

of listening to an expert describe a process and thinking we understand it only to find out that we can't replicate it when we try to do it ourselves. You've heard your students say, "I understood it when you talked about it in class, but when I tried to do the homework, I couldn't!" That's an instance of this phenomenon. We feel like we understand something just because we've seen it or heard it or read it before. It takes the attempt to apply the information to prove to us that we don't understand it yet. Active learning during class breaks that cycle rather than waiting until the exam to show the students that they didn't really understand.

Finally, active learning opens up the opportunity for motivation. Doing something is generally more motivating and interesting than just taking notes. And when we do something and get it right, that's a real motivator! The inclusion of questions, non-graded quizzes, and opportunities to apply ideas can all be done very quickly and without the need for the instructor to grade or even review each student's work. A perfect example of active learning that is becoming more popular is the use of personal response systems (clickers) in lecture classes. (See Chapter 17 on technology for a more detailed description of this equipment.) This technology allows the instructor to periodically ask everyone in the class to answer a question by clicking their answer choice; the results are then immediately displayed to the class and used as feedback. If you've ever used one of these systems or seen someone else use it, you know how interested the students are to see if they got the right answer and what a great teaching moment it is when they didn't.

Although the feedback system just described is great for active learning, not all active learning requires feedback from the instructor. Sometimes it's enough to just get the students to stop and write briefly about what they are thinking at that moment. Writing is an excellent opportunity for individual active learning. (See Chapter 16 for more ideas on writing as learning.) I've already referred to the "minute paper" strategy of having the students spend 5 minutes at the end of class writing a summary of their current understanding of the topic for the day. Usually they hand these in for the instructor to read, but the writing doesn't have to be graded. It can just be read and digested to form the basis of a further conversation between the instructor and the class.

THE VALUE OF ACTIVE LEARNING IN GROUPS

The bottleneck in educational efficiency is that learning to think requires thinking and communicating one's thinking through talking, writing, or

Active Learning: Group-Based Learning*

THE VALUE OF ACTIVE LEARNING ITSELF

Before we start talking about how to get students active in their learning by using groups, I thought it might be worthwhile to talk about *why* to get them actively learning in the first place. Throughout this book I've tried to include ideas from the research literature on learning, and if there is one thing that the literature agrees on universally, it is the value of involving the learner in the active processing of incoming information. There is a big difference between hearing and learning. In fact, there's a difference between hearing and listening mindfully. Despite the fact that some instructors believe that telling is teaching, a learner really hasn't stored new information in long term memory until he or she does something with that information. It might be that the learner makes a connection between what he's hearing and what he already knows. Or it might be that she creates an example or image to represent the new information and its structure. Whatever the processing act is, even if it's taking lecture notes that are summaries of what's said instead of verbatim, the learner makes that information unique to his or her understanding. So some form of active learning is necessary.

Another value of active learning is that it helps eliminate the "illusion of understanding." This is that wonderful experience we've all had

*I use the term *group learning* to include "collaborative" and "cooperative" learning. Some authors distinguish collaborative from cooperative learning, but both involve peer learning in which there is interdependence of students working toward a common goal. Similarities in and differences between collaborative and cooperative learning are discussed in Cooper, Robinson, and Ball (2003).

doing, so that others can react to it. Unfortunately, a professor can read only one paper at a time, can listen to only one student's comments at a time, and can respond with only one voice.

The problem is not one of communicating knowledge from professors to students more efficiently. Printed materials have done this very well for years, and for most educational purposes are still superior to any of the modern alternatives. The problem is rather one of interaction between the learner and teacher. Fortunately, interactions that facilitate learning need not be limited to those with teachers. Often, those with peers are more productive.

WHY DOES PEER LEARNING WORK?

The best answer to the question "What is the most effective method of teaching?" is that it depends on the goal, the student, the content, and the teacher. The next best answer may be "students teaching other students." There is a wealth of evidence that peer learning and teaching is extremely effective for a wide range of goals, content, and students of different levels and personalities (Johnson et al., 1981). Moreover, skill in working cooperatively is essential for most vocations. Miller and Grocchia (1997) found that cooperative learning produced positive results in ability to work with others as well as better cognitive outcomes. Marbac-Ad and Sokolove (2000) found that cooperative learning in biology courses resulted in higher-level student questioning.

