Ten Research-Based Steps for Effective Group Work

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Abstract

Active learning approaches often involve students working in groups. The advantage of this pedagogical choice is that students can apply concepts, solve problems, and, in general, engage cognitively with course content with the support of peers. Moreover, if designed thoughtfully, group work can help students develop metacognition, the ability to think about and monitor one's own thinking and learning, closely related to the idea of critical thinking and a key element in learning. Group work involves complex cognitive and affective elements, however, that embody all the challenges of human social interaction and affect the functioning of the group. In this article, I share 10 research-based practices for using group work productively. Key steps include clarifying and sharing your goals for student learning, proactively addressing common sources of student resistance, prompting and training students in effective group function, forming groups appropriate for the task, designing activities worthy of a group effort, using appropriate grading criteria, and incorporating reflection into the process—both your students' and your own.

Keywords: active learning, group work, cooperative learning, team-based learning

Numerous studies demonstrate that active learning in face-to-face classrooms promotes better student learning outcomes, greater student retention, and more inclusive class environments than does lecture alone (Freeman et al., 2014; Hake, 1998; Springer, Stanne, & Donovan, 1999). Active learning approaches often involve students working in groups (for a comprehensive review, see Davidson, Major, & Michaelsen, 2014). Such groups can range from as few as two members in the simple think-pair-share strategy (Lyman, 1981) to as many as seven or more in team-based learning (TBL; Michaelsen, Knight, & Fink, 2004). Groups may be formed as needed during class or may be deliberately structured in advance using very specific criteria—or anything in between. Some general pedagogical practices that depend on students working in groups include collaborative learning (Bruffee, 1999), cooperative learning (Johnson, Johnson, & Smith, 1998; Millis & Cottell, 1998), peer instruction (PI; Mazur, 1997), or TBL, each of which is described more fully in various sections that follow. Historically these terms referred to definitively different kinds of group experiences, but they are now often used interchangeably—a practice that can result in some confusion about what is actually occurring in the classroom.

The advantage of group work is that students can apply concepts, solve problems, and, in general, engage cognitively with course content with the support of peers. If designed thoughtfully, group work can help students develop metacognitive skills (Sandi-Urena, Cooper, & Stevens, 2012). Metacognition is the ability to think about and monitor one's own thinking and learning and is closely related to the idea of critical thinking. The ability to think metacognitively has been shown to be a key factor in student learning (for discussions, see Martinez, 2006; and Millis, 2016).

The first time instructors use groups in face-to-face classes, however, they may be disappointed. Group work embodies all the challenges of human social interaction—personality conflicts, differing expectations, worries about criticism, and varying levels of buy-in or resistance—all of which affect the functioning of the group. Theories of why collaborative groups may fail include those based on cognitive as well as social challenges (Nokes-Malach, Richey, & Gadgil, 2015). Cognitively, for example, multiple students speaking and contributing ideas can disrupt an individual's usual processes of memory retrieval. This issue may be especially important if the task is either too easy or too difficult. Socially, students may not all contribute equally (so-called *social loafing*) or may fear to contribute because of potential judgment from the other members of the group. Because of these challenges, group work does not automatically ensure improved student learning outcomes or satisfaction (Andrews, Leonard, Colgrove, & Kalinowski, 2011).

Given the inherent difficulties and accompanying risks, how do instructors navigate such pitfalls and use groups effectively in class? In this article I provide a step-by-step process to guide instructors in designing group-work experiences that fulfill their promise.

1. Clarify Your Learning Goals for Group Work

As we all know, learning requires individual effort. So when is it an advantage to use class time for student group work? For example, working in a group can help individuals memorize information, but using class time for such lower-level learning is rather inefficient. But a group environment can, under the right conditions, be a powerful way for students to process information and create meaning—key prerequisites for moving ideas from working memory into mental structures conducive to long-term retention (Bransford, 1979; Craik & Lockhart, 1972). As discussed more fully later, assigning students to work in groups allows them to

- practice class content/concepts
- develop problem-solving skills
- recognize the diversity of views on an issue
- deepen understanding through debate
- cultivate their metacognition (thinking about thinking)
- learn how to work in a group (if guided)

Groups are a great way to allow students an opportunity to work through course ideas and skills while they have you and their peers for support. Ideally, groups allow members to practice retrieval of information and receive feedback on their thinking—two essential processes to promote learning (Brown, Roediger, & McDaniel, 2014; Halpern & Hakel, 2003). Thus, providing time in class for students to process key concepts in groups by answering a question, solving a problem, or analyzing a case study can enhance students' learning from lecture.

