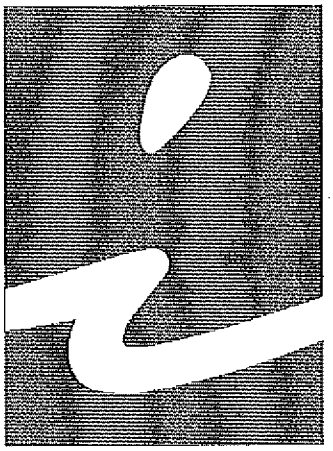
Collaborative Learning 101

K. Patricia Cross



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Acknowledgment

The Educational Testing Service (ETS) has been a key partner in League projects and activities for over a decade. We are indebted to ETS for its generous contributions to the preparation and publication of this fourth paper in an annual series the League produces as "The Cross Papers." With support from ETS this paper will be distributed to thousands of community college leaders around the world.

Foreword

As the League for Innovation in the Community College enters the third year of its Learning Initiative, we are fortunate to count K. Patricia Cross as one of the champions of our continuing efforts to improve and expand student and organizational learning. As a League Senior Fellow, Cross prepares an annual paper that tackles key educational issues in a style that is both scholarly and practical. In short, her gifts of synthesis, application, and articulation bring what are often esoteric concepts clearly into our everyday educational worlds.

In the fourth Cross Paper, *Collaborative Learning 101*, Cross invites us to sit with her on the bank as she peers deeply into the multiple streams of thought that feed into the "swelling river of interest in collaborative learning." Consistent with what we have come to expect of her work, she approaches this important topic as neither a true believer nor a caustic critic, but as a thoughtful scholar and practitioner, helping us see the ebbs and flows of this powerful learning and teaching technique.

There is something here for everyone. New faculty members will

environments.

We know that your academic community will enjoy the conversations, ideas, and applications that spring from this paper. And, we'll enjoy watching how *Collaborative Learning 101* comes to life in the learning and teaching at your institutions in the months and years ahead.

Mark David Milliron
President and CEO
League for Innovation in the Community College

COLLABORATIVE LEARNING 101

K. Patricia Cross

Different streams of thought, flowing over the rocks and sand of their unique stream beds, often end up flowing into a common river of substantial size. There is today a swelling river of interest in collaborative learning that draws its energy and volume from four identifiable streams of thought that have their origins in modern society.

The first stream flowing into the swelling river of interest in

activities.

The second stream adding to the flow of interest in

and teamwork.

The third stream is the Stream of Deep Learning. We are much more sophisticated about learning–what it is and how to produce it–than we were even a decade ago. In part, our knowledge comes from research that shows that, unlike surface learning, deep learning requires active engagement on the part of the learner. Unless learners process the new information by reflecting on it and making connections within their own minds, the new information floats loosely and lightly on the surface and is quickly forgotten. Moreover, bits of unassimilated information don't last very long in a world that makes information obsolete within a few years. Employers need workers who have learned how to learn the new lessons that appear regularly in almost any 21st century job. The Stream of Deep Learning flows into the river of collaborative learning by motivating learners to put forth hard effort, to become actively engaged in thinking.

Finally, the fourth stream is the Stream of Diversity. A rapidly shrinking world and an increasing awareness of social injustice creates a fast moving stream that picks up energy from the diverse tributaries that flow into it. The Stream of Diversity is full and exciting, and it is a major contributor to the fast-moving river of collaborative learning because it provides the challenge to think in new ways and to gain practice in reconciling different perspectives.

Anyone visiting colleges these days is struck by the influence of these thought streams on the generation of high interest in collaborative learning. The problem is that not many faculty members have much experience in planning and organizing productive student learning groups, and many are honest skeptics about how much students really learn from discussion with their peers. Students, too, sometimes complain that they want to learn from the "experts," not from peers "who don't know any more than I do about the subject."

When group learning is implemented without a basic consideration of what students are expected to learn and how groups can be structured to bring about the desired ends, student and teacher skepticism is to be expected. Creating small groups without high expectations for learning is an invitation to disaster

and to dissatisfaction on the part of everyone. The purpose of this essay is to provide some basic knowledge about learning groups from the substantial base of experience and research that has been built up over the past two decades.