A very thoughtful review of the processes underlying group learning was written by Angela O'Donnell (2006). She describes the social/motivational as well as the cognitive basis for the advantages of group learning. For example, motivationally, peer learning has the advantages of interaction with a peer—an opportunity for mutual support and stimulation. One piece of evidence for the motivational value of peer learning (Schomberg, 1986) is that it reduces absenteeism. Knowing that your teammates are depending on you increases the likelihood of your doing your work. Cognitively it provides an opportunity for elaboration—putting material into one's own words—as well as a chance to begin using the language of the discipline. It communicates that the locus of learning is in the students' heads. An effective partner can act as a model of useful strategies as well as a teacher.

Several of the effective peer learning techniques involve alternating between listening and summarizing or explaining. Structures of peer learning such as the learning cell that reduce the chance that one

participant is simply a passive recipient seem likely to be better for both motivation and learning.

The task of the successful student in peer learning is to question, explain, express opinions, admit confusion, and reveal misconceptions; but at the same time the student must listen to peers, respond to their questions, question their opinions, and share information or concepts that will clear up their confusion. Accomplishing these tasks requires interpersonal as well as cognitive skills—being able to give feedback in nonthreatening, supportive ways, maintaining a focus on group goals, developing orderly task-oriented procedures, and developing and sustaining mutual tasks. It is little wonder that peer learning sometimes fails; the wonder is that it so frequently works. And it does.

Students are more likely to talk in small groups than in large ones; students who are confused are more likely to ask other students questions about their difficulties or failure to understand than to reveal these problems with a faculty member present. Students who are not confused must actively organize and reorganize their own learning in order to explain it. Thus, both the confused and the unconfused benefit.

GROUP LEARNING: VARIATIONS ON THE THEME

Peer Tutoring

"Pay to be a tutor, not to be tutored" is the message from studies of peer tutoring. For example, Annis (1983a) compared learning of students who read a passage and were taught by a peer and students who read the passage and taught it to another student.

The results demonstrated that teaching resulted in better learning than being taught. A similar study by Bargh and Schul (1980) also found positive results, with the largest part of the gain in retention being attributable to deeper studying of material when preparing to teach. These results fit well with contemporary theories of learning and memory. Preparing to teach and teaching involve active thought about the material, analysis and selection of main ideas, and processing the concepts into one's own thoughts and words. However, this does not mean that those being tutored fail to learn. Peer tutoring also helps those being tutored (Cohen, Kulik, & Kulik, 1982; Lidren, Meier, & Brigham, 1991). Hartman (1990) provides useful suggestions for training tutors. Peer tutoring need not be one on one. Group tutoring is also effective.

The Learning Pair: From Learning Cells to Think-Pair-Share

We don't often think of pairs of students as constituting a "group," but as an easy way to start using more active learning, they are simple to implement and don't take much time. One of the best-developed systems for helping pairs of students learn more effectively is the "learning cell" developed by Marcel Goldschmid of the Swiss Federal Institute of Technology in Lausanne (Goldschmid, 1971). The learning cell, or student dyad, refers to a cooperative form of learning in pairs, in which students alternate asking and answering questions on commonly read materials.

1. To prepare for the learning cell, students read an assignment and write questions dealing with the major points raised in the reading or other related materials.
2. At the beginning of each class meeting, students are randomly assigned to pairs, and one partner, A, begins by asking the first question.
3. After having answered and perhaps having been corrected or given additional information, the second student, B, puts a question to A, and so on.
4. During this time, the instructor goes from dyad to dyad, giving feedback and asking and answering questions.*

A variation of this procedure has each student read (or prepare) different materials. In this case, A "teaches" B the essentials of his or her readings; then asks B prepared questions, whereupon they switch roles. Research by Goldschmid and his colleagues demonstrated that the learning cell is effective in a variety of disciplines (Goldschmid, 1975; Goldschmid & Shore, 1974). Training students to generate thought-provoking questions enhances learning (King, 1990; Pressley et al., 1992).