Class discussion is a traditional pedagogy designed to encourage students to share their opinions and articulate and refine their thinking. Small-group work can be a productive alternative to whole-class discussion when classes are large or when issues are complex or controversial. In such cases, some students may not feel comfortable speaking in front of the whole class. Engaging with a small group allows students to see a diversity of perceptions on an issue while encouraging them to clarify their own reasoning and values. When discussing hot topics, however, students need to be guided in how to conduct civil discourse. Beginning the class or course by asking the students to set ground rules for productive conversation can provide a map to help them navigate the rocky landscape of interpersonal communication. When conversations get heated or personal, instructors can remind students of these shared values regarding learning from, and about, points of difference. Instructors can also pause discussion momentarily and encourage freewriting to help students express their feelings.

Structured group discussion formats are particularly useful for guiding students in best practices for difficult dialogues. Brookfield and Preskill (1999) offer a number of resources for this, such as "Circle of Voices" and "Circular Response Discussions." In Circle of Voices, students sit in a circle in groups of four or five and share their thoughts in turn, each student speaking without interruption for three minutes. In Circular Response Discussions, each student in a group again speaks for three minutes in turn without interruption. In this case, however, students must paraphrase the student who spoke before them, connecting those prior comments in some way to their own. These approaches not only allow all opinions to be heard but also allow students to find common ground.

An important advantage of groups over individuals is that, when planned properly, group exercises can be instrumental in helping students learn to think about their thinking (metacognition). Group conversation can force individuals to express ideas more clearly, answer questions, and provide evidence for their assertions—all activities that students rarely engage in when listening to lectures or studying alone. However, because these results are not automatic, you will need to guide your students in developing these habits, as discussed more in sections 4 and 9.

Many fields in which our graduates will work prize the ability to function in teams. Working in teams as students is obviously essential for developing this skill, but mere participation in group work won't necessarily teach students how to function productively. If one of your goals for students working in teams is that they become proficient at it, recognize that they will need instruction and practice in group functioning as discussed in section 4.

2. Be Transparent with Your Students about Your Reasons for Using Groups

Once you have clarified your goals for using groups in class, share them with your students. Being transparent in your goals for student learning can actually result in better student learning outcomes (Winkelmes, 2013). Let students know that this decision was deliberate on your part and was based on your desire to promote their learning—not to get out of work. Students can mistakenly think that your use of collaborative activities relieves you of your teaching responsibility. Ways to approach students' concerns include the following:

- addressing their worries directly and assuring them of your best intentions for their learning from group work
- explaining the advantages of working in groups and how these advantages can, in the best cases, overcome the disadvantages
- reassuring students through your behaviors; for example, circulate in the classroom and note students' questions and confusion, ask probing questions to guide student thinking along productive paths, and clarify misconceptions and answer questions through minilectures or additional resources.

Students know that you hold power over them in the form of grades, and they may fear that their classmates are as clueless as they are concerning the kind of learning that will translate into satisfactory grades. Showing students that you are still integrally involved in supporting their hard work of learning can alleviate some of their fears.

3. Be Proactive in Anticipating and Addressing Student Resistance

Student resistance to active-learning modalities is common. Resistance can arise from any number of, or a confluence of, environmental, affective, social, and cognitive factors. We are, after all, asking students to be active agents in a dynamic that ultimately they do not control. We are asking them to expose themselves to strangers, in various ways, and even to be judged on those encounters. How willing they are to take those risks depends on a complicated set of circumstances.

Seidel and Tanner (2013) summarized three major sources of student resistance in their review: students' former experiences of the learning environment, challenges of working with peers, and demotivating behaviors of instructors. Tolman, Sechler, and Smart (2017) describe an integrated model of student resistance that recognizes that students' personal characteristics, such as their level of cognitive development and metacognitive awareness, are further affected by their prior classroom experiences and environmental and cultural forces, including various identity issues. All these factors shape their comfort level with active-learning practices such as group work.

Likewise, the authors note that instructors have their own issues when confronting student resistance. Instructors may not recognize that humans are naturally hardwired to take the path of least resistance cognitively, and experts often underestimate the difficulties novices in their disciplines face. In addition, or as a result, instructors may make unsubstantiated assumptions about the source of students' resistance. Thus, the more heavily instructors emphasize group work in class time and grading, the more time they may need to explore and address common sources of resistance.