I have titled this paper *Collaborative Learning 101* because it is written primarily for teachers who want to stick a toe in the water of collaborative learning or to try a few simple strokes to see for themselves if and how collaborative learning works in their disciplines, for their students, and in their classrooms. Some strong swimmers in the community colleges are already demonstrating the power of learning communities and other more complex arrangements that frequently involve team teaching and curricular modifications, but this paper is deliberately designed as an *introduction* to collaborative learning. While the overview of research and theory that forms the first half of this paper will be of interest to everyone who cares about improving student learning, the second half, consisting of practical tips from teachers experienced in managing student learning groups, is addressed primarily to teachers who want to experiment with collaborative learning within their own classrooms. Of course, I hope that even teachers with considerable experience in learning groups will learn some new techniques to solve some age-old problems or to introduce some new excitement into their work with collaborative learning groups.

Types of Groups

Learning groups exist in many forms and are created for a wide variety of purposes. Some are *ad hoc* groups that last only a few minutes, such as dyads in which students are asked to turn to a neighbor to discuss a point made in the lecture. Some teachers use 10-minute buzz groups consisting of three or four students and designed to give participants an opportunity to explore each other's reactions to a reading assignment. Other student learning groups may work most of the semester on a group project, while long-term learning communities, lasting from a semester to as long as an undergraduate's entire college career, are designed to give students a feeling of belonging to a community of learners. Groups based on a particular pedagogy, such as problem-based learning or

case-study learning, are designed to accomplish specified cognitive goals like critical thinking and problem solving. Some learning groups are based on an epistemology; social constructivism, for example, contends that since knowledge is socially constructed, learning should be produced by the group rather than reproduced from some disciplinary authority (Bruffee, 1995; Vygotsky, 1978).

Characteristics of Effective Learning Groups

Despite a stimulating and sometimes confusing array of techniques and rationales for collaborative learning, the literature reveals substantial agreement on what interactive group learning is, as well as what it is not. Karl Smith captures nicely some common misunderstandings about the nature of cooperative/collaborative learning:[1]

> Many faculty who believe they are using cooperative learning are in fact missing its essence. There is a crucial difference between simply putting students in groups to learn and structuring cooperation among students. Cooperation is not having students sit side-by-side at the same table to talk with one another as they do their individual assignments. Cooperation is not assigning a report to a group of students, on which one student does all the work and the others put their names. Cooperation is not having students do a task individually and then having the ones who finish first help the slower students. Cooperation is much more than being physically near other students, discussing material with other students, or sharing material among students, although each of these is important in cooperative learning. (Smith, 1996, p. 74)

[1] There is considerable confusion in the literature over the terminology of small group learning. It is common for those writing K-12 education to use the term "cooperative learning." More recently, and especially in higher education, "collaborative learning" seems to be the preferred term. Some authors who pioneered some of the work on small group learning in K-12 have brought the term "cooperative learning" with them in their writing for higher education.

In contrast to what cooperative learning is not, Smith identifies what it is by listing five elements that are considered essential for successful cooperative learning groups (Smith, 1996, pp. 74-76. See also Johnson, Johnson, & Smith, 1998, pp. 21-23).

1. *Positive interdependence.* The success of individuals is linked to the success of the group; individuals succeed to the extent that the group succeeds. Thus, students are motivated to help one another accomplish group goals.

2. *Promotive interaction.* Students are expected to help and support one another actively. Members share resources and support and encourage each other's efforts to learn.

3. *Individual and group accountability.* The group is held accountable for achieving its goals. Each member is accountable for contributing his or her share of the work; students are assessed individually.

4. *Development of teamwork skills.* Students are required to learn academic subject matter (taskwork) and also to learn the interpersonal and small group skills required to function as part of a group (teamwork). Teamwork skills should be taught "just as purposefully and precisely as academic skills" (Smith, 1996, p. 75).

5. *Group processing.* Students are expected to learn to evaluate group productivity. They must describe which member actions are helpful and unhelpful, and make decisions about what to continue or change.

Virtually all collaborative learning methods emphasize the importance of *promotive interaction* and *individual accountability.* Students not only must learn to work together, but also must be held responsible for their teammates' learning as well as their own. Slavin (1996), in particular, has been insistent that successful groups must endorse individual accountability and team rewards. "It is not enough," he says, "to simply tell students to work together; they must have a reason to take one another's achievement seriously" (Slavin, 1996, p. 21).

