

EFFECTIVE STRATEGIES FOR COOPERATIVE LEARNING*

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About 15 years ago one of the authors (RF) began to experiment with groupwork in his engineering courses. After making every mistake in the book (which he had not yet read), he recognized that there must be more to getting students to work together effectively than simply putting them in groups and asking them to do something, but he wasn't sure what it was. Then, like so many of his colleagues in engineering, he attended a workshop given by Karl Smith, heard the gospel of cooperative learning according to Johnson *et al.*, and was converted. Things went much better after that, although every course he taught produced additional items on his lists of things that work and things to avoid.

During that same period, the other author (RB) was also using cooperative learning—first as an elementary school teacher and then as an education professor—and compiling her own lists of successful and unsuccessful techniques. Eventually the two of us combined our lists and began to give teaching workshops together, and at almost every campus we visited someone was using cooperative learning and had come up with a technique or pitfall that was new to us. We paid attention, and if an idea sounded plausible and was supported by experience we added it to the appropriate list.

In this paper we summarize some of these ideas, presenting them as answers to questions from workshop participants who have been exposed to the basic principles and methods of cooperative learning as set forth by (for example) Johnson, Johnson, and Smith (1998), Millis and Cottell (1998), and Felder and Brent (1994, 1996).

Forming teams

I've seen lots of rules for forming teams—make them heterogeneous in ability levels and learning styles and MBTI types and homogeneous in interests and hobbies, avoid outnumbered minorities, put people together with common blocks of time to meet outside class, and several others. How can I do all that simultaneously?

You can't.

OK, which rules should I use?

It depends on your goals. If you want to conduct a classroom research study that investigates, say, the effects on learning of personality type distributions of workgroup members, you would obviously want to use Myers-Briggs Type Indicator profiles in forming teams. If you have no research agenda but just want to teach your course effectively, we recommend making ability heterogeneity your primary criterion. The drawbacks of groups composed entirely of weak students are obvious, and groups of all strong students are likely to parcel out the work rather than engaging in the group discussions and informal tutoring sessions that lead to many of the proven instructional benefits of cooperative learning. Also, if the teams will be required to meet outside class, try to form teams of students who have common blocks of unscheduled time. Let the hobbies and learning styles go.

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What about the outnumbered minorities?

That one is a two-edged sword, and you'll hear conflicting opinions about it from different people. Here's what we recommend. First, the only minorities you should be concerned about are those at risk academically, for whom the dropout rate is historically greater than the overall average dropout rate in your field. An example would be women in engineering. Then, early in the curriculum when the dropout risk is greatest—say, in the freshman and sophomore years—try to avoid groups in which members of those minorities are isolated. In engineering groups with two or three men and one woman, for example, the woman will often be relegated (or will relegate herself) to a passive role in the group and so lose much of the benefit of cooperative learning. Later in the curriculum, as the dropout risk decreases and the students are preparing to enter the world of work, you should remove this restriction on group formation. The minorities will often find themselves isolated in workgroups on the job, and they may as well start learning how to deal with it while still in college.

How can I find out at the beginning of the semester about the students' abilities and when they can meet outside class?

You can have them fill out a questionnaire on the first day in which they give their name, grades in prerequisite courses (or high school grades for first-semester freshmen), and if you plan to avoid isolated minorities, sex and ethnicity. (Tell the students in a footnote that if they would rather not respond to the last two items they may skip them.) On the same form, give them an hour-by-hour matrix of the week including Saturday and Sunday and ask them to cross out the times when they cannot meet outside class because of scheduling conflicts. After class, form 3- and 4-person teams that are heterogeneous in ability (as measured by the grades in the prerequisites) with common blocks of available time outside class and, when relevant, no isolated at-risk minorities. Announce the groups in the second class period, make any necessary adjustments (such as dealing with students who missed the first day), and go from there.

I have students entering the class and others dropping it throughout the first two weeks of the term. How can I form stable groups on the first day?

You can form practice groups by random assignment and announce that you'll form the permanent ones two weeks later. Sometime during those two weeks, give a quiz, and at the end of the two weeks have the students fill out the questionnaires. Then form the permanent groups, using the quiz grades along with the grades in the prerequisites as measures of ability level.

I have a lot of commuting students with full-time jobs who cannot get to campus to meet with a group outside class on a regular basis. What do I do about them?