Best practices for reducing student resistance and social loafing (Aggarwal & O'Brien, 2008) include the following:

- being transparent about teaching goals and choices
- relating activities to students' interests and goals and making the work authentic
- validating the work of groups by decreasing your role as content authority; let students debate answers without immediately offering the "correct" answer. Avoid reiterating content students have already dealt with through group discussion. Let students summarize key takeaways.
- scaffolding the practice of having students work together; start with small casual groups, provide icebreakers, create guiding questions for discussions, give students examples of language for positive discussion and civil disagreement, and ask students to generate and agree to a list of productive group behaviors—a group contract or covenant.
- keeping challenges of group work reasonable; limit group size (three to five) and divide big projects into doable chunks.
- promoting awareness of, and providing feedback on, student perceptions of one another's contributions through peer evaluation

Although students may be willing to work in groups, they do not automatically know how to maximize learning from them. The next sections provide ideas to make group activities more productive.

4. Help Students Maximize Their Experience in Groups by Prompting Good Group Practices

Theories of the cognitive causes for the success of collaborative groups (as reviewed in Nokes-Malach et al., 2015) often include the power of the group to

- cue individuals' prior knowledge
- complement individuals' knowledge
- enhance working memory assets through the collective
- correct errors
- re-expose individuals to knowledge
- promote individuals' retrieval events

Group process can enhance several key elements of learning—accessing prior knowledge, retrieving ideas, and self-explaining (Brown et al., 2014; Halpern & Hakel, 2003). Interestingly, however, students may not automatically explain their thinking about an issue or problem to other group members. Novices in our disciplines may not have developed the critical-thinking habits that are second nature to us. One way to improve their learning is to prompt them to explain their answers to each other (Knight, Wise, & Southard, 2013). Instructors need to train students to engage in self-talk—why do I think this, why is this answer better, how does this relate to that? Students may also need guidance in how to ask others for clarification or how to express a differing opinion. You may need to emphasize the critical role that asking questions and debating answers plays in human learning to lessen students' fear of being negatively judged by their peers.

Practices that encourage what Johnson et al. (1998) call *promotive interactions* include the following:

- requiring all students to come to class prepared with questions from a reading or assignment
- creating activity prompts that cue students to think about their thinking and explain their reasoning
- demonstrating and fostering active-listening behaviors
- providing sample language for expressing confusion or disagreement; many of the moves and language of written academic argument (Graff & Birkenstein, 2014) are adaptable to oral forms of argument as well.

How much guidance and support students need for productive group work depends on whether students work as casual groups or as teams, an important distinction discussed in the next section.

5. Based on your Learning Goals, Decide Between Using Casual Groups or Structured Teams

Although the terms *group* and *team* are often used synonymously, there is a subtle yet important difference between them. A group is any collection of people brought together for some purpose. A team, however, is a group of people who work together for a common goal. So although teams are groups, not all groups really function as teams. There can be positive learning outcomes when students work together, whether as groups or teams, but those outcomes may not be the same. As instructors we need to clarify our goals for asking our students to work in groups. Only then can we decide whether we need to spend the time and attention necessary to produce effective team function in order to achieve our goals.

Often any informal use of groups is called *collaborative learning* (Barkley, Major, & Cross, 2014), though the term formerly referred to a social process of knowledge construction (Bruffee, 1999). Pedagogical strategies such as cooperative learning and TBL, however, rely on the use of structured groups that engage in specific activities meant to foster team functioning. For example, during group exercises in cooperative-learning formats, students are assigned specific roles that rotate throughout the term. Changing roles enables each student to assume some responsibility for group process.

In TBL, most of the class time is spent with students working in permanent groups on application exercises. Team members are held accountable for their individual effort as well as their contribution to the team through both individual and team quizzes and peer evaluations. Just as our personal experience attests, getting a group to function as a team is neither simple nor automatic. Cultivating effective teamwork requires a focus on social process that supports the ability of the diverse individuals to function productively.

If we simply want students to have a chance during class to process some ideas or talk to one another about those ideas, using randomly formed groups who come together just for that purpose may accomplish that. Some sample goals a casual group can address include

- briefly discussing a concept or idea
- posing questions on a reading
- applying concepts to answer a question or work a problem
- sharing alternative views on an issue
- reviewing concepts or generating questions for an exam

Casual groups used regularly can result in demonstrated learning gains for students. Specifically, in PI (Mazur, 1997), the instructor designs the class around discussion of conceptual questions that students in casual groups first answer individually (usually using personal-response systems) and then answer again after discussion in their groups. PI depends on students doing some prior preparation, and instructors do provide some follow-up explanation for questions. This use of informal groups has shown positive impact on student learning compared to lecture alone (Crouch & Mazur, 2001).