Theory and Research on Collaborative Learning

Today's heavy emphasis on the active involvement of students in their own learning receives strong support from both cognitive theory and empirical research. Traditional classrooms are not considered maximally productive because active participation is usually limited to relatively few students. In typical classes of fewer than 40 students, for example, research suggests that 4 or 5 students account for 75 percent of the interaction, and in large classes of 40 or more, 2 to 3 students account for half of all interaction (Karp & Yoels, 1976).

Critical to our understanding of the learning process is the basic tenet of modern cognitive theory: Children do not arrive on this earth with cognitive structures that are preformed and ready to absorb knowledge. Rather, people quite literally build their own minds throughout life by actively constructing the mental network that connects and organizes isolated bits of information. Much as we would like to think that we as teachers can tell students what we have learned and thus get it into their heads efficiently and accurately, the evidence shows that we cannot transfer our knowledge ready-made into student minds. Students have to do the actual work of learning by actively making connections and organizing learning into meaningful concepts. When students are interacting with other students to clarify, explain, and understand, they are actively building their own minds. (For more about cognitive learning theory, please see Cross Paper #3, *Learning is About Making Connections*, 1999.)

Research on cooperative and collaborative learning is extensive. Indeed, there is far more research on learning in small groups than on any other instructional method, including lecturing (Johnson, et al., 1991; Slavin, 1989-90). As of June 1999, ERIC had listed 4,763 items under the descriptor "cooperative learning." While many of these articles relate to the extensive interest in cooperative learning in the K-12 sector, more than 1,200 of the items on cooperative learning were indexed to higher education, and 452 additional studies were

listed under the term "collaborative learning." With such an extensive body of literature, the large number of syntheses and meta-analyses that integrate and summarize what we know about cooperative and collaborative learning has been helpful. Virtually all of the compilers and synthesizers of research findings regarding group learning come to positive conclusions (Cuseo, 1992; Johnson, et al., 1991; Millis & Cottell, 1998; Slavin, 1990). Natasi and Clements (1991) reflect the nature and tone of much of the research:

> Cognitive-academic and social-emotional benefits have been reported for students from early elementary through college level, from diverse ethnic and cultural backgrounds, and having a wide range of ability levels . . . . Furthermore, cooperative learning has been used effectively across a wide range of content areas, including mathematics, reading, language arts, social studies and science. (p. 11)

Since I have been reviewing research on learning for more than 30 years, I have grown suspicious of sweeping conclusions about the superiority of any particular method of instruction. Thus, I sought corroborating evidence that students learning from interaction with fellow students is a highly productive learning experience. Perhaps the most convincing endorsements of the value of interactive student learning in higher education came from three researchers who are not identified with collaborative education or involved in evaluating group learning *per se*.

Alexander Astin's large-scale statistical studies across hundreds of colleges and thousands of students, using 22 measures of student learning outcomes, concluded that two factors–student-student interactions and student-faculty interactions–had a special potency in academic achievement, personal development, and student satisfaction with college. Since cooperative learning capitalizes on these two critically important kinds of interaction, Astin (1993) came to the following conclusion:

> Research has consistently shown that cooperative-learning approaches produce outcomes that are superior to those obtained through traditional competitive approaches, and it may well be that our findings concerning the power of the peer group offer a possible explanation: Cooperative learning may be more potent than traditional methods of pedagogy because it motivates students to become more active and more involved participants in the learning process. (p. 427)

Richard Light (1992), using a very different approach to the study of student learning in college, studied one college intensively. He and his colleagues interviewed 570 Harvard undergraduates to see what learning experiences they valued most in their college years. He concluded:

> All the specific findings point to and illustrate one main idea. It is that students who get the most out of college, who grow the most academically, and who are happiest, *organize their time to include interpersonal activities with faculty members, or with fellow students built around substantive, academic work.* (Light, 1992, p. 6, emphasis in the original).

Still in search of some scholarly skeptics over what can only be called an unusual academic exuberance, I reviewed yet another kind of research, the work of Bill McKeachie and his fellow psychologists at the University of Michigan who reviewed more than 500 research studies pertaining to teaching and learning in college classrooms. To the question, "What is the most effective method of teaching?" McKeachie and his colleagues responded, "It depends on the goal, the student, the content, and the teacher. But the next best answer is, 'students teaching other students'" (McKeachie, Pintrich, Lin, & Smith, 1986, p. 63).

Undoubtedly, students can and do learn from fellow students. Light's qualification on the productivity of interactions *"built around substantive academic work"* is especially important to

community college teachers, and it is vital to any discussion of collaborative learning in college classrooms.

