8. Before answering as a group, each person should individually complete this question by themselves. Once everyone is done, complete question 9 as a group.

   a. Label the apical surface on each epithelial tissue photomicrograph.
   b. Label the basal surface on each epithelial tissue photomicrograph.
   c. Draw a bracket to indicate the location of the epithelial tissue.
   d. Name the specific epithelial type under both tissue photomicrographs.
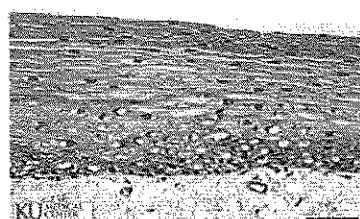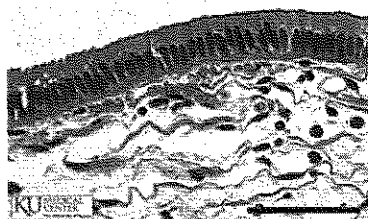
Images courtesy of The University of Kansas

Tissue = _____   Tissue = _____

9. Discuss and compare your individual answers to the previous question with your group. (The manager should ensure that all group members share their answers). Develop a group consensus and write the best answer.

10. The majority of dust is composed of human skin cells. What does this indicate about the rate of mitosis for epithelial tissue?

11. Epithelial cancers are the most common types of cancer. Answer the following questions together as a group:

   a) Briefly explain what cancer is.

   b) What do you think makes skin so susceptible to uncontrolled cellular growth?

6

MANAGING STUDENT GROUPS

The people around me on my team acted as support and helped hold me accountable.
If I failed they failed, and I'd feel guilty if I dragged them down, so I worked harder.

—An ALC student

Much of designing strong learning experiences in Active Learning Classrooms (ALCs) boils down to understanding how student groups work. This quickly becomes apparent in student responses on surveys about the room. Many students spontaneously mention the health or dysfunction of their group, and how the group dynamics shaped what they learned in the classroom. Helping students understand the essential importance of collaboration in ALCs and attending to the vitality of student groups is a critical task that instructors must address in their course planning as well as throughout the term.

Ample research has demonstrated that groups help students learn (e.g., Johnson, Johnson, & Smith, 1998; Slavin, 1990, 1996; Springer, Stanne, & Donovan, 1999; Strobel & Van Barneveld, 2009; Tomcho & Foels, 2012). Researchers have concluded that working collectively provides the following benefits to students:

- Exposure to multiple perspectives (e.g., Johnson et al., 1998, 2013; Tinto, 1997) and increased openness to diversity (Cabrera, Colbeck, & Terenzini, 2001);
- Improved occupational awareness (Cabrera et al., 2001); and

- Lifelong learning, increased problem-solving abilities, and greater satisfaction with learning (e.g., Johnson et al., 1998, 2013); positive attitudes toward course materials (e.g., Johnson et al., 1998; Springer et al., 1999); persistence (Braxton, Milem, & Sullivan, 2000); and, if introduced in the first year, increased likelihood that a student will persist to the second year of college (Braxton, Jones, Hirschy, & Hartley, 2008; Loes, An, Saichaie, & Pascarella, in press; Tinto, 1997).

Additionally, working in groups is one of the more promising means of promoting higher-order thinking skills at the post-secondary level (Freeman et al., 2014; Johnson & Johnson, 2009; Loes et al., in press; Tinto, 1997). ALCs are intentionally designed to allow students to work together, which can provide opportunities for their growth in any of the aforementioned dimensions.

With these multiple benefits of group work, however, are several potential drawbacks. Many instructors worry about various aspects of introducing group work into their classes, such as the following: To what degree will students resist this method? How do I create groups to maximize the potential for learning? How do I create the conditions for constructive group dynamics? The goal of this chapter is to address challenges that instructors encounter when managing groups for learning and teaching in ALCs. Table 6.1 outlines the topics we address in the chapter, such as group formation, size, promoting accountability, group dynamics, dealing with dysfunction, and social loafing. These issues may emerge in traditional classrooms as well, but given that the design of ALCs foregrounds group work for most activities, it is crucial that ALC instructors address them effectively.

The literature on the specifics of group learning is vast. Arendale (2004) found over 8,000 entries in the ERIC database that contained the terms *collaborative, cooperative,* and *learning communities*. McKeachie and Svinicki (2014) documented that terms for collaborative and cooperative learning are used interchangeably and frequently conflated. We provide our rationale in the section as we discuss the ways instructors address issues with student group work and the principal role those issues play in learning and teaching in ALCs.

Defining Groups and What They Do

The umbrella term of *small groups* in higher education is associated with assembling students into groups (usually fewer than eight) as a means of fostering active learning (Davis, 2009; Michaelsen, Knight, & Fink, 2004).

TABLE 6.1
Chapter 6 Topics

Areas	Topics
Defining Groups and What They Do	Common characteristics of small groups Developing group outcomes and objectives
Assembling Individual Students Into Groups	When to form groups Ways to form groups Group size Group roles Group duration
Promoting Group Success	Group accountability Group dynamics Group dysfunctions
Groups Outside of the Classroom	Group work in blended, hybrid, or online settings
Assessing Group Learning and Productivity	Weighting grades to promote group work Avoiding grade curving Peer assessment
Closing Group Activities	Group accomplishments and peer reflections Thank-a-group-member

Small-group learning has evolved over the last five decades and now encompasses many nuanced strategies, such as

- Cooperative learning (e.g., Johnson et al., 2006; Slavin, 1990, 1996);
- Collaborative learning (e.g., Barkley, Cross, & Major, 2014; Bruffee, 1993);
- Peer instruction (e.g., Crouch & Mazur, 2001; Mazur, 1997);
- PBL (e.g., Major & Cross, 2004);
- POGIL (Moog, 2014); and
- TBL (e.g., Michaelsen et al., 2004).

Complicating matters, all of the approaches listed may vary by discipline as well (Davidson & Major, 2014; Pascarella & Terenzini, 2005).

Despite the nomenclature associated with these various group methodologies and strategies, we use the term *groups* for this reason: It is the broadest definition, while presenting the fewest constraints, that describes students working together to achieve a joint goal. Accordingly, in what follows we will not distinguish among the strategies listed but instead discuss

them together, using the term *groups* to refer to them collectively. Defining a specific strategy for group work in the context of different assignments, however, may help instructors apply the type of pedagogy more effectively.

Common Characteristics of Small Groups

Broadly speaking, Davis (2009) suggested the framing of group work should focus on the learner or student (i.e., student-centered learning) and the application and practice, or "hands-on" nature, of the work. Researchers of group learning have asserted that groups promote the development of skills across the spectrum of higher-order thinking (e.g., Davidson & Major, 2014; Davidson & Worsham, 1992; Prince, 2004; Terenzini, Cabrera, Colbeck, Parente, & Bjorkland, 2001; Weimer, 2013) and student engagement (e.g., Padgett et al., 2010; Tinto, Goodsell, & Russo, 1993). Moreover, instructors often remark that working together toward a common goal improves student learning (from retention to mastery) of a concept, task, or topic. Researchers also have suggested that students develop the capacity to reach mastery through a complex and challenging objective that no single student could reach alone (e.g., Johnson et al., 1998; Michaelsen et al., 2004). They observed that the level of group formality and structure may shape student achievement and group dynamics (Davidson & Major, 2014).