Goals that may require forming and training teams include wanting students to

- answer complex or controversial questions
- organize their own learning to propose solutions to multilayered, multiweek problems (for example, in problem-based learning)
- produce a collaborative project
- maximize their learning (according to TBL advocates, as discussed in section 6).

Certainly, if student groups will be expected to produce collaborative projects for a grade, helping students learn to work together effectively is part of an instructor's responsibility, as discussed in the next sections.

6. Form Groups in Ways that Fit Your Goals

The mechanics of forming groups can itself pose a barrier to their use. How many students should be in each group? What should be the diversity mix? Should group composition shift or remain the same during the term? The answers to these questions again depend on what instructors want students to gain from group work. Online tools exist that make forming groups based on specific criteria easy. Students enter their information into a website form, and the site algorithm creates groups of the desired composition. Some of these websites also support peer review of groups (e.g., CATME.org).

Key ideas in forming groups include the following:

- Avoid isolating underrepresented individuals in groups; e.g., one woman, one student of color, one older student, and so on. You want all students to feel supported, and you want to minimize the risk of *stereotype threat* (Steele, 2010) in group processing.
- Fit the size of the group to the task. Simpler tasks require fewer students working together—or may not be appropriate for a group at all (see section 7). Brief in-class activities that allow students to process ideas may only require two to four students to cluster together where they are seated. Advocates of TBL, however, often use stable groups of five to seven students working on fairly complex application exercises.
- Form groups with specific criteria in mind—or not. When using groups regularly or as teams, you may want to organize students to maximize different expertise and demographics. Research, however, has yet to definitively answer the question of whether self-selected student-formed groups or instructor-formed groups are better in terms of student learning outcomes (Harlow, Harrison, & Meyertholen, 2016).

- Build on the principles of cooperative learning when using teams by fostering individual and group responsibility, positive interdependence, and supportive interaction (Johnson et al., 1998).
- Use stable teams. If you wish your student groups to function as teams, then maintaining stable groups is encouraged. Stability allows time for individuals to go through the growth pangs necessary to cohere as a group. Some evidence suggests that using permanent teams even in PI, for example, may promote greater gains in expert-like thinking than changing group composition (Zhang, Ding, & Mazur, 2017).

The structured pedagogy of TBL embeds cooperative learning practices within the course format (Michaelsen et al., 2004). For example, students are held individually accountable for preparing for each unit by taking an individual Readiness Assurance Test (iRAT). This test deals with basic course content, and students take it at the beginning of the class session or before class online. They then take the same quiz again as a team, the team Readiness Assurance Test (tRAT). Both quizzes factor into students' overall course grades. Instructors may also count the group product of some of the subsequent application exercises in grading or include some collaborative opportunities during regular exams in addition to individual assessments. In addition, students in each team conduct peer review on their members—another way to encourage group accountability as well as provide feedback on group function.

Instructors who do not use TBL per se but who do use groups regularly may address the issues of team function in similar ways by using more traditional forms of cooperative learning (Millis & Cottell, 1998; Millis, 2010). In formal cooperative-learning approaches, students are assigned specific roles in the group. These roles often rotate among group members to build students' skills and promote accountability to the group. The roles assigned will depend on the specific tasks or projects that groups are asked to complete. For example, when students work on cases or problems in class, logical roles might include leader/facilitator, recorder, reporter, fact-checker, devil's advocate, or a monitor to encourage and ensure equitable participation in discussions (for more ideas, please see Millis). If groups are to work on larger projects, the roles may expand to include oversight of specific aspects of the project (e.g., manager, researcher, draft writer, and product reviewer or editor).

The way instructors form groups should be closely related to the kind of work they want the groups to do, as discussed in the next section.

7. Design Group Assignments Worthy of a Group Effort

As noted previously, several models indicate that tasks that are too simple are not enhanced by collaborative work (as reviewed in Nokes-Malach et al., 2015). Assignments for groups should require that all or most of the group members contribute to complete the tasks. For example, problems should be complex enough that any individual would be hard-pressed to find a solution in the time allotted, or questions should require multiple perspectives to answer thoroughly. Directing students to simply work together on homework problems is often not a good group assignment. Groups may simply shift the work to the one or two students who know how to solve the problems. Students may feel that this kind of assignment is simply busywork—after all, if we expect students to be able to complete homework on their own, what is the advantage of a group?