What Do Students Learn?

Broad studies of student learning outcomes such as those from Astin, Light, and McKeachie offer convincing evidence that interactive learning makes positive contributions to a student's college education. But the claims for collaborative learning go further. In particular, there is high interest in two important outcomes: 1) the contributions of group learning to content mastery, critical thinking, problem solving, and other cognitive attributes, and 2) the contributions of group learning to the development of interpersonal skills and other noncognitive factors that are valued in careers and citizenship.

Research on Cognitive Outcomes

The research on the effects of interactive group learning is extensive, involving hundreds of studies, over 50 years of research, and dozens of different models or forms of learning groups. Johnson and his colleagues at the University of Minnesota have concentrated largely on comparing learning outcomes from three types of learning structures: *cooperative, competitive, and individualistic. Cooperative* learning involves "promotive interaction" in which, to accomplish group goals, students encourage the achievement of other members of the group while also working on their own achievement. Competitive structuring consists of environments in which students focus on "increasing their own achievement and on preventing any classmate from achieving higher than they do" (Johnson, et al., 1991, p. 31). And *individualistic* structures are more like mastery learning in which no interaction exists; "students focus only on improving their own achievement and ignore as irrelevant the efforts of others" (Johnson, et al., 1991, p. 31).

In extensive meta-analyses across hundreds of studies, cooperative arrangements were found superior to either competitive or individualistic structures on a variety of outcome

measures, generally showing higher achievement, higher-level reasoning, more frequent generation of new ideas and solutions, and greater transfer of what is learned in one situation to another. The Johnson team concluded:

> Cooperative learning is indicated whenever the goals of learning are highly important, mastery and retention are important, the task is complex or conceptual, problem solving is desired, divergent thinking or creativity is desired, quality of performance is expected and higher level reasoning strategies and critical thinking are needed. (Johnson, et al., 1991, p. 40)

Given that conclusion, it is hard to think of any educational situation in higher education in which cooperative learning would not be recommended by the Johnson team.

Robert Slavin at Johns Hopkins University also reported highly positive results (1989-90, 1990, 1996). Slavin's particular research interest is in comparing the outcomes from various types of cooperative learning[2] as well as comparing cooperative learning with traditional control groups. Slavin's most important conclusion is that "cooperative learning has its greatest effects on student learning when groups are recognized or rewarded based on the individual learning of their members" (1996, p. 52). Students must have an incentive, he says, to help each other put forth maximum effort. Indeed, studies of behaviors within groups show that students who benefit most from cooperative learning are those who give elaborate explanations to help their fellow team members achieve. "If a group member wants her group to be successful," reasons Slavin, "she must teach her group mates (and learn the material herself). If she simply tells her group mates the answers, they will fail the quiz that they must take individually" (p. 53). Slavin's conclusion, after extensive review of research on cooperative learning in K-12, is that "cooperative learning

[2] Types of cooperative learning groups in K-12 have become almost brand names with each brand having a definition, a method, and a sponsor. See Slavin 1996, Chapter 2, for some descriptions.

methods can be an effective means of increasing student achievement, but only if they incorporate group goals and individual accountability" (1990, p. 32).

Research on Interpersonal and Teamwork Skills

Students learn interpersonal and teamwork skills to the extent that they are required to manage their own learning groups. Students learn quickly that if their group is to work well in the classroom, they must practice and develop certain skills of teamwork. Bosworth (1994) provides a taxonomy of the skills that are necessary for students to use groups effectively in a classroom situation:

1. *Interpersonal Skills.* These are basic social skills that most students learn through interaction with friends–listening to others, knowing people's names, giving constructive rather than destructive feedback, and responding to others' ideas, for example. These are essential skills, says Bosworth, if the group interaction is to remain smooth.

2. *Group Management Skills.* When teacher management is given over to collaborative learning groups, members must learn management skills such as making and following an agenda, keeping on task, and evaluating group productivity.

3. *Inquiry Skills.* Students who are working collaboratively need to know how to probe for additional information; analyze, synthesize, and evaluate information; and draw conclusions.

4. *Conflict Resolution Skills.* Conflicts can arise over interpersonal issues such as members not doing their share of the work on time, or they can occur because of intellectual differences such as disagreement over an interpretation or presentation. Students need to develop the skills to resolve such conflicts productively.

5. *Synthesis and Presentation Skills*. Once the group has gathered information, members need to decide how best to organize, synthesize, and present it. An effective presentation requires students to agree on an appropriate approach, carry through on it, and bring it to closure.