Many strategies to promote student learning with groups contain common elements, which we have distilled into the following categories, based on research from several decades on the topic:[1]

- *Accountability*: All group members are individually accountable and responsible to ensure work is done in a timely and complete manner (Crutchfield & Klamon, 2014; Michaelsen et al., 2004).
- *Group processing*: Groups set goals and conduct frequent assessment of performance (Anson & Goodman, 2014) to increase functionality and eliminate inefficiencies. A key component of this process is self- and peer reflection.
- *Interaction*: The work must be done together, often synchronously, though some individual work (done asynchronously) might be required to complete the collective goal. Goodsell, Maher, Tinto, and Associates (1992) suggested that "learning is inherently social" (p. 12) and often happens when students interact through discussion and tasks in group settings.
- *Interdependence*: Group members rely on each other to achieve the goal, objective, and/or task. The group's success or failure is dependent

on all members' performances. Some methods of group work (e.g., cooperative) rely on interdependence in more formal ways than others (Johnson et al., 1998); higher levels of participant interdependence enhance outcomes for students (Tomcho & Foels, 2012).
- *Skill development*: Ample opportunities for students to build on prior knowledge and skills (hard and social) are integrated into the process. Felder and Brent (2007) stated that this category also includes collaborative skill development, such as decision making, conflict management, and trust building.

Instructors unsure of the precise detail of a specific method should know that, in general, small groups of students working as a collective have shared goals and interdependent tasks, and how they reach this state can be determined by selecting among a set of pedagogical approaches. We will highlight these features throughout the chapter and point to ways the instructors integrate these elements into their teaching in ALCs.

Developing Group Outcomes and Objectives

Learning outcomes and objectives are primary drivers of what students will be able to know, do, and value as a result of completing a course (e.g., Beichner et al., 2007; Crutchfield & Klamon, 2014). Suskie (2009) stated that much confusion surrounds outcomes and objectives because they are often interchanged. She described outcomes as "the end rather than the means" and the "why" (p. 116). The objective is the "means to the end," the tasks related to reaching the goal (p. 117). In turn, course learning outcomes and objectives should guide how groups will function during the course term. Consider the following questions when determining learning outcomes for your ALC course: What ideas or concepts should endure for students one month, one year, and one decade after they complete a course? What competencies or levels of mastery should a student be able to demonstrate after finishing the course?

For example, Jon Berndt Olsen at the University of Massachusetts has the following statement related to course outcomes in the syllabus for History 101; Western Thought Since 1600:

> This course aims to develop your ability to *think critically*—to read and think about complex historical issues beyond the simple facts of the case. Certainly the facts are important, and the exams and papers will make sure that you are learning them. But beyond that, you will learn to think like an historian, trying to understand not only the "what" of history, but also the "why."

Olsen then links the course outcomes to an objective specifically meant for the groups, which is listed on the syllabus. In doing so, he is able to point to the alignment between course outcomes and objectives:

> Teams should analyze the three documents and seek out differences and commonalities. Are the three ideologies presented here—National Socialism, Fascism, and Stalinism—three variations of the same thing or very different in their core values? Using the whiteboard, create a visual representation of these three worldviews.

To check the students' understanding, Olsen gives an individual quiz as well as a group quiz on the material. He stated that the students quickly learn who has and has not read the material during the group quiz portion of the exercise. Students in groups are good about holding members accountable during the process, he contended, because of the multiple steps involved. After the quiz, the group members must work carefully to identify the similarities and dissimilarities of the article based on their reading of the text. Finally, the students have to determine the best way to communicate their interpretation of the articles as a group, how they will represent this interpretation on the whiteboard during class, and who will present the information.

Beichner and colleagues (2007) encouraged instructors who teach in ALCs to think beyond content coverage (i.e., using the course texts' tables of contents) to determine course outcomes and objectives. Many of the ALC instructors we worked with said that learning to be an effective member of a team is a stated outcome of their classes. To be clear, this outcome does not mean instructors implement group work for the sake of group work, but rather that they connect group work to content- or process-related goals. Content-related goals need to concern subject matter and often include the development of skills. Process-related goals can be associated with activities and habits. For example, a process goal for a course might be for students to learn to work collaboratively. Of course, each instructor, program, college, and institution may have its own goals, but the literature on group learning suggests that alignment between objectives and tasks ensures adherence to some of the good practices for small-group work.

Assembling Individual Students Into Groups

For groups to accomplish their objectives, ALC instructors need to consider when to form groups, the ways they have groups come together, how many students should be in a group, whether group members should be assigned formal roles, and how long groups will stay together. The literature is replete with

strategies to construct, coordinate, and condition groups in ways optimal for ALCs, and we will conyextualize these approaches in experiences from ALC instructors in the following sections. Appendix 6.1 contains an overview of these topics and can be used as an "at a glance" reference that cites relevant literature.

When to Form Groups

While some instructors, especially those new to ALCs, may make use of informal groups that have less structured arrangements and goals, many ALC instructors assemble formal groups[2] early in the term (on the first day or during the first week). Forming groups early in the term requires intentional and consistent effort before the class begins, and even before the course is taught in an ALC. Forming formal groups early in the term may serve to emphasize the instructor's intentions for group work (Hillyard, Gillespie, & Littig, 2010; Johnson et al., 1998). Early formation allows group members to begin to get to know each other so they can start bonding and work to become a cohesive unit (Johnson et al., 2013; Levi, 2013; Michaelsen et al., 2004).

A common practice is to spend part of the first day or two explaining expectations to students and laying the groundwork for group formation. Ambrose and colleagues (2010) stated that establishing ground rules linked to course objectives is another important consideration for instructors. A communication professor gives students a reading about the research on team cohesiveness during the first class session. She is intentional and direct in explaining to students that the course grade is heavily based on group work. Some students dislike this style of teaching and elect to drop the class. She is then able to determine groups after the first class period. One professor of Spanish and Portuguese does not form teams until the second week of class. She allows the students who are sitting at a table to get to know each other over the first four or five class sessions so the students have some time to interact in informal ways before formal groups are determined.

There are some drawbacks to early formation as well, namely the distribution of student abilities and skills and the fluctuation in student enrollment. The main challenge is that class rosters are often not finalized until a few weeks into the term. To manage both of these issues, a resource economics professor has new students join groups from which other students have dropped. Early formation may hinder the balance of "member resources," which entail the different attitudes, abilities, skills, and socioeconomic background characteristics a student brings to class (Michaelsen et al., 2004). Proponents of group work suggest that instructors strive to distribute these resources, such as academic ability and diversity (e.g., gender, race/ethnicity), as evenly as possible in groups. Another strategy is to combine members who have joined after the first day (Oakley, Felder, Brent, & Elhajj,

2004), typically before the add/drop period for classes has closed and course rosters are finalized. He lets his students know there will be fluctuation during the first few weeks but that most of the teams will be set from day one. Thus, while early group formation has great benefits, you should anticipate some fluctuation in the initial groups as a natural consequence and simply plan for it.

Whether students are assembled into groups on the first day of class or during the early weeks of the course, ALC instructors widely agreed that students should be working together from the earliest class period possible. Early group work also applies to instructors who have students rotate and/or switch groups during the term. Regardless of first day or early formation or whether students will rotate or switch groups, it is important for instructors to consider how the groups will be formed.

Ways to Form Groups

Forming teams can be a complicated process. Opinions about how to form groups are many and varied (e.g., Barkley et al., 2014; Barr, Dixon, & Gassenheimer, 2005; Davis, 2009; Johnson et al., 1998). There is very little empirical research, however, on which method best promotes student learning or enhances the learning experience.[3] This section features four approaches ALC instructors can use for group formation: random, instructor-generated, self-selected, and mixed. We will also present advantages and drawbacks to each approach.

Random

Research from a number of fields supports the random formation of groups as the simplest and most efficient approach (Nilson, 2010). Some instructors use software, such as spreadsheets and web-based random number generators (e.g., www.random.org), and learning management systems (e.g., Moodle, Blackboard) to help with this process. Others implement low-tech and traditional methods. For example, a music therapy instructor gives students a number when they walk in the room, and the number corresponds with a table number in the room. Another approach used by ALC instructors is to have students count off by the number of desired students per group until every student has been assigned to a group. Random assignment is an equitable way to form groups (Barkley et al., 2014) and works well in large classes with broad and diverse member resources that therefore are more likely to be randomly distributed.