The simplest form of pair work is called the "Think-Pair-Share" strategy. The actual origins of this strategy are hard to pin down, but it has been listed by virtually every author who writes about group learning in the classroom. The basic idea is to ask the class a question and have each person "think" about it for a little bit. The class forms "pairs," and each pair member "shares" with one another what they thought about; then that gets shared with the class as a whole. To recapture student attention and

*Students can also use the learning-cell technique outside of class. My students use it in preparing for tests. A similarly structured method is "Ask to Think—Tell Why" (King, 1997).

stimulate deeper processing, I often ask students to think about a problem for a minute, write for a minute, and then share their thoughts with a neighbor. Students then feel more free to participate in a general discussion of the problem. Pairing can also be effectively used for interviews, discussion of an issue or questions, analyzing a case or problem, summarizing a lecture or assigned reading, or even just checking if they understood what the instructor just said!

Another type of pair sharing is the use of creative controversies (Johnson and Johnson, 1995) which I discussed in Chapter 5 as a technique for discussion. In this format each student of the pair is given one side of an argument to research and develop. Then the pair compares their arguments and tries to come up with a compromise that will satisfy both sides.

Team Learning: Syndicate and Jigsaw

The term *syndicate* has a faintly evil connotation in the United States, but in Great Britain and other countries, *syndicate* is used to describe a team-based system of learning that has proved to be effective. In syndicate-based peer learning, the class is divided into teams (or syndicates) of four to eight students. Each syndicate is given assignments (perhaps three or four questions). References are suggested, and members of the syndicate may divide the readings. The findings are then discussed by the various syndicates as they meet in small groups during the regular class period. The syndicate may then make a written or oral report to the class as a whole.

I have found that I get more interesting reports when I remind students that they have probably sometimes been bored by student reports. Hence, they need to plan not only the content of the report but also how to make it interesting. I'm impressed by student creativity; my students have developed graphic and audio aids, skits, class participation, and other devices for motivating their classmates.

The *jigsaw* method, first developed by Elliot Aronson, begins like the syndicate by dividing a class into groups that are given assignments. Members of each group report back to their group, which agrees on what and how to present to the rest of the class. However, instead of a presentation to the entire class, each member of the group next meets in a new task group with one member from each of the other groups. In this new task group each student is responsible for teaching the students from the other groups what his group has learned. Because every student is thus in a group in which every group is represented, all students have the opportunity to learn the essence of all the assignments.

Students often form groups to study difficult material together or to prepare for an exam. Yan and Kember (2004) interviewed students from a variety of disciplines and found that some groups collaborated to minimize the work for the individual group members. Others, however, collaborated to gain a better understanding of an issue or concept.

Online Groups: Synchronous and Asynchronous

The advent of technology has made it possible to have students work together even when they can't get together in the same place at the same time. Many of the same strategies that I have described for in-class group work could be replicated online, but in general the online group work tends to be asynchronous, meaning that it doesn't have to happen at the same time. (This use of technology to support student-to-student and student-to-instructor learning is discussed much more completely in Chapter 17 on teaching with technology.) Uses include discussion boards, e-mail, wikis, and probably many more by the time this book is published. It's hard to keep up with the changes in technology. The technology actually allows me to bypass the common complaint that students have about group work that is supposed to happen outside of class. Because class-management software allows me to form group spaces that are unique to each group in my class, it's easy for them to "meet" whenever they can or to share their ideas at the time and place most convenient for them. In addition, for some students, especially international students whose English may not be as good as their peers, this asynchronous group work allows them the time they need in order to interpret what their peers are saying and to craft a response and edit it before making it public.

A particularly interesting use of synchronous online groups came in very handy this past year when I had two deaf students in my class. Because small group work is so important in my classes, I set up chat rooms for any group that one of these students was in. All the students in that group would log in to the chat and everyone was able to make their contributions without having to go through an interpreter. It was very satisfying for me and for *all* my students, and resulted in a much greater inclusion of the deaf students in the class conversation.

