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22

Informal Group Learning Activities

Instructors can encourage learning and student interaction by incorporating informal group activities into their teaching repertoire. The following activities can be carried out in classes of any size in almost any discipline, to reinforce concepts, check on students' understanding, or offer a change of pace. Some of these activities require planning and preparation, and some require that students work in pairs or groups outside the classroom.

If you are teaching a lecture course, you might want to select one or two activities that suit your course objectives and see how your students respond. For best results, avoid introducing too many new activities in any one course and try to avoid overusing any one activity.

General Strategies

Form ad hoc groups or pairs during a class session. To increase student participation and interaction, divide your class into small groups for an in-class exercise. Ask students to form groups with two, three, or four people sitting nearby. Have students turn to people behind (or in front of) them since students may sit next to people they know. Or ask them to form small groups with students they don't already know and to introduce themselves before working on the task. Another method is to have students count off (1, 2, 3, up to the number of groups you need), and have students gather by number (1s, 2s, and so on) to work on the task.

Give clear instructions. Explain to students the nature of the activity, your expectations, what they are to accomplish, and the amount of time they are to spend on the activity. Identify a signal for groups to stop working; for example, a raised hand, a timer, or a whistle.

Get feedback from students during the term. Ask students to give you informal feedback immediately after an activity, or conduct a midsemester evaluation to help you understand what is working and what needs to be improved. See Chapter 52, "Early Feedback to Improve Teaching and Learning."

Consult books and Web sites for ideas for activities. Search for Web sites devoted to "active learning" and review books that have compiled and catalogued hundreds of informal learning activities, such as Barkley, Cross, and Major (2004); Bean (1996); Jaques and Salmon (2007); Silberman (2006); and Staley (2003). The examples below are a sample of what you might do in your classroom.

Examples of Activities

Turn to your neighbor. Pose a problem or a question and ask students to think about it for a minute. Then ask them to turn to the person next to them and share their thoughts. After a few minutes, ask several pairs of students to share their thoughts with the entire class. This technique encourages the exchange of ideas, and it helps students clarify points or apply concepts to a problem or situation. (Sources: Cameron, 1999; Lyman, 1992)

ConcepTests. During a lecture, challenge students with a moderately difficult question—one that only 35–70 percent of students will be able to answer correctly. Give them a few moments to compose their thoughts and then have them discuss their answers with a partner or a small group. When students disagree, each should try to persuade the others by explaining their reasoning. Studies show that students in introductory physics lecture classes did better on exams when ConcepTests were used as part of a traditional lecture format. Questions can be drawn from points that are difficult or frequently misunderstood, or from past exam questions missed by half the class. (Source: Mazur, 1997)

Buzz groups. Buzz groups are teams of four or five students that form extemporaneously to respond to one or more questions; the groups can discuss the same question or different questions. Discussion is informal and students do not need to arrive at consensus—they simply exchange ideas. In a variation called *Snowball*, the size of the groups doubles with every round, and the tasks become more difficult. For example, during the first round, group members share their ideas; during the second round, the larger groups identify common patterns among the ideas; and during the third round, the still-larger groups develop guidelines, principles, or action plans. Buzz groups are typically used as a warm-up for class discussion. (Sources: Barkley et al., 2004; Jaques and Salmon, 2007)

Learning cells. For homework, students are given reading assignments and asked to prepare two questions about the reading. During class, students pair off and ask and answer each other's questions. In one variation, students have read the same assignment, and they compare their comprehension and recall, and clarify their understanding of the material. In another variation, students are assigned different readings and they pool their information and perspectives. (Source: Goldschmid, 1971)

Concept mapping. A concept map illustrates the connections between terms, ideas, or concepts. Students working alone or in groups construct a concept map by connecting individual terms with lines whose labels indicate the relationship between the terms. Developing a concept map requires students to identify and organize information and to establish relationships between pieces of information. Students create nodes which identify concepts, and the nodes are connected by lines labeled to indicate the relationship between the concepts. As appropriate, instructors can give clues about the connections. For examples of concept maps, see the references cited below and use your Web browser to search for "concept map tutorials." Some studies show that students using concept maps achieve at higher levels and retain information longer. Although students may understand and appreciate the value of concept mapping, they tend not to adopt it in their own studying. (Source: Fox and Morrison, 2005; Nakhleh and Saglam, 2005; Romance and Vitale, 1999; Santhanam et al., 1998)