Adding a level of complexity or authenticity to questions and problems can stimulate students to engage in intellectual questioning and promote their critical thinking (Brookfield, 2012; Roberson & Franchini, 2014). Some ways to do this include the following:

- providing too little or too much information in a problem; instructors may feel that it is their responsibility to provide all the necessary parameters for thinking about a question. We can cultivate students' critical-thinking skills, however, by requiring them to decide on pertinent criteria with the support of peers.
- asking students to apply content to a novel circumstance—the best applications require students to integrate several concepts or ideas or use them in unexpected ways.
- contextualizing problems by creating real-life scenarios involving course content (SERC, 2015). Certain fields, such as physics, have a store of ready-made examples (Physics Education Research and Development Group, 2012).
- using case studies, real-life scenarios, or news stories; everyday life can often provide a wealth of adaptable examples that allow students to work with content in more authentic situations.
- directing the groups to create possible exam questions; this exercise is a great way to conduct an exam review. You can offer to use the best question (or two) on the exam.
- asking groups to critique a writing sample using a rubric that you provide; alternatively, ask groups to create the rubric for an upcoming assignment.

Such activities require group members to draw on their differing experiences and expertise and to practice their analysis and evaluation skills. Assignments that require students to explain their choices and argue options with their peers are most likely to promote students' metacognitive abilities (Sandi-Urena et al., 2012).

TBL practitioners guide the design of effective group activities through four principles called the 4 *S*'s: significant problem, same problem, specific choice, and simultaneous reporting. The activity must demand that students apply what they are learning to answer a meaningful or more complex question. All groups address the same problem so that each group has a vested interest in the outcome. Preferably, students

are forced to debate a number of options and choose the best one. This requirement encourages deliberation and questioning among group members. Finally, at the end of the discussion time, all groups report their decisions by simultaneously holding up either differently colored cards corresponding to their chosen answers (A, B, etc.) or small whiteboards showing their solutions. Because all groups display their responses at the same time, no group is swayed to change its answer based on others'. The use of color-coded cards makes the diversity of views in the room obvious.

One caveat when designing questions for groups is not to overestimate the attention span of the students. Questions that are too complex, along with those that are too easy, will cause group members to disengage. Multilayered problems may need to be broken down into segments that each require no more than about 5 or 10 minutes. As needed, instructors can direct students to work on several such segments distributed throughout a class period.

8. Consider Factoring Group Work into Your Grading Scheme

Students often judge what instructors value by what we choose to grade. Although grades and other extrinsic motivators are less than ideal, many students are strategic: They allocate their time and effort to tasks based on grading requirements. You certainly don't need (or want) to grade all the group assignments and activities you require. But if you devote a substantial amount of class time and resources to group work, then it merits weight in your grading scheme. Again, how you do this depends on your goals in using groups, and whether you are using casual groups or committed teams.

If you plan to count group work as part of the students' grades, ameliorating the problem of social loafing is key. Research studies have looked at two common ways to incentivize group members: (a) giving students points for participation or quality of work and (b) calling randomly on students to answer questions discussed by the group (discussed in Eddy, Converse, & Wenderoth, 2015). Assigning a modest amount of points to activities that students complete can result in greater student participation (Perez et al., 2010, as noted for clicker activities) and attendance and performance (Freeman et al., 2007). Assigning points for participation in the activity rather than for correctness or accuracy of responses seems to enhance the quality of group discussions without detracting from the learning benefit (Freeman et al., 2007; James, 2006: James & Willoughby, 2011; Willoughby & Gustafson, 2009). Asking random students to report on the findings of the group can also raise the level of importance students place on the activity. Although random calling can seem intimidating, studies have shown that it can boost students' confidence in speaking (Dallimore, Hertenstein, & Platt, 2013) and reduce potential gender bias in participation (Eddy, Brownell, & Wenderoth, 2014).

Students who are accustomed to working as a team in cooperative-learning or TBL classrooms may be more prepared to engage in team activities without a grade. The small-group cohesion can enhance students' feelings of accountability (Johnson & Johnson, 2008). Typically in TBL, for example, any member of the team may be held responsible for answering a question in an application exercise—though there are often no penalties applied for incorrect or missing answers. Peer pressure is a powerful motivator in these cases, but a nonthreatening atmosphere reduces the stress of randomly being called on in class.

If you use structured groups regularly, you may want to include some collaborative testing opportunities in class. This practice can reduce student anxiety about testing and provide students with immediate feedback. Some research suggests that collaborative exams enhance student learning (Cortright, Collins, Rodenbaugh, & DiCarlo, 2003; Gilley & Clarkston, 2014). Using collaborative exams also further affirms the value of group work in class.