There is no consensus, however, about the effectiveness of forming groups through random assignment. Disadvantages to this approach include risks to group cohesion and unequal distribution of students from underrepresented

backgrounds as well as the unequal distribution of member resources. Oakley and colleagues (2004) suggested that instructors should endeavor to keep students from underrepresented populations together, especially early in a curricular sequence. This may help some students who might otherwise feel isolated to have a greater affinity with the group. Proponents of instructor-generated groups, Michaelsen and colleagues (2004) posited that random formation simply leaves too much to chance. McKeachie and Svinicki (2014) stated that instructor-determined groups are more likely to result in a balance of member resources across groups.

Instructor-generated

Instructors must first determine the criteria that they will use to form groups, and recognize that there are advantages and drawbacks to their choices. An essential part of this process is knowing something about the students who are enrolled in the course. One popular method entails using a pre-class questionnaire (via e-mail or learning management system) or in-class exercise at the onset of the term.[4] Instructors can solicit information about the backgrounds of the students (e.g., grade point average, major, level of math preparation). By knowing the students' background characteristics, the instructor can balance the distribution of member resources (Michaelsen et al., 2004). An English professor who teaches a course on dystopia, video games, and comic books has her students fill out a survey so the instructor can look for common characteristics and interests. The questions ask students to identify the type of gamer they consider themselves (e.g., casual versus hard-core), types of gaming platforms they own and have access to (e.g., next-generation, PC-based), and the types of games that they would like to explore (e.g., role playing, strategy). Knowing some of these background characteristics, instructors who generate groups can work to ensure better skill development for group members and diversity of member resources per group.

Another spin on this method is to assemble students into groups based on common interests. A drawback of forming groups based on common interests is that the resulting groups might be more homogeneous than those established by other methods (Barkley et al., 2014). This uniformity can affect skill development as well as group interaction. The English professor mentioned previously admitted that the "hard-core" gamer group can be very intense. In different iterations of the course, she has split up those who identify as "hard-core," given the deeper knowledge they can share with less experienced gamers. This peer-to-peer knowledge sharing is an important takeaway for instructors teaching in ALCs. The literature revealed that in group settings the more academically gifted students can help the academically challenged students (Nilson, 2010). Brooks and Solheim (2014) found

that all students, regardless of academic ability, tended to benefit from working in groups in ALCs, with the greatest gains coming from students who were in the lower quartiles of the class. Instructors who generate their own groups can seek to distribute student characteristics and member resources, and know that both academically challenged and gifted students will thrive.

Just as software is available to help in the formation of random groups, instructors can use another program to assign students to groups more deliberately. One tool instructors might consider using in this regard is the Comprehensive Assessment of Team Member Effectiveness (CATME; www .catme.org). This free tool allows instructors to input the desired criteria on which to base groups (Loughry, Ohland, & Woehr, 2014). Instructors also have the option of selecting from a bank of questions provided by CATME developers. Tools within a campus learning management system may also have features that allow instructors to assemble students into groups based on instructor-generated criteria.

Self-selected

Some instructors prefer to let students self-select into groups. For proponents of self-selected groups, Brookfield and Preskill (1999) suggested that students feel more comfortable and more motivated when they are able to self-select group members. For logistical purposes, it might simply be faster to assemble students based on where they are sitting in a classroom. Barkley and colleagues (2014) stated that students might also find this process to be more "fair" than other strategies. Bacon, Stewart, and Silver (1999) indicated that self-selected groups might be more efficient for short-term projects because students may already know each other and thus need to spend less time in the early "formative" stages of group development.

Davis (2009) posited self-selection might work well in smaller classes or for classes designed for majors or upper-division students. A biochemistry and molecular biology professor lets the teams form naturally in an upper-division course, assuming advanced students have different preferences and capabilities than lower-division students:

> I never intended for that to happen, because I wanted to balance diversity and all, but these are upper-level students and they know each other. They probably already have study groups. Why should I fight that? Sit with the people they can work with. If teams found that they needed more expertise in an area, like a mathematician or a chemist, then we could do some trading. Students didn't trade very much, so I just sort of let it go. Those (self-formed) teams worked better than they had before [in previous iterations of the course].

Arguments against self-selection include the lack of balance in group members' academic ability and resources. The lack of balance in underrepresented students, especially during the "first two years of a curriculum" (Oakley et al., 2004, p. 11), might further isolate them (e.g., Felder & Brent, 2001). Davis (2009) proposed that shy or underrepresented students might have a difficult time joining a group. Davis also stated that "groupthink" (p. 195) may affect self-selected groups because the need for group solidarity may trump the generation of alternative ideas. McKeachie and Svnicki (2014) posited that some students dislike self-selected groups because of the social pressure they face to join with friends. Michaelsen and colleagues (2004) suggested that instructor-formed groups are likely to move students beyond where they initially sit early in the course. Finally, levels of accountability may vary widely due to the students' familiarity, or lack thereof, with each other. Students who are highly familiar with each other may spend time off-task discussing cocurricular or extracurricular issues. From our research on social context, we know that social distraction in the ALCs can lead to poorer learning outcomes. Students who are not familiar with each other, however, may further resist working together. By anticipating these varied student responses, ALC instructors can plan to address problems with students' membership in self-selected groups as issues arise.

Mixed

The literature on group formation is growing but lacks empirical conclusiveness (Moreno, Ovalle, & Vicari, 2012). As one instructor put it, "I've tried everything. There really is no silver bullet." Several ALC instructors employ a "mixed methodology" to the formation of groups, drawing on some aspects of the instructor-generated methods and of other approaches. One simple extension of the random count-off method mentioned previously is the "line up and count off" approach based on selected characteristics.

First, have students line up around the room according to certain attributes that you have pre-selected, and then have them count off to form their teams. For instance, you could begin by asking how many students have a certain amount of experience with the topic (e.g., laboratory experience, writing experience, or math background). Have these students form a line. Next, ask the remaining seated students to answer another resource question (e.g., Have you taken a biochemistry class? A composition class? Have you had two or more classes in this major?). Have these students line up behind the first group. Continue asking questions in this way until all students are in line with each line positioned behind the one before it. If any students remain seated, ask them to line up as well. Finally, starting at the head of the

front line, have students count off by the number of teams you will have in your class (e.g., 1–19; instruct all ones go to Table 1, all twos to go to Table 2, etc.). One student from each line should count off in turn. In this manner, you will randomly distribute students in groups, but you will not run the risk of one group having more than its fair share of student resources.

Anson and Goodman (2014) suggested that groups could be formed according to when the class members have availability (see Oakley et al., 2004, for a template). For example, if four members of a class are able to meet at 1 p.m. on Tuesday and Thursday, the instructor could put these students into a group. This assignment ensures students have common times outside of class to meet. Common work time is an important feature of blended, hybrid, and flipped approaches to teaching that can be successfully paired with ALCs (e.g., Baepler, Walker, & Driessen, 2014).

Determining the most productive way to assemble groups for different assignments will come with experience. All of the instructors to whom we have talked have modified their group formation methods to a greater or a lesser extent based on their experiences teaching in ALCs.