Mind maps. As Budd (2004) notes, a mind map is an outline in which the major categories radiate from a central image, and lesser categories are portrayed as branches of larger branches. Students use graphics, images, and color to identify themes, subthemes, and supporting examples. For example, instructors have asked students to construct mind maps for the concept of supply and demand in housing prices. Students draw a house in the middle of a page and on one side draw pictures of supply (for example, land, construction, regulations). On the other side of the house, students draw pictures of demand (for example, location, features, affordability). Mind maps can be used during class to help students, individually or in groups, explore a concept or issue. (Source: Budd, 2004)

Jigsaw. In jigsaw projects, each member of a group completes a discrete part of an assignment. When members have completed their tasks, they report their findings to the rest of the group, and the group joins the pieces to form a finished project. For example, in a chemistry course each student in a six-person group could be assigned to research a different form of power generation (nuclear, fossil fuel, hydroelectric, and so on) and then to teach the key concepts to other members of the group. The group then comes together to prepare a comprehensive report. When all groups are working on the same topic, members of different groups who are working on the same subtopic can meet to develop strategies for teaching the material to their home group.

The jigsaw principle is commonly used to structure discussions. Students work in small groups, each of which develops expertise on a topic and formulates ways to teach their topic. These expert groups then break up, and students move to a new group, which consists of students who have developed expertise in different subtopics. In these second-round groups, students teach the material and lead the discussion on their particular subtopic. For example, in an English class, each group is assigned an author who incorporated autobiographical elements in their short stories. During the second round, students take turns leading the discussion, as the groups talk about each of the authors. The instructor then reconvenes the entire class for a discussion comparing the different authors' uses of autobiographical material. Resources and guidelines for using jigsaws can be found at www.jigsaw.org. (Sources: Barkley et al., 2004; Jaques and Salmon, 2007; Lai and Wu, 2006)

WebQuests. Students engaged in a WebQuest undertake a structured inquiry in which the information comes from online resources. The instructor provides the students with most or all of the following elements: descriptive background information, a statement of a specific task, a list of Web-based information resources, a description of the research process to accomplish the task, and suggestions for organizing the information and reflecting on the process and results. This design enables students to focus on interpreting information rather than searching for it. Collections of WebQuests and instructional resources can be found at webquest.org. Professors have used WebQuests on topics as diverse as human cloning, reducing whale mortality from collisions with ships or entanglement in fishing gear, differentiating satire and parody, and deciding whether to choose paper or plastic. (Sources: Dodge, 1995; Lamb and Teclehaimanot, 2005; Zheng et al., 2005)

Two-column lists. Students are asked to create a two-column list that compares views or presents the pros and cons of a position, and they are told to list every relevant point they can think of for each column. These lists are used to launch a discussion. The requirement to jot down items in both columns generally results in a more thorough and thoughtful discussion of the topic.

KWL. *KWL* stands for "what I know," "what I want to know," and "what I learned." To introduce a new topic, the instructor asks students to list what they

know and what they want to know about that topic. The instructor collects these lists and uses them to correct erroneous preconceptions and to adjust the course content to reflect students' knowledge and interests. At the end of the unit, students list what they have learned. The instructor collects and reads all the lists but does not grade them. (Source: Fritz, 2002)

Send-a-problem. Each group of students is given a problem, tries to solve it, and then passes the problem and solution to a nearby group. Without looking at the previous group's solution, the next group works to solve the problem. After several passes, the groups analyze, evaluate, and synthesize the responses to the problem they received in the final pass and report the best solution to the class. This strategy works best when the problems are complex and do not have a single right answer. For example, an instructor in urban planning asked student groups to work on a residential rezoning problem. During the last round, the groups evaluated the solutions they had received and selected the best one. (Source: Barkley et al., 2004)

Challenging questions. Give a challenging question for groups or pairs to resolve or, better yet, ask students to pose and answer an interesting question based on the principles discussed in the course. Here are examples from an economics course: Why are child seats required in cars but not in airplanes? Why are brown eggs more expensive than white ones even though they taste the same and have identical nutritional value? Why do brides spend so much money on a wedding dress they will never wear again, while grooms often rent cheap tuxedos though they may have many future occasions that call for them?

These intriguing questions (and the economic explanations) are among those described in Frank (2007).

