



Active Learning Strategies

Active learning is used to describe strategies that engage students in thinking about or applying the content in a course. These strategies are based on the assumption that students need to actively construct their knowledge to learn something. A brief introduction to active learning is the video ["What is Active Learning?"](#) (4:12 min) by the Northwest Iowa Community College (2011). This [video](#) (4:35 min) shares Dr. Katie Hirschboek's perspectives on using active-learning strategies in one of the [UA's Collaborative Learning Spaces classrooms](#).

The list below presents some relatively simple active learning strategies that can be incorporated into an on-ground course. For 50 additional strategies to engage students, see [Student Engagement Techniques: A Handbook for College Faculty](#).

Reading Quiz

This is one way to incentivize students to read assigned material! Active learning depends upon students coming to class prepared. The reading quiz can also be used as an effective measure of student comprehension of the readings (so that you may gauge their level of sophistication as readers). Further, by asking the same sorts of questions on several reading quizzes, you will give students guidance as to what to look for when reading the assigned text. If you ask questions like "How many electrons are in an oxygen atom?"), you are telling the student that it is the details that count, whereas questions like "How is electron configuration related to atomic properties?" highlight key concepts. If your goal is to instruct (and not merely to incentivize), carefully choose questions that will both identify who has read the material (for your sake) and identify what is important in the reading (for their sake).

Clarification Pauses

This is a simple technique aimed at fostering "active listening". Throughout a lecture, particularly after stating an important point or defining a key concept, stop, let it sink in, and then (after waiting a bit!) ask if anyone needs to have it clarified. You can also circulate the room during these pauses to look at student notes, answer questions, etc. Students who would never ask a question in front of the whole class will ask questions during a clarification pause as you move about the room.



Wait Time

Rather than choosing the student who will answer the question presented, this variation has the instructor WAITING before calling on someone to answer it. The wait time will generally be short (15 seconds or so) - but it may seem interminable in the classroom. It is important to insist that no one raise his/her hand (or shout out the answer) before you give the OK, to discourage the typical scenario in which the five students in the front row all immediately volunteer to answer the question, and everyone else sighs in relief. Waiting forces every student to think about the question, rather than passively relying on those students who are the fastest out of the gate to answer every question. When the wait time is up, the instructor randomly picks a student to answer the question. Once students are in the habit of waiting after questions are asked, more will get involved in the process. One easy way to randomize calling on students is to have each student's name on an index card; pull a card to select a student to answer the question.

Student Summary of Another Student's Answer

To promote active listening, after one student has volunteered an answer to your question, ask another student to summarize the first student's response. Many students hear little of what their classmates have to say, waiting instead for the instructor to either correct or repeat the answer. Having students summarize or repeat each other's contributions to the course both fosters active participation by all students and promotes the idea that learning is a shared enterprise. Given the possibility of being asked to repeat a classmate's comments, most students will listen more attentively to each other.

Think-Pair-Share

This strategy can be modified to fit any class size and situation. Students do not have to move from their current seats and discussion can be guided. The instructor presents an issue for discussion in the form of a problem or question, but instead of just throwing the question out for one student to answer, the students discuss possible solutions in pairs. Students should be given time (30-45 seconds) to think about the issue, then the students can form pairs to discuss the problem or question. Discussion time can vary depending on the question and how the discussion is going within the pairs. In the final step, students share their responses with the entire class.

Finger Signals

This method provides instructors with a means of testing student comprehension without the waiting period or the grading time required for written quizzes. Students are asked questions and instructed to



signal their answers by holding up the appropriate number of fingers immediately in front of their torsos (this makes it more difficult for students to "copy", thus committing them to answer each question on their own). For example, the instructor might say "one finger for 'yes', two for 'no'", and then ask questions such as "Do all organic compounds contain carbon [hydrogen, etc.]?". Or, the instructor might have multiple choice questions prepared for the overhead projector and have the answers numbered (1) through (5), asking students to answer with finger signals. In very large classes the students can use a set of large cardboard signs with numbers or letters written on them. This method allows instructors to assess student knowledge literally at a glance.

In-Class Derivations

In classes that include complex derivations of equations, instructors can create a "need to know" by using one of these strategies:

- Assign students the task of completing as much of the derivation as they can before class.
 - Provide students with the final equation and ask them to develop some ideas about how it might be derived. This can be assigned as an individual pre-class assignment or as a small-group task before the presentation of the derivation.
 - During the presentation of the derivation, instructors can pause at key points and ask students to do a Think-Pair-Share about what the next steps might be.
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Student Problem Solving I

In many problem-solving courses, instructors tend to teach problem-solving techniques by solving the problems themselves. Because students learn more by doing, rather than watching, there are better scenarios than this. Rather than illustrating problem-solving, have students work out the problems themselves in small groups using small whiteboards and markers, paper and pencil, or computers if the appropriate software is available.

Student Problem Solving II

For very complex problems, instructors will likely have to do more intermediate interventions to guide students. Some useful ways to frame those interventions are:

- Have students outline the major steps of the solution or apply the instructor's problem-solving framework. Give students a few minutes to tackle the first steps of the problem, and then the instructor reviews those steps and directs students to tackle the next steps. The instructor continues this until the problem is complete.



- Have students convert the problem into a similar problem that they do know how to solve, and then identify the differences between the problem at hand and the similar problem.
 - Once a problem is solved, guide students in an analysis of whether the solution makes sense. Consider extreme cases to test the solution.
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Active Review Sessions

In the traditional class review session, the students ask questions and the instructor answers them. Students spend their time copying down answers rather than thinking about the material. In an active review session, the instructor poses questions and the students work on them in groups. Then students are asked to show their solutions to the whole group and discuss any differences among the solutions proposed.

Quiz/Test Questions

Students are asked to become actively involved in creating quizzes and tests by constructing some (or all) of the questions for the exams. This exercise may be assigned for homework and evaluated (perhaps for extra credit points). In asking students to think up exam questions, we encourage them to think more deeply about the course material and to explore major themes, comparisons of views presented, applications, and other higher-order thinking skills. Once suggested questions are collected, the instructor may use them as the basis of review sessions, and/or model the most effective questions. Further, you may ask students to discuss the merits of a sample of questions submitted; in discussing questions, they will significantly increase their engagement with the material to supply answers. Students might be asked to discuss several aspects of two different questions on the same material including the degree of difficulty, effectiveness in assessing their learning, proper scope of questions, and so forth.

Keep in mind that it is important to also consider how to productively engage students in an active-learning classroom. For some strategies, you can refer to [How Do I Help Students Engage Productively in an Active Learning Classroom?](#)

Please contact this guide's current curator, [Ingrid Novodvorsky](#), with any questions about active-learning strategies.