Group Size

Depending on the type of space you have available and the class size, the number of students per group may vary. Tomcho and Foels (2012) found that learning outcomes do not vary systematically with group size, so the decision about how large to make student groups can be determined on the bases of administrative considerations and the student experience. For example, Michaelsen and colleagues (2004) suggested that groups of more than eight can be difficult to manage. A biochemistry and molecular biology professor stated that finding the right number for a team can be a challenge: "You want the teams not to be too big to avoid social loafing, but not too small so personal dynamics come into play. . . . I've found five, six, or seven work best for me." Many of the ALC instructors we spoke with use teams with three to six members. Groups in this range promote interdependence such that it allows an instructor to design activities too substantial or complex to be completed by a single student. A math instructor said, "Four to six per team works, but I've found five works best for me. The tasks can be big enough, and challenging enough, so that all members need to be involved to solve the problem." Groups of this size can use the various skill sets possessed by group members (Davis, 2009). While groups of four permit the use of pairs of two, groups with odd numbers ensure no "ties" occur when deciding on a course of action or other group processes.[5]

Other factors that influence this decision can include the type of furniture in an ALC or the pedagogical strategy the instructor employs. For

example, in many ALCs, large tables seat up to nine students. In this case, instructors can consider forming sub-teams. Beichner and colleagues (2007) promoted the use of the "rule of three," by which there are three teams of three at a particular table. An astronomy instructor, for example, has a "three-team" and a "table team (of nine)." The team of nine is based on the number of seats at the physical table itself, while the "three-team" often works on elements of an assignment and confers with the table team to deliver the final product. A resource economics instructor prefers groups of nine because the multiple perspectives from a large group can add creativity and bring different strengths to the group projects. He said that the smaller sub-teams are useful too, particularly for difficult topics, because they can afford a greater level of intimacy for a conversation or topic.

Group Roles

The literature endorsing the assignment of group roles is mixed. Much of the literature that supports group roles indicates that groups function best when given structured tasks with clearly outlined expectations (e.g., Bacon et al., 1999; Oakley et al., 2004). Providing students the chance to operate in roles is one way to help groups organize and engage different skills. Roles are also useful to help promote interdependence (Barkley and colleagues 2014), which in turn is a predictor of student learning in classes that use group activities (Tomcho & Foels, 2012). For example, Van Horne and colleagues (2014) found that when an instructor assigned students in a group basic roles (e.g., recorder, manager, skeptic), the act of performing in those roles changed the level of student engagement. To ensure greater levels of participation, the instructor also rotated roles so that each student experienced every role in a group.

David Matthes of the University of Minnesota has a few unique ways to prepare students for group roles and work. Matthes presents students with guidelines entitled "General Instructions for Pods and Teams" (see Appendix 6.2). Available as part of the students' course materials, this reference is a primer on how the groups will function as pods (smaller groups of 3–4 students) and whole table teams (9–10 students). This document contains a useful illustration to represent Matthes's expectations of independent or group work per assignment. He uses the illustration throughout the course to indicate visually on assignments and activities whether a student is expected to work alone, in a small team (pod), as part of a larger group (table), or as part of the entire class.

Matthes's handout also includes descriptions for roles group members will play at each group and level. To ensure no one person is overextended or plays a singular role, Matthes created a "Team Pod Role Assignment Grid" (see Appendix 6.3), which helps the students rotate through the roles.

Each team is given a grid and asked to fill it out. Students then follow the role assignments on the grid for their pod and their team based on each week of the semester. For example, Albert Chang, Marie Green, and Estella Torres[6] are all in a class that is using the assignment grid. They sit at the same table. Albert fills the first slot on the grid (first name, last name), which puts him in Pod 1. In this role, Albert serves as the coordinator of the table team for the first week of class. Marie fills out the second slot, which places her in Pod 2. Marie serves as the coordinator of Pod 2 for the first week of class. Estella fills out the third slot on the grid, placing her in Pod 3. Estella serves as the coordinator of Pod 3 for the first week of class. The other members of the team (not listed here) would fill out the rest of the grid and assume the roles according to the sequence laid out by Matthes in this example.

Opponents of assigned group roles (e.g., Britton, 1990; Michaelsen et al., 2004) recommended that roles emerge naturally as teams interact and work on skill development. Critics of roles also suggested that if students are assigned to roles, they might not get a chance to develop other skills or might have an imbalanced workload, which can negatively affect group dynamics (Bruffee, 1995). Michaelsen and colleagues (2004) argued that assigning and determining roles is needlessly time-consuming and that students are often able to sort themselves out while working on an assignment or project. By assuming or assigning themselves roles, groups are better able to function because they have had autonomy over the process.

Group Duration

Instructors frequently ask, "How long should the groups remain intact?" Michaelsen and colleagues (2004) asserted that groups need to stay together for the duration of the course. Remaining together allows them to build trust as well as the cohesion necessary to perform tasks effectively and efficiently. However, Tomcho and Foels (2012) found that groups of brief duration (one to three class sessions) promote student learning better than groups of longer duration (half to the whole term). Nevertheless, many instructors said it is easier to manage groups that remain intact for longer periods, especially in larger courses. An astronomy instructor pointed out that keeping groups together for the course can also foster relationships for student success:

> I think establishing the fact that these are permanent groups helps students to get to know group members. It would be smart to know how to contact them should you miss class, or you want to study, or you want to share materials, to tell them that students who go to class and work with their groups do better.

It is important to determine whether the size of the groups align with the learning objectives for the session, unit, or term. For example, a music therapy professor prefers to switch groups after every major project to give her students the opportunity to interact with a variety of participants. She stated that working with different classmates helps students learn to manage different personalities, skill sets, and perspectives. There are drawbacks related to short-term group duration, however. For example, it might be difficult for a group to reach a cohesive state over a shorter period of time. In addition, if a group is together for just a handful of class sessions, the opportunity to generate peer feedback is limited.

Promoting Group Success

Instructors should not assume that simply putting students in groups will be met with favor, nor will students inherently be able to perform as a fully functioning unit right away (Michael, 2006). In fact, much of the literature cited thus far in this chapter includes advice on how to help groups evolve and achieve their goals. For groups to be successful, ALC instructors need to promote group success. Central topics to consider in promoting group success are group accountability, dynamics, and dysfunction.

Group Accountability

For groups to function with accountability, the instructor must make that expectation clear to students early in the course. One way to articulate this expectation is to describe in the syllabus how groups will be held accountable. Clear presentation of expectations (e.g., using rubrics) throughout the term leads to better student experiences with group work (Bacon et al., 1999).[7] A communications professor who uses a TBL approach has the following statement on the class syllabus:

> This is a Team Based Learning [(TBL)] course. TBL is a collaborative learning model that uses problem-solving and constant assessment as a basis for teaching problem-solving and decision-making skills. TBL groups are formed at the beginning of the semester and stay constant throughout. TBL uses both individual and group-based assessment in the form of assignments, activities and in-class tests.

By noting that the course will include group assessments in the syllabus, the instructor is clearly demonstrating the intention to use groups to promote student learning and accountability. Davis (2009) suggested that instructors

take time to make clear why they are presenting a team approach in their syllabus and then spend the initial part of the first in-class team meeting elaborating on the subject. ALC instructors could consider giving a quiz about the syllabus to get students working together from the start of class and to ensure students have covered the part of the syllabus that addresses group work.

Oakley and colleagues (2004) suggested giving further guidance to shape the preliminary interactions of groups and to discourage a "divide-and-conquer policy" (p. 11). An instructor might say, "Students, do not divide and conquer. It might seem more efficient, but when the assignment is a truly collaborative effort, both academically gifted students and academically challenged students benefit." However, Davis (2009) stated that instructors can promote interdependence by suggesting students divide the workload. How a group manages its tasks and goals is likely determined by how self-organized and directed a group becomes. Nilson (2010) proposed that instructors tell students they will be in the roles of both leaders and followers while working in groups. In this way, students come to the realization that they need to assume a collective responsibility for each other and their work.

Another way to promote interdependence involves having individual teams generate criteria for group conduct and behavior—in essence, a team contract. ALC instructors have used a few variants of this contract. For example, David Gross, a biochemistry and molecular biology instructor at the University of Massachusetts, Amherst, said:

> I have students on the first or second day—depending on when the teams form—talk about group behavior and what kind of group behavior they know that they show, constructive and destructive. I have them design what they think would be an effective team member. I tell them we're going to do peer reviews and those peer reviews are going to be based on what the team came up with as a collective. They work for 10 to 15 minutes on that to figure out what is good behavior, and in the beginning they get it in their heads as to what their own expectations are. I think it helps them build teamwork and buy into the idea [of teamwork].