Collecting evidence on the effectiveness of collaborative learning groups in developing these skills is not easy to do, but experienced teachers develop considerable insight into the teamwork skills necessary for collaborative learning. The research shows that when compared with competitive learning situations, collaborative learning creates more positive relationships among diverse and heterogeneous students, students express more liking for other students and for the teacher, and they offer more concern and social support for fellow students (Johnson, et al., 1998; Slavin, 1990).

Who Benefits?

Although most studies evaluating the effects of group learning for different kinds of students claim equal benefits for students across a wide range of backgrounds and abilities, some researchers report that underprepared students may benefit more from student led discussions than do better students (Gruber & Weitman, 1962). The explanation offered is that a group containing sufficient student resources of knowledge and higher level thinking skills will help less skilled members restructure and deepen their understanding. More than 20 years ago, Vygotsky (1978) observed that exposing all students to concepts and understandings within their ability to grasp, but not yet part of their personal understanding, enables each to learn from other students those concepts that are just beyond their current level of development. Thus, theoretically at least, poor students would stand to learn more from better prepared students than vice versa.

Some would claim that the better students are wasting their time by explaining things they already know. However, there is also ample research and experiential evidence to suggest that in peer tutoring, students who teach learn more, especially at a

conceptual level, than students who receive the tutoring (Annis, 1983; McKeachie, et al., 1986). As teachers who have spent many hours preparing a lecture or designing a learning exercise know first hand, organizing knowledge to explain it to others is a powerful learning experience. Thus, there should be considerable value to good students in having to organize and articulate their own learning to make it understandable to others. Indeed, Slavin (1996) found in his review across hundreds of research studies that "students who give each other elaborated explanations (and, less consistently, those who receive such explanations) are the students who learn the most in cooperative learning" (p. 53).

Taken as a whole, the research appears to substantiate the claim that both underprepared and well-prepared students benefit from group learning, but perhaps for different reasons. Good students may benefit by having to formulate their thoughts and knowledge into concepts understandable to others, while poorer students may benefit from the explanations that lie within their grasp, but are not yet understood.

Today, there is high interest, especially in community colleges, in any group that has been underrepresented in higher education in the past. Obtaining diversity in student populations is important for colleges for pedagogical as well as social reasons. The evidence is strong that students who might be considered nontraditional college students prefer cooperative group learning and stand to benefit more from it than do traditional students. Women, members of underrepresented racial and ethnic groups, adult and reentry students, commuters, and international students have been identified as students for whom peer and group learning seem especially valued and valuable. In a study of 2,051 students at 23 institutions, Cabrera (1998) found that minority students expressed a greater preference for learning in groups than did majority students, and Treisman (1985) found that the five-year retention rate for African-American students majoring in mathematics or science at Berkeley was 65 percent for those who were involved in collaborative learning groups, compared with 41 percent for African-American students not involved.

The simple answer to the question of who benefits from group learning situations seems to be "almost everyone." Furthermore, group work appears to enhance and enrich a goal that many colleges consider paramount for students today, and that is learning from diversity. Cuseo (1996) underscores the value of group learning with a diverse student body:

> By creating positive interdependence among culturally heterogeneous groups of learners, cooperative learning has the potential to capitalize on the contemporary wave of student diversity–converting it from a pedagogical liability (which instructors must somehow adapt to or accommodate) into a pedagogical asset–by capitalizing on the multiple, sociocultural perspectives that can be experienced when students from diverse backgrounds are placed in heterogeneously-formed cooperative learning groups. (p. 24)

Conclusions from Research and Theory

The research on collaborative learning has been extensive and on the whole quite convincing. There is now compelling evidence from both empirical research and cognitive learning theory that learning for retention and understanding requires the active involvement of the learner. Students quite literally build their own minds by making the connections in the brain that organize bits of information into coherent understandings. The research evidence is strong that collaborative learning groups are one way to get students from a diversity of backgrounds and experience actively involved in learning. Thus, the goal for teachers organizing effective collaborative learning groups is to create an environment in which students are actively engaged in learning, attending, thinking, analyzing, considering, arguing, imagining, reflecting, and otherwise actively making the connections in the brain that constitute learning.