A colleague of mine uses synchronous chatting in her class in order to get a permanent record of the discussion for later analysis by her and the students. This characteristic of online groups highlights an interesting phenomenon in the literature. Because technology allows researchers to capture a permanent record of the discussions they are studying, there is a huge literature building up around computer-mediated communication,

and we know more about it than most other teaching methods. A review of the literature by Romiszowski and Mason (2004) provides all kinds of perspectives on how to use online discussions. As for my colleague, she uses it because she is interested in studying how students come to understand ideas. Her students use it to review the discussions and write papers drawing on what was said. On a more mundane level, it does give her a permanent record of who participated and what the quality of their contribution was.

Team-Based Learning

This type of group learning is a very well-developed and structured strategy for getting students to learn from one another rather than exclusively from the instructor. It was developed by Larry Michaelsen in large management classes at the University of Oklahoma in the late 1970s, and has since spread far and wide. There are two good references about this technique listed in the supplementary readings section of this chapter, but here's a brief overview. Students are formed into groups of seven to nine students who work together through the entire semester. Before coming to class the students read the text assigned for the day. Upon arrival at class, each student independently answers a "readiness" quiz about the reading and turns it in. Then the group gets together and retakes the quiz as a group. The discussion runs hot and heavy when students disagree about the correct answer, and therein lies one of its strengths: You have to be able to convince the others that you are right, which means you'd better be sure of your answer so you don't lead the group astray. Being able to articulate your reasoning is an extremely valuable learning method and it is the core of this method. Eventually each student's grade for that quiz is a combination of his or her own performance and the performance of the group.

Learning Communities

There is currently a big movement in postsecondary education to use all of these advantages of group learning in what are called "learning communities." Gabelnick and colleagues (1990) reported on the growth of learning communities in higher education early in their development. There are several ways to think about learning communities, but the one most relevant for our purposes is the "classroom community." The idea behind such a system is to harness all the benefits of group learning in the context of a class. Students and instructor would work together to achieve learning goals rather than the instructor assigning a task and the

students carrying it out. The class makes group decisions about how to proceed and supports one another in the process. Each student would feel like a member of that community, learning from and helping others learn from the class. A critical component of this whole process is the active learning that takes place within the class. Classroom communities provide a safe place for the tough business of learning new things.

ISSUES IN DESIGNING GROUP WORK

Here are some tips that may be helpful in initiating a variety of types of cooperative learning methods:

1. You should be the one to form the groups rather than letting students form their own. You are more likely to create diverse groups and less likely to have friends (especially couples) in a group (which can lead to some difficult group dynamics). I find that my students actually prefer to be in a group that is not the same as their social group. And they are more likely to stay on task. I suggest forming groups that are based on characteristics and skills that students bring to the group. For example, in one of my graduate classes, I have students coming from a range of fields and the goal of the class is to understand how the theories apply across fields. So in that class, I try to create groups that have one representative of each of the fields present in the class. When they work on a theory, each person is representing his or her field to the representatives of the other fields. However, in an undergraduate class made up of future teachers who are going to be teaching at a wide range of grade levels and the goal is to be able to apply the theories to designing instruction for your future students, I form the groups by grade levels: all the pre-K teachers in one group, all the first grade teachers in another, and so on. That way they will get the maximum benefit out of working on the applications. There might be some similar groupings in your class. Some instructors form groups on the basis of personality inventories. I don't recommend this for a lot of reasons, but mostly because most instructors are not trained in the use of such inventories and put too much faith in their validity and reliability. Better to ask your students straight out how they like to work in a group and put students with similar preferences together.
2. Once the groups are formed, have students discuss what contributes to effective group functioning. (See the box on group behavior for ideas to raise with the class.) Explain why working together is important and valuable even for students who don't like to work in groups. When they come to an agreement on what good group behavior is, have them sign a

contract that they will abide by those rules or suffer the consequences of being booted out of their group. If that happens, they either have to find another group that will accept them or do the work themselves. Some instructors adopt the philosophy that students have to learn to work with others they don't get along with and refuse to rearrange the groups. That might be a good idea, but the instructor should also probably facilitate a discussion about how the group can get back on track. One strategy that seems to be fairly successful if groups are going to work together for the entire semester is to have a midsemester feedback survey that provides each group member an assessment of what he or she contributes to the group and what changes the other group members might suggest. I have a colleague who has an elaborate online system that allows this to happen anonymously and privately and it seems to work fairly well at bringing errant members into line.