ALC instructors, like this one, can let individual groups formulate how they will hold each other accountable. Instructors might want to provide a few guiding topics for self-governing groups to address, like how to manage time and what skills are needed for certain assignments or projects. Once the group has reached a consensus or majority, the members can formalize the document as a contract for the group, and each member signs it.

Another approach to designing team contracts is for individual teams to determine some of the key criteria on which they will be evaluated. Then,

in a discussion with the whole class, the teams offer one or two suggestions they would like in a contract. Instructors can help guide the conversation to address the common characteristics of groups (e.g., the criterion of being on time concerns accountability; actively listening to others concerns group processing). Once each team has a chance to provide suggestions, the instructor can use the themes that emerge and distill the items into a contract. An environmental sciences professor used this approach and said it was easier for him to codify the terms for the contract after group discussion. The contract can be distributed in class and or posted on the learning management system so students have ready access to it and can reference it when questions about accountability arise. Moreover, the groups and the instructor can refer to the contract as a source for discussion if dysfunction arises in the group. Alternatively, a variation of this process is for the instructor to present a set of criteria for group behavior policy that students can review and alter.

In addition to requiring group contracts, an instructor might choose to show groups how to devise a plan to manage tasks and projects successfully (Davis, 2009). Groups can draft a plan of action and submit it to the instructor (or teaching assistants) for feedback. Instructors could structure assignments so students have to submit elements of a project in stages. Structuring activities is an important way for instructors to plan for the different stages of group work. If a team is conducting a research project, for instance, they might submit a literature review, research questions, and sections about data collection and analysis separately for feedback from instructors. Group members can identify parts of the project to which they contributed. The final product might also indicate in which sections group members made contributions. Let's say five students—Lin, Manfred, Jose, Kate, and Ryan—worked together as a group to produce a final paper. They could divide their contributions to the final paper as follows:

- Statement of purpose (Lin, Manfred)
- Literature review (Jose, Lin, Ryan)
- Research questions (All)
- Data collection (Kate, Ryan)
- Data analysis (Ryan, Kate, Manfred)
- Findings (Manfred, Jose, Lin)
- Implications (Jose, Kate)
- Final draft (All)

The activities can be structured in ways that also allow team members to provide frequent, formative peer evaluations on the performance of assigned tasks as well as on attitudes toward the group itself (Oakley et al.,

2004) so members have the opportunity to build on strengths and address limitations.

Group Dynamics

Positive group dynamics are crucial to successful collaborative, cooperative, problem-based, or team-based learning approaches.[8] Students do not always have the skills or motivation, however, to make groups work in ALCs. Petersen and Gorman (2014) suggested ALC instructors build in time for groups to interact. The following are three approaches used by ALC instructors to promote constructive group dynamics:

1. A biology professor allows students to name their teams. Students can have fun with this low-barrier activity. It gives each team an identity and promotes interaction, as all members of the team must agree on the team name.
2. Early in a course, an environmental sciences faculty member uses stages of group development (Tuckman, 1965; Tuckman & Jensen, 1977) with students to help them discuss how groups perform and identify stages of their groups' development progression. Tuckman and Jensen (1977) asserted that groups move through five stages: forming, storming, norming, performing, and adjourning. The instructor asks students about the characteristics of each stage and some potential issues that may occur during the stages. This process raises awareness of group dynamics early in the term. Instructors who use this process can also refer back to it during the term and ask groups to determine their current stage as a means of facilitating an ongoing discussion about dynamics.
3. A math instructor has her students work on an application activity early in the course. The scenario is based on the location of three retail distribution centers; the instructor asks how students would make recommendations for a fourth center, given the addresses of the existing three. The problem has several answers but requires students to think about components beyond multivariate calculus, such as cost of fuel and traffic patterns. By working together early in the course, students are able to see how solving such a problem requires different skills, as well as the talents of several members, to complete the task on time.

More generally, Oakley and colleagues (2004) suggested that groups do not always function efficiently and that it is important for instructors to provide groups with opportunities to perform effectively and efficiently. In doing so, students will interact more, often building social bonds as well as

Image 6.1 First-year engineering students in Jean VanderGheynst's Introduction to Engineering Design at the University of California, Davis completing a team-building activity called "Surviving on the Moon."
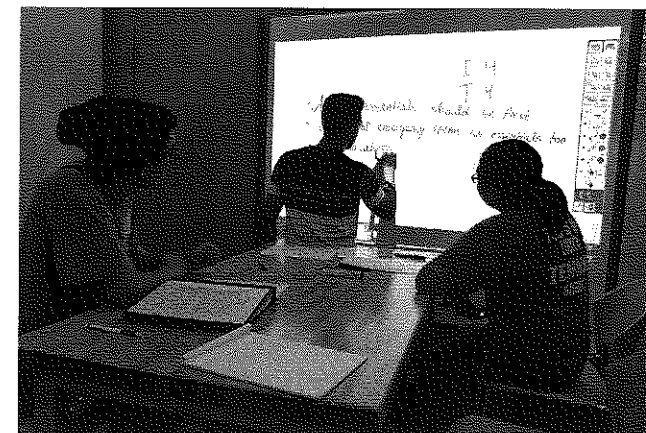
Note. Photo by Tiffany Johnson.

interdependence as they strive to achieve a shared goal. Oakley and colleagues stated that instructors who set expectations and provide preliminary instruction on effective team practices will help foster sound group dynamics. Another way to support the building of social bonds in a group is to have students engage in an ice breaking activity at the start of a new topic. While there are many ice breaking activities, try to choose one that challenges the team to quickly use their collective expertise to solve a problem (see Image 6.1).

Group Dysfunctions

Couch potatoes (Oakley et al., 2004), *free-riders* (Hall & Buzwell, 2012), *hitchhikers* (Oakley et al., 2004), *lone wolves* (Barr et al., 2005), and *social loafers* (Latane, Williams, & Harkins, 1979) are terms for problematic group members who do not make equal contributions to group success. No matter the classification, each behavior has the potential to derail groups in ALCs. Instructors should work to decrease students' negative attitudes about group work at the onset of and during class (Hall & Buzwell, 2012). The following are some ways ALC instructors have responded to and managed students' negative attitudes about group work:

- A chemistry instructor allows groups to fire a member of the team if the dysfunction is problematic; however, she uses a specific technique to ensure such groups follow a regulated process. Students can fire a member, but they have to give the group member under scrutiny

warning and enumerate what she or he needs to do to prevent being fired. The group then presents their case to the instructor for a decision. She says in all her years of teaching, no one has ever been fired, probably due to the forced communication students would need to undergo to instigate a firing.

- A political science instructor employs a progressive process to help with dysfunctional groups. The first step is the students address the issue themselves; if that does not work, the second step is a mediated session with the instructor. If that course of action fails, then the third step is the instructor resolves the problem for the students by making an executive decision. In his experience, his classes never moved past the first step because the teams have been able to work out their differences.

These examples reflect the research on this topic. The literature on dysfunctional groups suggests that the instructor should allow the group to try to solve the matter internally and should resist reassigning team members (e.g., Davis, 2009; Johnson et al., 1998; Nilson, 2010). A physics instructor agreed: "I tell them to work it out. The reason they are in groups is to learn to deal with diverse people and situations. I step in when needed, but almost all of the groups are able to sort things out."

Other strategies include asking groups to review the group contract as a means to facilitate a discussion about how to address the issue. Frequent (three to five times per term) peer feedback (addressed later in the chapter) is another good way to structure conversations about contributions and responsibilities (Davis, 2009). Some ALC instructors allow members to leave a group, but only if another group will accept them. It is uncommon that other teams will accept a member who leaves her or his original group.