Ironically, there has been less research on the efficacy of collaborative learning for the development of teamwork and

interpersonal skills than on academic skills such as critical thinking, problem solving, and mastery of subject matter content. There are probably several reasons for this. First, and simply, there is more skepticism about the power of peer learning groups to improve academic learning than there is about their effectiveness in improving teamwork, which is, after all, what students are practicing in collaborative learning. And so researchers have put forth a kind of defensive effort to demonstrate the academic effectiveness of peer-group learning. Second, current measurement tools to evaluate interpersonal effectiveness are inadequate. Paper and pencil tests are used extensively to measure academic learning, whereas the logical criteria for interpersonal effectiveness and teamwork skills are performance measures which have been harder to develop, or maybe the academic enterprise has just been slower to develop credible measures of interpersonal effectiveness. There is strong evidence that students generally give their collaborative learning experiences high ratings. They feel they learn more, and they have more positive attitudes toward other people–both fellow students and instructors–than they do in traditionally taught classes.

We need not, however, depend solely on the abstractions of research and theory to support the current high interest in collaborative learning. A growing body of practical experience is being accumulated by teachers working daily in their classrooms with learning groups. We turn now to what experience tells us about how to make collaborative learning productive.

Lessons of Experience: Tips from Teachers

Some teachers have been using collaborative learning groups in their classes for years and have learned through experience some valuable lessons about making groups work efficiently and effectively. Predictably, teachers sometimes differ in their advice; attempts have been made to reflect these differences and the reasons for them in the answers provided.

Question: What is the best size for a learning group?

Answer: Keep the groups small, especially in the beginning. Optimal size for classroom working groups is four or five, and Bean (1999, p. 153) recommends keeping all groups in the same room if at all possible, despite the considerable noise that is generated. The most common group size is probably four or a "quad." Bruffee (1993) and Bean (1999), however, offer a rationale for five as the ideal number. Groups larger than six dilute the experience, they say; groups of four tend to split into pairs, and groups of three tend to form a pair and an outsider. Those defending four as the optimal number, however, view the option of working in pairs as an advantage rather than a limitation (Millis & Cottell, 1998). There is general consensus that longer term groups formed to do a project or write a report should be smaller; three seems optimal.

Question: How are groups formed?

Answer: There are three ways, each with variations, to form groups: *random, stratified,* and *student choice. Random* assignment, often made by "counting off" is preferred by most faculty on the grounds that it is easy to manage and is perceived as fair by students. Furthermore, random assignment usually results in reasonable diversity since friends often sit together in class and are broken up by the procedure. *Stratified* assignments involve selecting students on some relevant criterion of skills, learning styles, or experience, and is probably best used later in the course when student characteristics are known. Alternately, stratified groups may be formed based on student data sheets that are completed at the beginning of the course. Data sheets might provide information about work experience, reasons for taking the course, preferred ways of learning, career goals, or anything else that may be relevant to grouping students by common–or diverse–interests. Finally, *student choice* permits students to group themselves and is preferred by some, for at least part of the time, on the grounds that students who feel comfortable with one another are likely to speak openly and honestly (Brookfield & Preskill, 1999). Student choice is discouraged by others on the grounds that groups of friends tend to be less businesslike and to engage in "insider chit-chat" (Bean, 1999). Moreover, they often reach closure too soon, either because they already agree or because they find differences difficult and are quick to paper over them (Bruffee, 1993).

Question: What kind of task assignments are most likely to result in productive discussion and learning?

Answer: The care given to developing the task assigned to the group for discussion is all-important. A poorly designed assignment not only wastes time, but also results in poor student attitudes, failure to cooperate, and even derision of the learning group process. Student dissatisfaction usually arises from a lack of clarity and structure in the assignment. The general advice seems to be that tasks should be highly structured in the beginning of the course, with less structured tasks reserved for later when students have had more experience (Miller, Groccia, & Wilkes, 1996). Structured groups, for example, would make clear the specific task, the expected product, the time allotment, and the method of reporting results. Bruffee (1993) recommends writing on the board or heading a worksheet with specific instructions such as the following:

> Once the groups have been formed, please introduce yourselves to each other. Then agree on one person to record the views expressed in the group, including both the decisions the group makes collaboratively and significant dissent. The recorder will speak for the group. For each question decide on one answer that represents a consensus among the members of the group. (p. 42)

Teachers experienced in group work offer the following tips regarding the formulation of the assignment.