There are several approaches you can use. The first is to reserve a portion of the regular class time each week for groups to work together. If that's not feasible or the amount of available time is inadequate for your assignments, you can form the commuters into virtual groups who "meet" via e-mail, instant messaging, computer conferencing, or telephone conferencing, and occasionally (if possible) in person. The students in these groups may not get the full benefit of cooperative learning, but it's better than nothing. If you have just a few students in that category and you cannot or don't want to form virtual groups, you can allow them to work individually and make yourself available for consultation at times convenient for them and for you.

I have some students who complain bitterly about having to work in teams, especially if they can't choose their own teammates. Should I let them work individually?

We strongly recommend against it. As we tell our students, we're sorry if they're unhappy about having to work in teams but the truth is that our job is not to make them happy—it is to prepare them to be professionals. On their first day on the job, two things will *not* happen. First, they will not be asked whether they prefer to work alone or with others, but will immediately be placed in one or more work groups. Second, they will not be presented with a list of all of the company employees and asked whom they would like to work with; rather, they will be told who else is in their group, and their job will probably depend on how well they work with those people. Since that's what they'll be doing out there, our job is to help them learn how to do it here.

In general, we find that we can minimize resistance by telling the students right from the start why we are using groups, stressing in our explanation the benefits cooperative learning can give them and offering to direct them to the research that proves it. (They'll probably never take you up on it, but you should be prepared to do it in the unlikely event that someone does.) For more on why student resistance occurs and how to defuse it, see Felder & Brent (1996).

Dealing with dysfunctional teams

After the first couple of weeks of cooperative learning I start hearing complaints about some team members not pulling their weight or dominating the discussion or generally being obnoxious. How can I teach my students to deal with these interpersonal problems?

Some CL practitioners spend a fair amount of time on team-building exercises at the beginning of a course, which is fine, but we prefer to take a problem-based learning approach: start the course normally, let the interpersonal problems start to surface naturally, and then equip the students with strategies for dealing with them.

Often group conflicts stem from different expectations group members have for one another. To get groups off to a good start, have them prepare and sign a list of ground rules they all agree to observe (for example, come to meetings prepared, let another member of the group know if you must miss a meeting or will be late, outline problem solutions individually before the group meeting, etc.). Then a few weeks into the semester, have the groups revisit their lists and evaluate how well they are doing in meeting the expectations they set for themselves.

An in-class troubleshooting exercise is a good tool for equipping students to deal with specific interpersonal problems that may surface. For example, after you've gotten a few complaints about slackers, you might mention that you've heard some team members aren't pulling their weight—not doing what they were supposed to be doing, not preparing for group sessions, maybe not even showing up—and you want to give the teams some ideas for dealing with those individuals. Then put the class into small groups and give them a few minutes to brainstorm strategies—not just good strategies but also bad ones, illegal ones—anything goes. List their ideas on the board, throwing in one or two of your own if you want to, and put the students back in their groups to try and reach consensus on the best strategies for what to do first, what to do if that doesn't work, and what to do as a last resort. After a few minutes, stop them and list their ideas, and then go on with the class. The students leave with an arsenal of good strategies, and the miscreants are put on notice that their irresponsibility is likely to have consequences they might not enjoy. One or two weeks later you can make the overly dominant team member (or any other troublemaker you've been getting complaints about) the subject of a similar exercise.

How can I identify and penalize non-participating team members?

First, collect peer ratings and use them to adjust the team assignment grades separately for each team member, and second, include last-resort options of firing and quitting in your system. (Suggested procedures follow.)

What's a good way to collect peer ratings?

Rich uses a method based on material taken from Brown (1995) and Millis and Cottell (1998). The students confidentially rate their teammates and themselves on various aspects of team citizenship (carrying out their assigned functions on the team, showing up for meetings regularly, preparing appropriately for each meeting, contributing to the best of their ability, and cooperating with the group effort) and use the results to assign overall ratings (“excellent,” “very good,” “satisfactory,” ..., “no show”) to each team member. Rich converts the verbal ratings to numbers (“Excellent” = 100, “Very good” = 87.5, ..., “No show” = 0) and divides the individual average ratings for each team member by the overall team average rating to determine grade adjustment factors. The product of a student’s adjustment factor and the team assignment grade is that student’s grade for the assignment. The calculations are easily done on a spreadsheet. Kaufman, Felder, & Fuller (2000) outline the method and present data from a study in which many of the potential drawbacks of such systems—e.g., ratings reflecting personal bias, inflated self-ratings, teams agreeing to give everyone the top rating, and student resentment—occurred too infrequently to cause concern.