Debates. Debates provide an efficient structure for class presentations when the subject matter easily divides into opposing views or pro and con positions. For formal debates, students are assigned to teams, given a position to defend, and asked to present arguments in support of their position and to rebut the arguments presented by the opposing team. The assignment for a formal debate states a clear, unambiguous positive proposition, specifies the time allotments for each speaker (usually five minutes or less), and explains the responsibilities of each speaker. In traditional debates, for example, the first affirmative speaker defines the main terms and outlines the affirmative case; the first negative speaker contests poorly defined terms and outlines the negative case; the second affirmative and negative speakers complete the case for their side by providing evidence; and the rebuttal speakers focus on the weaknesses in the most important arguments of the opposing case. Students who are not debating can serve as judges and keep a record of the arguments. As a follow-up, each student writes a brief summary of either the affirmative or negative side of the debate that includes the thesis, reasons, and evidence.

For informal debates, you can pose a proposition and ask those who agree to sit in one section of the room and those who disagree to sit in the other. You may also want to create a third section for those who are undecided. Ask students from one section, then the other, to support their position. At set intervals (ten or fifteen minutes), ask students to move to another section if they have changed their minds. A variant approach is to rename the sections after students have chosen sides and have students argue for the opposite of their original position. This technique may help students move beyond a "right versus wrong" understanding of an issue to a more tolerant and nuanced view.

For examples of debate questions and supporting materials, see the series *Taking Sides: Clashing Views in . . . .* The series comes with an instructor's guide, and the more than two dozen books include debate questions and relevant readings in fields such as history, bioethics, psychology, political science, criminal justice, business, and anthropology. For example, *Taking Sides: Clashing Views on Educational Issues* poses debate questions (Is privatization the hope of the future? Can federal initiatives rescue failing schools?) and presents primary source articles to support each position. (Sources: Bean, 1996; Crone, 1997; Goodwin, 2003)

Panel discussions. Students divide into panels and each panel is assigned a topic to research. On presentation day, each panelist makes a very short presentation before the floor is opened to questions from the class. Panel discussions are most successful when instructors offer students sufficient direction on how to prepare their presentations and prepare for the question-and-answer follow-up.

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23

Formal Group Learning Activities

Students who ask questions, solve problems, create solutions, propose alternatives, engage in hands-on activities, and participate in learning groups are likely to learn more and retain information and skills longer than students who sit passively listening to a lecture (Astin, 1993; Pascarella and Terenzini, 2005; Prince, 2004).

This chapter surveys various approaches to structured group activities that will engage students. Some can easily be incorporated into a traditional lecture or discussion course, while several represent more complex and ambitious approaches to class format and structure. See also Chapter 24, "Case Studies" and Chapter 25, "Simulations: Role Playing, Games, and Virtual Worlds."

General Strategies

Select approaches that suit your style and educational objectives. Choose activities that feel comfortable. Begin by using one strategy during one or two class periods or for one segment of a course.

Teach students how to work with new approaches. Students may need some advice or help in taking a more active role in the classroom. Establish expectations for student engagement at the beginning of the course and reinforce your expectations throughout the term. Help students understand that they can learn more by doing rather than by listening, and by working with others rather than by working alone. (Sources: Felder and Brent, 1996; Leeds et al., 1998)

Get feedback from students during the term. A midsemester evaluation will help you see what is working and what needs to be improved. See Chapter 52, "Early Feedback to Improve Teaching and Learning."

Examples of Activities

Discovery learning. In a discovery format, the instructor presents a novel situation, an interesting puzzle, a set of observations to explain, or an open-ended question that students explore in a largely self-directed manner. Students may be asked to speculate, based on partial information, about what materials were used in ancient artifacts, or they may be asked to make hypotheses about the conductivity of various liquids. In the purest form of discovery learning, an instructor sets the problems and provides feedback on students' efforts but does not direct or guide those efforts. This pure form is rarely used in higher education because it can be very time consuming. More often, the instructor provides guidance throughout the process, in the form of identifying problem-solving activities, facilitating those activities during the discovery process, helping students stay on task, and pointing students toward appropriate resources. Studies show that guided discovery (a mix of instructor guidance and some free exploration) is more effective than pure discovery (where students receive little or no guidance). (Sources: Kirschner et al., 2006; Mayer, 2004; Prince and Felder, 2006)

Guided design. In guided design, which was developed in the field of engineering, students work in groups of four or five, and they are led through a complex sequence of steps to solve real-world problems, with the instructor providing feedback at each step. These steps might include defining the situation, stating the problem and goal to be achieved, generating ideas and selecting the best one, defining the new situation that would result when the selected idea is implemented, preparing a detailed plan to implement the idea, implementing the plan, and evaluating and learning from the success or failure of the process and the plan. Guided design serves as a bridge from single-solution textbook problems to applied open-ended problems. For example, in a course on the mechanics of materials, an instructor used this process to have students redesign a gate at a parking garage so that the gate would deflect on impact from a car, avoiding structural damage to the car. (Sources: Wales and Stager, 1982; Wankat, 2002)