- Bean (1999) suggests four criteria for a productive group assignment: "In all cases, a good small group task promotes controversy, has a product, can be accomplished in the specified time limit, and is directed toward a learning goal of the course" (p. 152).[3] Some examples of good task assignments follow:[4]

[3] Not everyone would agree that the task must promote controversy, but it should lend itself to exploration.

[4] Selected and modified from Bean 1993, pp. 155-159.

What are the arguments for and against giving the 83 year old stroke victim described in the case information about the terminal illness of her daughter?

In what way is Jackson Pollack's "Autumn Rhythm" different from the results of a monkey throwing paint at a canvas?

Carefully observe this (poem, statistical table, painting, advertisement) and as a group pose three good questions about it.

- Ask questions that have more than one answer. Not only does this make for more interesting discussion within the group, but when the time comes for reporting, it also makes the session more interesting and less repetitive since different groups have the opportunity to show variety in the analysis. For example, in a composition course, "What's wrong with sentence five?" is less effective than "How would you improve the weakest sentence in this essay?" (Bruffee, 1999, p. 43).

- Make the material to be analyzed short. A single paragraph or even a sentence or two is often plenty for a 30-40 minute discussion. In most cases, one question is enough; it should be short, concrete, and clearly expressed (Bruffee, 1999, p. 42). If possible, it should be written in a handout or on overhead or chalkboard, specifying the task, the time limit, and the expected product.

- Structure the task to promote interdependence among students, making them rely on one another to create the group product (Smith, 1996, p. 77).

be asked to generate questions they would like to hear discussed, or they might be asked to give arguments or provide evidence for or against a premise or quotation. Variety in both task and product provides for different

student strengths and learning styles in addition to providing less repetition and higher interest for the class.

Question: What kinds of activities have teachers found most useful?

Answer: Classroom teachers have been extraordinarily creative in designing group learning tasks that engage students in problem solving, critical thinking, and consensus building. Most collaborative learning techniques have been devised to give students time to reflect, to challenge fellow students, or to solve problems that arise within collaborative learning groups, such as students who talk too much or too little. Here are a few examples:

- Research has shown that many students fail to take good notes; their notes are incomplete, inaccurate, or both. A strategy in which the teacher stops during the lecture to give students time to reflect can also improve student note-taking skills. In this activity, the teacher asks students to summarize their notes to a neighbor, who then adds to and corrects the summary. After a few minutes of sharing, each student is encouraged to take something from the other's notes to improve his or her own (Millis & Cottell, 1998, p. 114).

preplanning but is a very effective way to build interdependence. The teacher distributes a set of materials that is divisible into the number of members in each group. In a group of four, for example, the materials are divided into four parts. Each student then meets with a student from another group who has the same part of the material. These students have two tasks: 1) to become experts on their assigned material and 2) to plan how to teach the material to their home groups. When students return to their home groups, now transformed into teaching/learning groups, each student is responsible for teaching a particular area of expertise and for learning the areas taught by the other team members.

- Talking Chips is a technique used to encourage full and equal participation in learning groups (Millis & Cottell, 1998). Each member of the group is given a number of chips at the beginning of the discussion. After each contribution, the student surrenders a chip. Students who quickly use all their chips become aware that they are dominating the discussion, whereas those with a stockpile of chips become aware that they need to contribute their share.

Question: What does the instructor do while students are meeting in their groups?

Answer: Teachers have strong opinions regarding this question. Almost all agree that teachers should not sit in or hover over groups because doing so inevitably shifts the attention away from peer relationships and shifts responsibility to the teacher. Some teachers make group responsibility for actions and products very clear to students by leaving the room until the plenary session. Many experienced teachers see this as an extreme position, and the more common approach is to wander from group to group as a resource person.

Question: What can I do to make the reporting sessions more interesting and productive?

Answer: Among practitioners, agreement is widespread that reporting and synthesizing the work of the learning groups should be required, both to indicate the importance of the activity to students and to give them practice in reaching consensus, summarizing information, and presenting their conclusions. The routine may be made more interesting by some of the following variations.

- If the report can be depicted visually, each team presents its conclusions on the board or on newsprint. Students then move around the room, viewing the work of other teams. This method is sometimes called the Gallery Walk (Millis & Cottell, 1998, p. 108).

- When the group products consist of items on lists, each team reports only one item. The item is written on the board or on newsprint; a team simply passes if all the items on its list have already been noted. Some teachers enliven this procedure by asking groups to clap when items on their lists are mentioned. This gives some idea of the popularity of the response, plus keeps attention focused. The reporting ends when no new items are offered.