How often do you collect the ratings?

In his lecture courses, Rich collects ratings sometime around the middle of the semester and applies the corrections to the average homework grade for the first half of the course, then collects new ratings at the end of the semester and applies the corrections to the average grade for the second half.

If you use a method like this, we suggest giving the students at least one practice round early in the course and have them share their ratings with one another. Students who get low ratings from their teammates will get a wakeup call, and if they don’t change their ways and consequently end up with low homework or project grades they should not be surprised.

What do you think of the peer rating system where each student estimates the percentage of the work done by each team member?

We recommend against it: a zero-sum game like that moves you back from cooperation toward individual competition.

How about firing and quitting?

Here’s how we recommend doing it. In the handout on Day 1 that explains your policies and procedures, announce that if a team member is chronically non-cooperative and the rest of the team has done all they could to get him in line—including trying to get the whole team to your office for a consultation—they may send him a memo warning him that unless he gets his act together, he’s off the team. If a week goes by and there’s no meaningful change, they may send a second memo officially firing him. Similarly, if one team member is carrying the rest of her teammates and she’s tried everything to get them to pitch in and failed, she may send a memo threatening to resign, and if they don’t start cooperating, she may send a second memo announcing her resignation. All of these memos should be copied to you so you can keep track of what’s going on.

Both the student who gets fired and the one who quits have the responsibility of finding a team of three willing to take them on as a fourth member. The one who quits won't have any trouble—in fact, she's probably got her new team lined up before the second memo goes out. The one who gets fired may have a *lot* of trouble—and generally, he doesn't care. Students who get to that point are usually failing the course and see no reason to continue to participate in group activities. If they get zeros on the remaining assignments, it makes no difference to them.

How often do things get to that point?

In Rich's classes—which typically have 20–30 groups—no more than one firing or quitting has ever occurred in a single course and usually none occurs. Rebecca has never had an incidence of firing or quitting in several years of using the technique.

What do you do when a group on the verge of fistfighting comes into your office?

When that situation arises there are usually two conflicting points of view on the team. The technique we recommend is *active listening*. Have one side make its case, and then have someone on the other side repeat the case verbatim without attempting to refute it, with people on the first side making corrections as needed until the party of the second part gets it right. Then the second side makes its case, and the first side has to repeat it without editorial comment. Finally, both sides try to work out an agreement that addresses everyone's issues and feelings. In our experience, once each side can satisfactorily articulate the other side's case, three-quarters of the battle has been won.

If the animosity among team members is so great that they simply can't function together, should I dissolve the team and reassign the members to other groups?

We would—we don't see much merit in forcing a hopelessly dysfunctional team to suffer through an entire semester or quarter—but we wouldn't recommend making it an option available at any time. A procedure that has worked well for us is to announce when teams are first formed that you will be dissolving them after a month and forming new teams, *unless* you get signed notes from all members of a team stating that they want to remain together, in which case they may do so.

Since Rich began using this system, no more than two teams in a class have ever elected to dissolve. Certainly many of the other teams are having problems—it's hard to avoid the “storming” phase of the well-known forming-storming-norming-performing team development sequence (Tuckman, 1965)—but most of them manage to work through the problems, with or without Rich's help. The implication is that CL is helping most of the students develop teamwork and communication skills, which is one of our primary objectives for using this instructional approach.

What do you do if only one team decides to dissolve?

Distribute the members among existing teams of three.

If some members of a dissolving team ask to stay together, should you let them?

If you can do so without sacrificing your ability to distribute the other students in a fair way, why not? Letting students who were initially assigned to work together continue to do so is not much different from allowing students on a team that has fired a member to remain together. We also endorse the idea of letting reassigned students designate people they specifically do not want to be teamed with.

Grading

I've been in a situation where some students failed the individual tests but their grades on the team homework were high enough to push their overall average above the announced passing level. If I pass them I think I'd be lowering my department's standards and opening myself up to accusations of grade inflation, and I'd also be setting them up for disaster when they go into courses that build on mine; on the other hand, I don't think I can belatedly change the criteria for passing the course.

We think you're right on all counts, not to mention that you'd be violating the individual accountability principle if you passed a student who couldn't pass the tests. One way to avoid getting stuck in this dilemma is to announce on Day 1 that the team homework grades will only count for students whose average grade on the individual tests is at or above the passing level. Students who fail the tests fail the course, even if their homework grade is 100.