An activity called "Coping With Hitchhikers and Couch Potatoes on Teams" is also useful (see Oakley, 2002; Oakley et al., 2004). In this exercise students consider scenarios in which a group is experiencing dysfunction, with some members hitchhiking (relying on the goodwill of other group members to carry them along) and others exhibiting characteristics of a couch potato (not pulling their weight). As groups work through the exercise, they may become aware of some of these characteristics or learn to curb habits that lead to behaviors associated with dysfunctional group members.

Groups Outside of the Classroom

Active learning instruction often requires students to be exposed to content before and after class, which allows instructors to use class time for activities promoting application of ideas, creating interaction between students and

instructors, and providing immediate feedback to students. How instructors structure activities will determine how class time is spent, which is often achieved by setting expectations from day one of the course. For example, a communication instructor stated the following to her class on the first day:

> Much of the group work will be done in class; however, you will need to work outside of class to prepare for in-class assignments and for your final project. The amount of group time you will need outside of class will be largely determined by how efficiently you use your in-class group time.

Group Work in Blended, Hybrid, or Online Settings

Thinking about what students will do in and out of ALCs is also an important consideration for instructors who plan to use blended, hybrid, or online modalities and flipped methodologies (Barkley et al., 2014). Both the literature and instructors with whom we worked suggest giving students an individual assessment beyond the reading and activities they conduct out of class and then giving the same assessment as a group when they convene in a face-to-face setting (e.g., Michaelsen et al., 2004). A physics instructor who uses the flipped approach has students watch videos before class and take a quiz on the material when they arrive in class. He then spends time in the ALC helping them problem solve, which he describes as his most valuable time in the classroom. Cloud (e.g., Google Docs) and collaborative tools (e.g., wiki) also allow groups to manage projects in class and are points at which the instructor can promote and monitor group interactions (Boettcher & Conrad, 2010).

Assessing Group Learning and Productivity

Assessing groups can seem daunting; however, there are several strategies to help ALC instructors measure learning and group performance. These strategies include grade weighting, avoiding grade curving, and peer evaluation. We explore assessment in Chapter 7 but will touch on a few strategies here.

Weighting Grades to Promote Group Work

One way to promote buy-in is to weight the grading structure in such a way as to promote group accomplishments. Ludmila Tyler, biochemistry and molecular biology instructor at University of Massachusetts–Amherst, allows groups to determine how percentages of grades will be awarded: "The weight of each major component will be set, with input from the students, no later than the second week of class. The percent weights for major components will be within the ranges listed below." Weighting within each category (e.g., for individual versus team quizzes) will remain at the values indicated in Table 6.2. Students vote on the range of percentages during class. Tyler said

TABLE 6.2
Syllabus Excerpt: Weighted Grading Percentages

	Percent of total grade
Individual iClicker responses	5–25%
Individual assignments	5%
Quizzes	10–25%
Individual quizzes, 70% of the quiz grade	
Team quizzes, 30% of the quiz grade	
Team activities and assignments, usually in-class	5%
Team projects	30–55%
DNA informational flyer, 15% of the project grade	
Sequencing proposal, 35% of the project grade	
Final project (BMB in Other Fields),	
50% of the project grade	
Individual personal statement	10–15%
Individual presentation reviews plus guidelines	10–15%

that she sets a few ground rules: (a) The individual grade weights must be within the specified ranges; (b) the total must equal 100%; and (c) the entire class must, within a specified time (e.g., by the end of the class period), agree on a single grade-weighting scheme. Tyler said, "This last requirement provides incentive for being thoughtful about grading priorities (particularly individual versus team work), but has the huge practical advantage of streamlining grading, which is especially important for my large classes."

An English professor employs a similar technique but has an even broader range of grade percentages for her students, and she plays the role of mediator in the large-group discussion about grades. First, she presents a range of grade percentages to her students (e.g., 65% for individual and 35% for team), and the teams discuss and agree on a range they favor. Then, the students participate in a large-group discussion about how their team arrived at their percentages for the grade balance. As the mediator, the professor explains to students that distribution of work is more manageable and students learn better when performing in groups. She says sometimes these explanations help tip the students' decisions in favor of group work receiving a higher point percentage. In addition, she says it helps highlight the fact that group dynamics matter.

Avoiding Grade Curving

Beichner and colleagues (2007) suggested that faculty teaching in ALCs avoid curving the grade, at least for individual students. A curved or norm-referenced grading scheme does not promote collaboration because it pits students against each other in competition for a scarce resource: a high grade (Nilson, 2010). Beichner and colleagues (2007) suggested that faculty who have concerns about using a grade-curving approach should redistribute the percentage weight of assessments to encourage participation and buy-in—for example, by shifting the distribution of points toward lower-stakes assessments (e.g., homework) and away from higher-stakes assessments, like midterms and exams. However, norm-referenced grading might be beyond the control of an individual instructor.

Peer Assessment

A central component of assessing groups in ALCs is using peer and self-assessment. For example, several instructors at University of Massachusetts–Amherst use iPeer (http://ipeer.ctlt.ubc.ca) to allow students to reflect on their individual and team contributions and performance. Students are asked to score their contributions based on a set of points that they can assign to themselves and teammates.

Peer evaluations also play a big role in Tyler's biochemistry course, as mentioned earlier in this chapter. Tyler uses the following language in her syllabus:

> All team scores will be modified based on peer evaluation. Unless everyone on your team contributes absolutely equally throughout the semester, you will not all receive the same scores on team quizzes, activities, and projects. Each student will be required to evaluate the contributions of his or her team members approximately four to six times during the semester. At the end of the semester, the evaluations will be averaged to generate a multiplier for the final team scores.
>
> *Example 1:* Student Lazy's team scored 100% for the team activities during the semester. Lazy's team members reported that he contributed, on average, 50% of his fair share of the team's work. Lazy's final score for the team activities would therefore be 50% (calculated as 100% × 50% = 50%). Similarly, Lazy would receive only half credit for the team quizzes and projects.
>
> *Example 2:* Student Hard-working's team scored 75% for the team activities during the semester. Hard-working's team members reported that he did more than his fair share and contributed, on average, 120% of the team's work. Hard-working's final score for the team activities would therefore be 90% (calculated as 75% × 120% = 90%). Similarly, Hard-working would receive 20% more credit for the team quizzes and projects.

By providing the disclaimer and setting the expectations in the syllabus, Tyler is able to foster student buy-in. Moreover, by providing the calculations for two fictional students, her students are able to quickly grasp how the assessment will work and the value of the group approach to promote success.

One might also consider the number of times students and groups are allowed to give feedback. For example, a Spanish and Portuguese instructor has her students conduct three self-evaluations and three peer evaluations during the term. She says that allowing her students to receive and give formative feedback throughout the term will help them become aware and address individual and group performance before it is too late to change.

We should acknowledge that some students may try to set the peer evaluation terms in their favor. For example, an environmental science professor said in an early iteration of his ALC course, the students tried to "game the system" and assign everyone high evaluations when not all members were making equal contributions. To ensure students are accurately representing contributions, Michaelsen and colleagues (2004) suggested allowing students a pool of points and not allowing them to assign any one student the same number of points. Barkley and colleagues (2014), Davis (2009), Michaelsen and colleagues (2004), and Oakley and colleagues (2004) all have helpful templates that can provide guidelines for self- and peer evaluation forms.

One strategy ALC instructors may consider including is a team feedback exercise, which Anson and Goodman (2014) linked to a structured team improvement process and self-reflection. ALC instructors comment that they frequently incorporate self-reflection as the first step in the peer reflection process. Another approach is to give the students a chance to provide feedback to themselves in the peer reflection process. ALC instructors have stated that many of the students are quite honest and will speak up when they are carrying an imbalanced portion (too little or too much) of the workload.