Instructors may administer collaborative exams in a number of ways (Hodges, 2005):

- separate and distinct from an individual exam
- included as part of an individual exam
- following an individual exam
- modified as a peer-coaching component of an individual exam

Two-stage exams add a level of formative assessment and rapid feedback to the testing experience (Wieman, Rieger, & Heiner, 2013). In TBL, for example, students are encouraged to prepare for class through an individual quiz, and they then benefit from peer debate by taking the same quiz as a team. A similar approach can be used for substantive exams, with either the whole test or portions of the test being taken by groups before or after being taken by individuals.

Merely grading a group activity, however, will not ensure that students learn from the process. Asking students to reflect on any learning process is essential to helping them become more metacognitive.

9. Help Students Recognize and Reflect on Their Learning from the Group

John Dewey is well known for his discussions of the power of reflection in promoting learning (1933). A review of brain research in this area validates his views and describes some of the current neuroscience behind these observations (Fleming, 2014). Reflection is, after all, both a prerequisite to, and a component of, the process of metacognition, and metacognition is related in some ways to critical thinking (for a discussion, see Lemons, Reynolds, Curtin-Soydan, & Bissell, 2013). Certainly, then, given the multilayered cognitive and affective demands of group work, instructors must support students' learning by prompting them to reflect.

Courses that involve group work benefit from prompting students to reflect at multiple points throughout the term. Group-work experiences can appear chaotic to students, so helping them review what the group work accomplished in a particular class session can support their learning and further ease their concerns. In addition, at intervals as the course proceeds, ask students to think about their role in the group, the overall quality of the group's functioning and ways to improve it, and how the group work contributed to their own learning. Following are some examples of exercises that support students in reflecting on the group experience (Helping Students to Reflect, 2015).

- Checklists—group members individually or collectively reflect on group contributions, performance, or processes using scaled checklist items.
- Learning journals—a more narrative form than checklists; individuals keep a record of reflections at each stage of a project on strengths and weaknesses of the group processes.
- Reflective paper—students write a paper on their group processes, addressing areas such as getting to know one another, organizing meetings, allocating tasks, and assessing their group's work.
- Student response to feedback—students close the loop on the feedback they have received by noting actions they have taken to improve their performance in the group.
- Student portfolio—students keep a portfolio of their group products and reflections, writing a culminating reflection on what the portfolio demonstrates.
- Peer review—group members provide one another with feedback several times during the term, using a form that asks them to share their perceptions of each member's contribution to the group in key areas.
- Class discussion—students share their perceptions of the feedback and reflections and how that has helped improve their performance on, and satisfaction with, group work.

Just as instructors want students to reflect on the role group work played in their learning, instructors also benefit from reflecting on the part group work played in achieving their teaching aims.

10. Close the Loop in Your Course Design by Assessing the Use of Groups in Your Class

At the beginning of this article, I encouraged you to think through your course goals to decide if incorporating group work in your classroom made sense. Assessing your class outcomes is the logical way to close the loop on your choice. If group work is an important element in your course, and if you guide and grade students on the process, consider adding IDEA's learning objective on group work to your end-of-term evaluations (see Qualters, 2006). This objective asks students about their sense of "acquiring skills in working with others as part of a team." In general, preparing in advance for collecting both formative and summative data can provide meaningful information for your course planning. Helpful practices include the following:

- keeping notes or a journal on the quality of class discussions related to activities—especially ones on particularly challenging or essential course concepts
- comparing student exam performance on a few conceptual questions for which you provided group-practice opportunities to some for which you did not
- analyzing student responses on questions related to group activities with a rubric that differentiates levels of competence
- gathering student feedback on their experiences of group activities (minute papers, student surveys) and noting any challenges to address
- reflecting on what you saw and heard in class—were students seemingly more engaged? Did their comments or questions reflect deeper thinking? Did *you* find the class more enjoyable and stimulating?

Based on the information you gather, you will more confidently be able to plan when and how to use group work—or how to modify those opportunities to better serve your goals.

Conclusion

Using groups in class may not work for all instructors, or for any instructor all the time. But group work can be a powerful pedagogical choice when coupled with appropriate planning and reflection. Groups can support each student in developing the disciplinary habits of mind that we so value. They can also make large classes feel more intimate and encourage students to find their voice. The ideas in this paper draw on the research to suggest best practices, helping you maximize this approach to create more effective learning experiences.

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