I use grade curving (norm-referenced course grading) in my classes. Can I still use CL?

In a word, no. (Or to put it more diplomatically, you can but there's a good chance it won't work out the way you hope.) Norm-referenced grading works against cooperation by removing a major incentive for teammates to help each other. If one student helps another too much, the recipient of the aid may move ahead of the helper on the curve, causing the helper to get a lower course grade. On the other hand, if an absolute (criterion-referenced) grading system is used, so that every student who gets a final weighted average grade of (say) 90 or better gets an A, team members have every incentive to help each other.

Distance learning

You mentioned the problem of commuting students who have trouble meeting with their groups outside class. I'm dealing with the extreme case of that problem, teaching a web-based course in which my students never get to campus at all. Can I use cooperative learning in that situation?

Yes, although it's more of a challenge than doing it in a traditional course. If the course is offered asynchronously, you're forced to create virtual teams that interact electronically. That's getting easier, though: at this point almost anyone with a computer can communicate with team members via e-mail and instant messaging and exchange work in progress (including text and graphics files, spreadsheets, and hypertext documents) via e-mail attachments and ftp transfers. In addition, growing numbers of on-line students—especially those in industry—have access to video conferencing facilities with electronic whiteboards. With those tools, virtual teams can almost (but not quite) duplicate the in-person team experience.

Getting the students into virtual teams and setting up communication mechanisms is the easy part, however: you must still make sure that the defining conditions of cooperative learning (most notably, positive interdependence and individual accountability) are in place. If they aren't, all of the academic and interpersonal problems associated with groupwork in traditional course offerings are likely to occur and, if anything, to be worse. Millis (2000) and Felder and Brent (2001) offer tips on adhering to cooperative learning principles in a distance learning environment.

What about synchronous offerings?

You can do everything with virtual teams in synchronous offerings that you can do in asynchronous offerings, plus you have the possibility of in-class group work. Let's say you're teaching a live class and simultaneously broadcasting it to remote sites, and you're about to put

the students into the first group exercise of the course—a two-minute brainstorm, for example, in which three-person groups generate lists of responses to a question and then share some of their responses in open discussion. If you've got facilitators at the remote sites, it's easy—once you've defined the exercise, each facilitator makes sure the groups form, keeps them on task, answers questions, stops them when you call time, and if you don't have a two-way video link, designates individuals to report when you call on that site. If there are no facilitators but you've got a two-way video link, you can treat the local site and the remote sites as one large class and proceed as usual.

In the synchronous course I'm going to be offering I won't have facilitators at the remote sites and I'll only have a one-way video link, so I can't monitor groups. Can I still use active learning?

Yes, but in this case all you can do is provide some up-front motivation and let the students monitor themselves. For example, before the first group exercise you might give a short speech explaining what you're about to do and why you're doing it, adding that the people at the remote locations have two choices: (1) form groups and do the exercise themselves, or (2) just sit there watching the groups in the live class without hearing what they're saying. Explain that much of the learning in the class will be happening in those exercises and you don't learn much by watching inaudible groups of people working on problems. Then do the exercise as usual. If the students at the remote sites choose to remain passive, they will learn less and will undoubtedly get bored during the exercises, but it's ultimately their loss, not yours.

Avoiding discouragement

I've run into every student complaint in the book whenever I've tried group work. Students say that they don't like working in groups; they're paying tuition for me to teach them and not to teach themselves; they're carrying their team by themselves; one of their team members rarely shows up for meetings and is never prepared or is racist or sexist or just plain nasty, and their team is falling apart. I didn't have any of these headaches when I taught the good old-fashioned way, and I'm really tempted to revert. Got any encouraging words?

A couple. First, if you find yourself confronted with many such complaints after the first few weeks of the course, go back to Johnson *et al.* (1998) or Millis and Cottell (1999) or any of the excellent troubleshooting columns in past issues of *Cooperative Learning and College Teaching* and refresh your memory on what the experts recommend. Also be sure to collect mid-course student ratings. You always hear from the complainers, but the students who are having a good experience are unlikely to volunteer that information unless you specifically ask them. Finding out that 90% of the class or more is in the satisfied category (which has always been the case in our classes) can help restore your perspective, and sharing the results with the class can provide the unhappy minority with a good reality check.

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