Team-based learning. In team-based learning, a course unit begins with students completing an initial set of tasks, which may include reading or lab assignments. Students then take a short multiple-choice readiness assessment test that measures their understanding of the basic concepts. After students take the test individually, they meet in their assigned groups to discuss the questions and reach consensus on the answers. Both the students' individual scores and their team scores are recorded and will be used in the calculation of their grade in the course. The instructor offers a short lecture to clarify any problems that surfaced during the assessment test. Next, the groups undertake a challenging assignment; for example, in a psychology course, groups were asked to determine which psychological phenomena explain people's failure to exercise regularly, floss daily, and eat more fruits and vegetables. Hosted by the University of Oklahoma, www.teambasedlearning.org offers guidelines, resources, examples, and implementation tips. (Source: Michaelsen et al., 2004)

Authentic learning. Authentic learning focuses on complex real-world problems and their solutions. The instructor selects a problem that is ill-defined and that requires sustained investigation and collaboration. Students are not given a list of resources but must conduct their own searches and distinguish relevant from irrelevant information. Authentic activities engage students in making choices, evaluating competing solutions, and creating a finished product. One instructor used authentic learning to have students assume the identities of stakeholders in the Mekong River Basin of Southeast Asia and debate the merits of a proposed development project using Mekong e-Sim, an online learning environment. Another used the technique to have students investigate the arsenic contamination of the water supply. Building a three-dimensional virtual reconstruction of an ancient Athenian marketplace was the goal of another effort. (Source: Lombardi, 2007)

Inquiry-based instruction. In *structured inquiry* learning, students are given a problem to solve, a method for solving the problem, and the necessary materials, but not the expected outcome. In *guided inquiry* or *inquiry-guided* learning, students must also figure out a method for solving the problem. Students thus develop their abilities to formulate good questions, identify and collect appropriate evidence, present results systematically, analyze and interpret results, formulate conclusions, and evaluate the worth and importance of those conclusions. Teaching methods, used singly or in combination, may include interactive lectures, discussion, group work, case studies, problem-based learning, simulations, fieldwork, and labs.

Guided-inquiry approaches can be most effective for small classes and also for first-year students who are forming habits of learning. In contrast, *open inquiry* learning requires students to also formulate the problem they will investigate. Like independent research, open inquiry is most appropriate for advanced students.

In *process-oriented guided inquiry learning (POGIL)*, developed by faculty in chemistry, students working in small groups are given data or information and a set of leading questions designed to guide them to formulate their own conclusions. The learning cycle consists of exploration, concept invention or formation, and application, under the guidance of the instructor. The POGIL Web site (www.pogil.org) offers descriptions of the method and instructional materials.

Studies show that, compared with other forms of instruction, inquiry-based instruction yields equal or higher scores on achievement tests, less student attrition, and greater student satisfaction with the method of instruction. Inquiry-based methods are used extensively in the sciences; guided inquiry is particularly popular in chemistry. (Sources: Cooper, 2005; Lee, 2004; Prince and Felder, 2006)

Problem-based learning. PBL, developed in the field of medicine, is an instructional method in which carefully crafted open-ended problems are introduced at the beginning of the instructional cycle and used to provide the context and motivation for the learning that follows. Instead of teaching students what they need to know and then posing problems, PBL begins with a problem that determines what students study. The problems derive from observable phenomena or events, which students come to understand as they learn about the underlying explanatory theories. Students engage in self-directed learning, most often in groups.

For example, students are presented with an open-ended, real-world problem, which they are asked to analyze and then to generate hypotheses that explain the data or phenomena, request additional data to support or challenge the hypotheses, identify questions for additional independent study, and determine how to proceed. The emphasis is on learning a subject by tackling a problem, rather than on problem solving per se; indeed, the problem may not be solvable. The simplest problems may require a few days of work, but the method is also used on complicated problems that take an entire semester.

Courses using PBL may incorporate a variety of formats:

- *Small-group discussion with an instructor.* Students meet as a group with a faculty member who serves as facilitator and occasional expert as students discuss a problem.
- *Collaborative learning groups.* Students meet in groups, usually during part of a class session, to solve a problem, with the instructor available to all groups as a consultant.
- *Case method.* Developed in business and law education, the case method involves a large group of students in the discussion of a problem that has been carefully analyzed by students prior to the class session. The instructor leads the class discussion, which focuses on critical analysis, exploration of multiple perspectives, application of ideas and principles, and decision making.
- *Lectures.* The instructor begins a lecture by presenting a problem for class discussion.

