index cards, pencils, pens, etc.) Each time a member wishes to speak, he or she tosses a chip into the center of the table. Once individuals have used up their chips, they can no longer speak. The discussion proceeds until all members have exhausted their chips. Then they reclaim their chips and begin another round.

**Send a Problem.** Each group member writes a question or problem on a flashcard. The group reaches consensus on the correct answer(s) or solution(s) and writes it on the back. Each group then passes its cards to another group, which formulates its own answers or solutions and checks them against those written on the back by the sending group. If groups disagree, the receiving group writes its answer as an alternative. Stacks of cards continue to rotate from group to group until they are returned to the original senders, who then examine and discuss any alternative answers or solutions given by other groups.

### Preparing Students for Life

Younger college students are intent on learning about the real world they are about to enter, while older ones want to know how they can function more effectively in it at a higher level. Your objectives as an instructor include preparing students for this rapidly changing world—to make them more knowledgeable citizens, consumers, social participants, appreciators of the arts, and/or science watchers and supporters, as well as more successful professionals and businesspersons. You select your content with this goal in mind. But the methods

you choose may reinforce or override your verbal messages.

To prepare students for full participation in our society and the world, it is obvious that student-active techniques are more effective than traditional ones. To prepare students for the business and professional world in particular, cooperative learning is an essential part of their college experience. These days most work is conducted in teams, and for good reasons. The research out of Western Europe, Japan, and North America indicates that teams operating with a cooperative ethos generate more innovative and creative ideas, devise better solutions to problems, and yield greater gains in general than do individuals functioning with a competitive ethos (Demings, 1993).

### For further reading:

Michaelsen, L.K., A.B. Knight, and L.D. Fink. 2002. *Team Learning: A Transformative Use of Small Groups*. Westport, CT: Praeger Publishing.

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