Peer evaluation helps students reflect on all of the dimensions of high-functioning groups (accountability, interaction, interdependence, skill development, and group processing). By including peer evaluation, ALC instructors can prompt students to hold constructive conversations about how the group is performing and address issues where they arise. Instructors can use this feedback to help students become aware of and improve their behaviors. Anson and Goodman (2014) wrote, "Without feedback, students will not be able to learn to improve their behaviors—this time, or the next time around" (p. 33). The process might be time-consuming, but the literature and practical input from ALC instructors suggest it is a worthwhile endeavor as students learn more from positive team experiences than negative ones (Bacon et al., 1999).

Closing Group Activities

The *adjourning* or *ending* of the group is worth noting. Tuckman and Jensen (1977) defined this stage as one where the group's tasks end and disengage (i.e., the course ends). Before you disband a group after completing a project, you might want to assign activities that bring closure to the group. In this section

we'll review some of these activities, including group accomplishments and peer reflections as well as ways group members can express gratitude to each other.

Group Accomplishments and Peer Reflections

Many instructors feel it is important at the group's end to revisit the group's accomplishments. Eggleston and Smith (2002) stated that instructors can tell the class as a whole that completing the course is an accomplishment in and of itself. This is also an excellent opportunity to connect how learning course topics will serve students in future academic, professional, or personal endeavors. This is an important consideration for instructors who have been working as a collective in their learning objectives. Instructors who gave a pre-course survey or pretest might have students retake the pre-exam again. Following the test, the instructor can show the results to the group to show the changes and how their understanding of the subject matter has evolved.

ALC instructors might have the groups review the group's contract individually, at first, and then talk about how well members met the terms of the contract. Groups might talk about certain aspects in depth (e.g., being on time, respecting everyone's opinions) or what they found the most or least valuable about the group experience in the ALC. One way to codify this experience for students is to ask them to identify one aspect of the group learning experience that they can bring to their next group situation.

Instructors might also encourage students to include elements from the course as artifacts or mementos. An education professor has students put a collaborative project in an e-portfolio for the course. More informal ideas include a group photo and set of group practices or principles they can apply in future group interactions (Petersen & Gorman, 2014).

Thank-A-Group-Member

Petersen and Gorman (2014) suggested that instructors provide students with an opportunity to thank a group member for the support they gave to each other during a final course meeting. This demonstration of gratitude might be done informally in a small-group discussion, through written thank-you notes, or by standing up and making a few short comments about the group members who positively affected the class experience for one another. Many ALC instructors find that this happens naturally, but allowing time for it during a class meeting may help the students see how a group process reaches closure.

Conclusion

Weimer and Lenze (1997) recognized that instructional methods are "eminently learnable," and working with groups requires very little, if any, formal

training. Managing groups is not always intuitive or easy; however, there is a wealth of literature (empirical and practical) to support the pedagogical strategies and methods instructors may employ in ALCs. Working with groups takes vigilance and consistent guidance from instructors. As instructors think about how to leverage groups to promote student learning, it is equally important to think what students will do when they are assembled into groups.

Notes

1. Substantial research on collaboration, cooperation, groups, and teams exists, and includes Arendale, 2004; Bacon and colleagues, 1999; Barrows, 1986; Brubacher, Payne, & Rickett, 1990; Cohen, 1994; Cuseo, 1992, 2002; Davidson & Major, 2014; Felder & Brent, 2001; Goodsell and colleagues, 1992; Johnson and colleagues 1998; Kagan, 1992; Michaelsen and colleagues, 2004; Millis & Cottell, 1998; Prince, 2004; Tomcho & Foels, 2012.
2. Johnson and colleagues (1998) stated that formal learning groups work together for a sustained amount of time (one period, but often several weeks, if not longer), have a shared set of learning goals, and require interdependent work by all members to complete objectives. With formal groups, another goal is to build a collective sense of cohesion and member support (Barkley et al., 2014; Michaelsen et al., 2004).
3. Moreno and colleagues (2012) found some learning advantages for instructor-generated groups based on pre-class subject matter knowledge, communication ability, and leadership ability.
4. Oakley and colleagues (2004) have a useful template for instructors to use or modify for this activity. The template includes categories for academic (e.g., major, year of study) and demographic (e.g., race/ethnicity, gender) details, personal interests (e.g., hobbies, favorite movie), and availability.
5. Nilson (2010) suggested that teams of three to five are large enough to ensure members have the chance to interact equally both in discussion and during work on collective projects and tasks. Smaller groups tend to allow for members to rely upon each other to achieve a complex task but should be large enough to prevent social loafing or freeloading (Hall & Buzzwell, 2012).
6. These names are fictional and used for educational and explanatory purposes. Any likeness to actual individuals is coincidental and unintended.
7. Instructor clarity has been shown to enhance a host of other college outcomes as well, such as academic motivation, critical thinking, persistence to the second year of college, and likelihood of matriculating (e.g., Loes & Pascarella, 2015; Loes et al., in press; Pascarella & Terenzini, 2005).
8. The literature in psychology and the social sciences is extensive. A recent publication by Levi (2013) contains an overview of much of this research.

Appendix 6.1: Overview of Advantages and Drawbacks of Group Characteristics

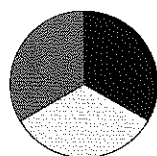| Topic	Type	Advantages	Drawbacks
When to Form Groups	First Day of Class	Formal group formation allows teams to bond and connect from the first day of class, which can benefit cohesion and ease interaction (Johnson et al., 2013; Levi, 2013; Michaelsen et al., 2004).	Students may decide to drop a course, which can create an imbalance of member resources and/or members per team.
	First Few Weeks of Class	Allows instructor to have a finalized course roster to set groups without risk of students dropping the course.	Groups miss out on a few sessions to bond and build cohesion early in the term, a crucial time in the course.
How to Form Groups	Random	• Supported by research in numerous fields (e.g., Nilson, 2010). • Random formation may ease the administrative work (e.g., no pre-course survey, configuration time). • Not time-consuming (Davis, 2009). • Perceived as fair by students (e.g., Barkley et al., 2014). • Distribution of member resources equal by chance (Davis, 2009).	• Not fully supported by literature as the most effective method (e.g., McKeachie & Svinicki, 2014; Michaelsen et al., 2004; Moreno et al., 2012). • Group cohesion may be slower due to lack of familiarity with group members (Nilson, 2010). • Underrepresented students could be separated, a concern during early stages in a curricular path (Oakley et al., 2004). • Distribution of member resources can be unequal by chance (Michaelsen et al., 2004).

(Continues)

Appendix 6.1: (*Continued*)

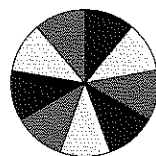| Topic	Type	Advantages	Drawbacks
How to Form Groups	Instructor-Generated	• Supported in the literature (e.g., Michaelsen et al., 2004; Oakley et al., 2004; Svinicki & McKeachie, 2014). • Instructors can achieve the desired balance of member resources (Michaelsen et al., 2004; Oakley, 2004).	• Member resources could be unbalanced (Michaelsen et al., 2004). • May isolate students in certain student populations in the classroom (Oakley et al., 2004).
	Self-Selected	• Many students favor this approach (Brookfield & Preskill, 1999; Davis, 2009). • Students often sit with friends and/or are reluctant to move after first few days of class (Bacon et al., 1999; Michaelsen et al., 2004). • May work better in smaller courses, upper-division courses, cohort-based courses, and graduate courses (Davis, 2009; Oakley et al., 2004). • Cohesion may occur sooner, thus allowing groups to move into performance stages quicker (Bacon et al., 1999). • Accountability may be strong due to familiarity of peers (i.e., "We won't let our team down, they are our friends").	• Member resources could be unbalanced, overly homogeneous (Michaelsen et al., 2004). • May isolate students who do not have friends or acquaintances in the classroom (Oakley et al., 2004). • Underrepresented populations may find it difficult to select into teams (Goodsell et al., 1992; Oakley et al., 2004). • Groupthink may overrule creative ideas for the sake of solidarity. May have a higher probability of academic misconduct (e.g., cheating; Oakley et al., 2004). • Accountability may be weak due to lack of familiarity with peers (i.e., "I don't know these people nor do I owe them anything"; loafing) or increased familiarity—which might hinder time on task (i.e., socializing).
Group Size	Small Teams (3–4 members)	• Allows members to fully utilize skills. • Minimizes opportunity for social loafing; accountability greater with smaller numbers. • Cohesion may occur sooner, thus allowing groups to move into performance stages more quickly.	• Groups may lack diverse opinions/members. • Groups may not be able to accomplish complex tasks.
	Large Teams (4–8 members)	• More members results in greater diversity of membership and perspectives (Tinto, 1997). • Groups are more likely to be able to accomplish complex tasks.	• Higher potential for social loafing. • Lack of interdependence due to size. • May not allow members to fully develop/utilize skills and/or experience different roles.
Group Duration	Short term	• Student can assume multiple roles during the term. • Students are exposed to a greater diversity of their peers' member resources. • Easier to manage dysfunctional teams.	• Groups may not become cohesive during short lengths of time. • Groups may not be able to give frequent peer feedback.
	Long term	• Increased ability for members to become a cohesive unit due to long-term collaboration (Bacon et al., 1999). • Groups might be able to handle more complex tasks due to time for project development. • Students may be able to play multiple roles during course.	• Students may not get a chance to interact with other classmates; loss of large class community. • Greater chance for social loafing due to project/course length.