For instructors using this method, a critical task is developing a good problem, a problem that raises a compelling issue and that is tied to course objectives.

The University of Delaware (www.udel.edu/pbl) and Samford University (www.samford.edu/ctls/problem_based_learning.html) host Web sites on PBL with descriptive information, examples, syllabi, and other resources. PBL also requires considerable subject matter expertise and flexibility on the part of instructors, who must be able to guide students to the relevant facts, laws, principles, and theories. Instructors also need skills and patience in working with students who are unaccustomed to handling project management and interpersonal conflicts.

Studies have shown the positive effects of PBL on students' skill development, intrinsic motivation, ability to work in teams, and retention of knowledge over long periods of time. However, some research shows that compared to conventionally taught students, PBL students have gaps in their cognitive knowledge and may see themselves as less well prepared in the discipline. (Sources: Albanese and Mitchell, 1993; Duch et al., 2001; Gijbels et al., 2005; Hativa, 2000; Hmelo-Silver, 2004; Knowlton and Sharp, 2003; Prince, 2004; Prince and Felder, 2006; Savin-Baden, 2003; Schwartz et al., 2001)

Project-based learning. Project-based learning begins with the assignment of one or more tasks that will lead to the creation of a final product (for example, a design, model, device, or computer simulation). Different types of project-based learning offer students different degrees of autonomy:

- On task projects, student teams work on projects that have been defined by the instructor and they rely heavily on methods prescribed by the instructor.
- On discipline projects, the instructor defines the subject area and the general approaches to be used, but the students identify the specific project and select the particular approach.
- On problem projects, students are almost completely free to choose their project and their approach.

Project-based learning is common in engineering; resources for engineering courses are available at www.pble.ac.uk (a consortium of universities in the United Kingdom). More general information on project-based learning is available at Boise State's Web site (www.pbl-online.org).

Project-based learning is similar to problem-based learning in that teams of students work on open-ended assignments, formulate solution strategies, and continually reevaluate their approach in response to the outcomes of their efforts. But project-based learning typically has a broader scope and may encompass several problems. Moreover, in project-based learning the end product is a central focus of the assignment, and the completion of the project relies heavily on the application of previously acquired knowledge. In problem-based learning, in

contrast, the emphasis falls on acquiring new knowledge, and the solution is less important than the knowledge gained in pursuing it.

Studies show that relative to traditionally taught students, students who participate in project-based learning are more motivated, demonstrate better communication and teamwork skills, and have a better understanding of issues and how to apply their learning to realistic problems. However, they may acquire a less complete mastery of content fundamentals. In addition, some students are unhappy about the time and effort required by projects and about the interpersonal conflicts caused by teammates who slack off. They may also feel they work harder than students who are traditionally taught, and some dislike being tested individually after doing most of their work in groups (a common complaint of students working in teams). (Sources: Bacon, 2005; Donnelly and Fitzmaurice, 2005; Prince and Felder, 2006)

Addressing Student and Faculty Concerns

"Students don't like these kinds of activities; they prefer that I lecture." Students who are accustomed to being passive may need time to adjust to being active, and in the end some will still prefer traditional lectures. Explain the value of nonlecture activities at the beginning of the course, and reinforce your expectations throughout the term. Try as best as you can to avoid such pitfalls as assigning frustrating, unclear tasks and posing unrealistic timeframes. (Sources: Felder and Brent, 1996; Leeds et al., 1998)

"These kinds of strategies take too much class time." Formal group learning activities can take more class time than lecturing, but many instructors believe that engaging and challenging students is worth the cost of modestly pruning the curriculum and course objectives.

"I teach large-enrollment courses and it would be chaos to do anything but lecture." Faculty have had students in large classes inflate balloons to understand how the universe expands, or dunk plastic bottles into ice-filled plastic bags to explore the relationship of temperature to pressure. During these activities, the instructor is still in control, but the control is more subtle, as the instructor guides the students through the experiment. These activities are used to supplement, not to replace, the lectures. (Source: Caprio and Micikas, 1997–98)

"It takes too much time to prepare for this." You will probably need more preparation time at first, but only until you become familiar with a strategy.

On the other hand, you may find you feel energized by undertaking new instructional approaches.

"These kinds of activities are about entertainment and not about learning." Learning can be both fun and worthwhile. These strategies challenge students and require concentrated effort—they are not easy games or empty pastimes.

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