- If the class is large, all teams must be prepared to report, but only three to five are called upon to make the report. Insights not mentioned by any of the reporting teams may be added in class discussion.

- When the product of the group discussion does not lend itself easily to writing, one member from each team might rotate to an adjoining group to share with them the results of the original group's solution. This method, known as Three-Stay, One-Stray, has the merit of engaging students in a teaching and learning situation. The straying student learns to teach the results of a discussion and the staying students ask probing questions about a subject all students have covered in background discussions.

Question: What do I do about grading?

Answer: Advocates of collaborative learning universally agree that students should be held individually accountable for their learning. Thus, few people offer any defense for assigning a common group grade to all members of the group, a practice that is often considered unfair by students and may promote antagonism toward weaker students within the group. Some teachers view collaborative learning simply as one method for involving students actively in learning, and they grade individual performance as they would for any other teaching and learning method. Others have devised methods for giving bonus credit, usually modest, for the performance of the group on the grounds that students will then have some motivation for helping everyone in the group to achieve. One approach is to have students take an

exam individually and hand in their papers for grading. They then discuss the questions in their groups and retake the same or a similar exam individually. The instructor adds a bonus to individual scores based on the group average.

Conclusion

The river of collaborative learning is flowing swiftly and clearly. None of the streams of contemporary thought that feed the river show any signs of drying up. Their volume is full, and they flow in a common direction to sustain the river.

As I sit on the river bank, however, watching the flow of enthusiasm for collaborative learning, I see some unevenness in the river bed, making for some rough spots and turbulent waters in places. I also see a distant possibility of changing channels in some of the tributaries. But, after all, a perfectly smooth river is an old river; time has worn a channel, and the flow is easy and unchanging. The river of collaborative learning is young and vigorous, cutting new channels and changing quickly and sometimes unexpectedly.

The research on collaborative learning is voluminous, but uneven. There is strong support from neuroanatomy and from cognitive science for the thesis that students must actively involve themselves in their own learning. Research also demonstrates that students are well-motivated to get involved in learning when they are faced with peers who depend on them and in turn nurture them in challenging learning tasks.

The river of collaborative learning hits rough spots in devising adequate performance measures for the interpersonal and teamwork skills that collaborative learning is, at least in part, designed to enhance. We assume, with good reason I think, that if students are required to practice collaboration in their classes, then the skills they develop will transfer to the workplace. But it would be helpful to know how and to what extent students can develop transferable teamwork skills from collaborative learning groups.

Another observation that I would make from my position on the river bank is that to date most of the research and most of the writing by practitioners is produced by avowed fans of collaborative learning. Thus, we have well-designed group learning experiments contrasted with not always well-designed traditional classes. We should not be surprised to find that well-designed learning experiences of any kind are more productive than those that are poorly designed or not designed at all. Although hearing more from some of the failures of collaborative learning–and failures do exist–might be instructive, we know from research and practice that carefully designed collaborative learning groups are a highly effective way of producing learning.

Finally, I would observe that while none of the streams that feed the river of collaborative learning seem in any danger of drying up, some may change channels. Student generations change quickly and sometimes inexplicably. Thus we have the activists of the 1960s who were concerned with social justice, the baby boomers of the 1970s who were concerned with getting ahead, the Gen Xers of the 1980s who are assumed apathetic, and the consumer/vocationalists of the 1990s who see job preparation as their first and sometimes only priority. Whether the student generation of the 2000s will continue to regard career advancement as the chief virtue of a college education is anyone's guess–as is whether employers will sustain their emphasis on teamwork in the workplace. But there is not much doubt that learning to work together and to benefit from a diversity of viewpoints and perspectives is an enduring value of education. Thus it appears that the streams of career preparation and diversity will continue to feed the river of collaboration, albeit possibly from new channels.

At the risk of drowning in my own metaphor, I hope that this paper has pushed a few people off the safety of the river bank into the swiftly flowing waters of collaborative learning and provided them with a few strokes to make the swimming easier.

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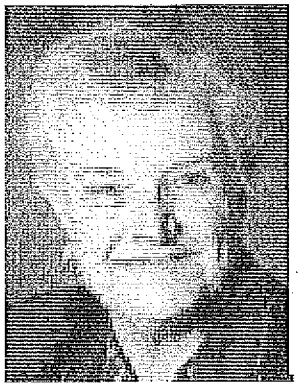

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