Appendix 6.2: General Instructions for Pods and Teams

This semester you will work through several class activities in pods of 3 to 4 (everyone sitting at one arc of the table) and as an entire team of 9 to 10 (everyone sitting at the entire table).
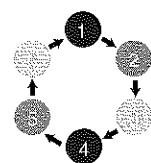
Each person has a role in the pod and in the team; these roles will rotate each week so that each person has a chance to perform each role during the semester, and learn from that experience. See the role assignment grid in your team folder.

Work in a pod   Work in a team   Work as a class

Team Roles (1 per team)	Pod Roles (1 per pod)
Team Manager: Gathers materials the team and the pods need; makes sure everyone knows their roles for the activity; keeps team on task and on time; ensures that team completes the tasks by the deadline and that all reports are filed on time.	*Pod Coordinator:* Ensures that pod completes its tasks on time and that all pod members are participating and on track; ensures that pod's assignments are posted or turned in as appropriate; keeps a log of the concepts the pod discusses and makes sure the team reporter is informed of the pod's work.
Team Reporter: Keeps a record of team's work and completes team reports; gathers material from each of the team's pods prior to class discussion; asks questions on behalf of the team and shares team's answers with class. While the team reporter should generally be the one who answers on behalf of the team after a particular pod- or team-level activity or discussion, it is also okay for others in the team to contribute to class discussions or ask questions when they have something new to add to the class discussion.	*Pod Technician:* Performs all technical operations, including using the computer, manipulating models, writing on the whiteboard or other media.
Team Analyst: Examines how team is working and ensures that all members are actively listening and participating; makes observations to the team about group dynamics and suggests changes or improvements; this might include observations about what worked well for the team on a given day, or what seemed to be a less effective strategy or tendency.	*Pod Talent:* Contributes ideas, insight, skills, effort, and talent to the pod's work; identifies areas of need and fills them; supports coordinator's and technician's efforts; reflects on pod's creative/productive process, boosts morale when needed, and plays "devil's advocate" role when pod seems to be thinking narrowly.

Appendix 6.3: Example of Role Assignment chart for Table Team (9 students) and Pods (3 students)

Team Pod Role Assignment Grid   Team:20-____

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Date	1/21	1/28	2/4	2/11	2/18	2/25	3/4	3/11	3/25	4/1	4/8	4/15	4/22	4/29	5/6
1 first name	1	2	3	1	3	2	1	1	1	1	3	2	1	3	3
last name	Crd	Tec	Exp	Crd	Exp	Crd	Crd	Tec	Exp	Tec	Exp	Exp	Crd	Tec	Tec
2	2	3	1	1	1	2	2	2	2	3	1	3	2	1	3
	Crd	Tec	Exp	Tec	Crd	Tec	Crd	Tec	Exp	Exp	Crd	Exp	Crd	Tec	Exp
3	3	1	2	1	2	3	3	3	3	1	1	1	2	3	1
	Crd	Tec	Exp	Exp	Crd	Tec	Crd	Tec	Exp	Exp	Tec	Crd	Tec	Exp	Crd
4	1	1	1	2	3	1	1	1	1	2	1	2	3	1	1
	Tec	Exp	Crd	Crd	Crd	Tec	Tec	Exp	Crd	Exp	Exp	Crd	Tec	Exp	Tec
5	2	2	2	2	1	1	2	2	2	1	2	3	1	2	1
	Tec	Exp	Crd	Tec	Tec	Exp	Tec	Exp	Crd	Crd	Crd	Crd	Tec	Exp	Exp
6	3	3	3	2	2	2	3	3	3	2	2	1	1	1	2
	Tec	Exp	Crd	???	Exp	Exp	Tec	Exp	Crd	Crd	Tec	Tec	Exp	Crd	Crd
7	1	3	2	3	3	3	1	1	1	3	2	2	2	2	2
	Exp	Crd	Tec	Crd	Tec	Exp	Exp	Crd	Tec	Crd	Exp	Tec	Exp	Crd	Tec
8	2	1	3	3	1	3	2	2	2	2	3	3	3	3	2
	Exp	Crd	Tec	Tec	Exp	Crd	Exp	Crd	Tec	Tec	Crd	Tec	Exp	Crd	Exp
9	3	2	1	3	2	1	3	3	3	3	3	1	3	2	3
	Exp	Crd	Tec	Exp	Exp	Crd	Exp	Crd	Tec	Tec	Tec	Exp	Crd	Tec	Crd
10	#1	#2	#3	#4	#5	#6	#7	#8	#9	#1	#2	#3	#4	#5	#6
	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp

1, 2 or 3 = Your pod number for the week. ?# = Your pod number unless another pod is missing one			
Team roles for the week:	Crd = Manager	Tec = Reporter	Exp = Analyst
Pod roles for the week:	Crd = Coordinator	Tec = Technologist	Exp = Expediter

If there is a tenth person on a team, that person switches roles with another teammate (#1–#9)
each week, as shown. The person switched with becomes an expediter for the week.

Note. Thanks to David Matthes from the University of Minnesota.

<div style="text-align: right;">7</div>

ASSESSMENT AND FEEDBACK

I think the hardest thing about team-based learning/ALCs is assessment.

—An ALC instructor

Instructors new to teaching in an Active Learning Classroom (ALC) sometimes have difficulty designing assessments for learning that happen in such a unique space. For instance, in some cases, collaborative activities might best be measured with collaborative assessments. Faculty, though, may be hesitant to use collaborative assessment approaches, either because their department or college requires the use of traditional exams or because they are unsure of exactly what to use and how to use it. The ALCs also pose an assessment challenge for instructors who use traditional exams. Because the small tables compel students to face one another—the very feature we otherwise laud—students may be more tempted to engage in academic misconduct. In this chapter, we will address both of these concerns by providing multiple examples of collaborative assessment and feedback strategies successfully implemented by ALC instructors. We will also address strategies for traditional, non-collaborative assessments for instructors who choose to use these approaches. To make it easier to envision how the approach might be adapted for your teaching we do not limit most of the examples to the context of a specific course or topic.

We describe strategies for both informal and formal assessment that take advantage of the affordances of the space and we exclude approaches that are significantly limited by the space. For instance, role-playing, performance exercises, or any assessment that requires the entire class to observe an individual (or small number of students) do not tend to work well in the ALC environment, with their lack of a single focal point. Accordingly, we will not report on them here, though, of course, a flexibly designed space may make some of those strategies more manageable.