3. Make sure students know what their task is; for example, if it involves out-of-class work, give teams a few minutes before the end of the class period to make plans. At this time they should also report to you what they plan to do and when and where they will meet.
4. For in-class group work, move around and listen in to be sure students are not lost and confused. Use this time to get and keep them

Suggestions for Students: How to Be an Effective Group

1. Be sure everyone contributes to discussion and to tasks.
2. Don't jump to conclusions too quickly. Be sure that minority ideas are considered.
3. Don't assume consensus because no one has opposed an idea or offered an alternative. Check agreement with each group member verbally, not just by a vote.
4. Set goals—immediate, intermediate, and long-term—but don't be afraid to change them as you progress.
5. Allocate tasks to be done. Be sure that each person knows what he or she is to do and what the deadline is. Check this before adjourning.
6. Be sure there is agreement on the time and place of the next meeting and on what you hope to accomplish.
7. Before ending a meeting, evaluate your group process. What might you try to do differently next time?

on the right track but don't let them suck you into doing their thinking for them.

5. The trickiest part of group work is grading it. Johnson and Johnson, the most widely published proponents of collaborative learning, recommend that you have both individual measures of accountability for learning and productivity as well as group measures. Each student's grade then is a combination of the two. I have found it helpful to ask the group members to describe in writing what each of their peers has contributed to the group across the life of the project. I do this in lieu of having them actually assign a grade. I then use those descriptions to look for strengths and weaknesses and consensus about each student's contributions.

IN CONCLUSION

1. Students often learn more from interacting with other students than from listening to us. One of the best methods of gaining clearer, long-lasting understanding is explaining the topic to someone else.
2. This does not mean that we can be eliminated or have time to loaf. More of our time will be spent in helping students work together effectively, less time in preparing lectures.
3. Cooperative peer learning is one of our most valuable tools for effective teaching.

Supplementary Reading

One of the pre-eminent scholars of cooperative learning in higher education is Jim Cooper, who in 1991 initiated the newsletter *Cooperative Learning and College Teaching*, an excellent source of ideas for different ways of using cooperative learning. You can subscribe by writing:

Network for Cooperative Learning in Higher Education

Dr. James L. Cooper

HEA-B-316

CSU Dominguez Hills

1000 E. Victoria St.

Carson, CA 90747

Small Group Instruction in Higher Education, edited by J. L. Cooper, P. Robinson, and D. Ball (Stillwater, OK: New Forums Press, 2003) is a fine resource.

Another good resource is Philip Abrami's book *Classroom Connections: Understanding and Using Cooperative Learning* (Toronto: Harcourt Brace, 1995).

Two comprehensive books on cooperative learning are D. W. Johnson, R. T. Johnson, and K. A. Smith, *Active Learning: Cooperation in the College Classroom* (Edina, MN: Interactive Book Co., 1991), and B. Millis and P. Cottell, *Cooperative Learning for Higher Education Faculty* (Phoenix: ACE & Oryx Press, 1998).

Cooperative learning does not imply absence of controversy. D. W. Johnson, R. T. Johnson, and K. A. Smith describe the use and value of controversy in their book *Academic Controversy: Enriching College Instruction Through Intellectual Conflict* (Washington, DC: ASHE/ERIC, 1997).

Team-based learning can be explored further in L. K. Michaelsen, A. B. Knight, and L. D. Fink, *Team-Based Learning: A Transformative Use of Small Groups* (Westport, CT: Praeger, 2002) and in L.K. Michaelsen, M. Sweet, and D. X. Parmalee, *Team-Based Learning: Small Group Learning's Next Big Step, New Directions for Teaching and Learning Series*, no. 116 (San Francisco: Wiley Periodicals, 2008) online.

For online group work the review by Romiszowski and Mason, "Computer-Mediated Communication" in D. Jonassen (ed.) *Handbook of Research on Educational Communications and Technology* (Mahwah, NJ: Lawrence Erlbaum, 2004) can answer a lot of questions with conclusions based on the research literature (although it does get kind of technical at times).