

# Center for Faculty Innovation

## New Faculty Orientation 2018

**Title:** Active Learning 101: Why and How to Get Started

**Description:** The National Science Foundation summarizes the discussion of active learning very succinctly: "Enough with the lecturing." In this workshop, we'll examine some of the empirical evidence and the fundamental principles of learning that support this view. We'll also discuss some easy-to-implement techniques that you can apply to make your class an effective learning experience for your students.

### Bright Ideas

Learning is durable change relative to an area of inquiry, supported through metacognition.

#### Good for Learning:

- Retrieval practice (testing as calibration)
- Interleaving (alternating problem types)
- Spacing (time between sessions)
- Elaboration (rich context encoding)
- Focused effort, pre-learning, growth mindset

#### Bad for Learning:

- Passive observation
- Rereading texts
- Intuitive judgments
- Massed practice
- Learning style adaptations

#### More information:

J.D. Bransford et al., *How People Learn: Brain, Mind, Experience, and School*. National Academy Press, 2000.

P. Brown, H. Roediger, and M. McDaniel, *Make It Stick : The Science of Successful Learning*. Harvard Press, 2014.

S.A. Ambrose et al., *How Learning Works: 7 Research-based Principles for Smart Teaching*. Jossey-Bass, 2010.

### Notes



# Active Learning 101

## Classroom Assessment Techniques (CATs)

### Muddiest point(s)

A muddy point is some aspect of a learning activity that was not clear (*i.e.*, it's "clear as mud"). In this activity, ask students to identify their muddiest point regarding a lecture, discussion, homework assignment, reading assignment, etc.

1. Determine what activity you want feedback on.
2. Reserve 3-5 minutes at the end of a class session.
3. Pass out slips of paper or have students use their own to write their response.
4. Stand by the door and collect the papers as they leave.
5. Read through the points and identify common themes after class.
6. Respond to the most common points in the first few minutes of the next class.

### Jigsaw

In a jigsaw, students individually study one piece of a larger, integrated concept. For example, in a psychology class on motivation, each student might first answer questions about one of four competing theories. The students then get together into a larger group that has one representative for each piece. Collectively, the students share and discuss their individual responses, integrating their knowledge collectively.

1. Identify 3-4 closely related pieces that can integrate into a collective theme.
2. Write 3-5 common questions that can be reasonably answered for each piece.
3. Pass out papers with the questions and other resources needed for each student to examine one of the pieces.
4. Give the students several minutes to answer the questions.
5. [Optional] Assemble groups of students with the same piece. Give them time to discuss their answers and come to a consensus.
6. Assemble groups that have one student per piece. Ask them to share their responses with each other, and to identify common themes and differences.
7. As a full class, ask for any additional points of clarification.

### Focused listing

The purpose of this technique is to focus students' attention on a single important term, name, or concept from a particular lesson or class session and direct them to list several ideas that are closely related to that "focus point."

1. Describe an important concept just studied or to be studied in a word or brief phrase.
2. Write that word or phrase at the top of a sheet of paper.
3. Give yourself 2-3 minutes to list 5-10 items of terms related to that concept.
4. Look over your list quickly, adding any important items you may have left out.
5. In class, give your students the focus topic and ask them to construct their own lists.
6. After giving students 3-4 minutes to construct individual lists, have them write one item on the board. Have them add checkmarks to common answers.
7. Discuss what items are missing and add them to the list.

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### **Background knowledge probe**

Before you begin instruction (either for the full course or for a particular module), give students an ungraded pre-quiz on the material. You can use this information to shape your instruction so that it reinforces correct initial conceptions and directly address misconceptions.

1. Prepare two or three open-ended or multiple-choice questions.
2. Write questions on the board.
3. Ask students to respond in two or three sentences to each question or circle a response.  
Example: The Golden Triangle
  - (a) Have never heard of this place.
  - (b) Have heard of it, but don't really know where it is.
  - (c) Have some idea where this is, but not too clear.
  - (d) Have a clear idea where this is and can explain.
4. Share results with students during the next class.

### **RSQC<sup>2</sup>**

Students provide responses to the five prompts below. As an in-class activity, leave about 10 minutes and have the students write responses on a piece of paper. Alternatively, ask the students to answer through Canvas. After class, identify common themes among the questions and respond collectively at the beginning of the next class meeting.

- Recall the most important point
- Summarize that point in one sentence
- formulate a specific Question about the material they would like answered
- make a Connection between this material to something else in their life
- Comment on some aspect of the material or how they have approached it

### **Peer instruction (PI)**

This technique focuses on getting students to talk through their misconceptions relating to a particular topic. It works especially well with clickers or clicker-like apps (such as Socrative or Poll Everywhere) to respond to a multiple choice question. Good PI questions are designed so that all distractor options are plausible and align with common misconceptions. Good questions also yield 30-70% correct responses in the first round of voting.

1. Show the multiple choice question on the technology of your choice.
2. All students provide an initial response to the question.
3. **Important:** Provide no feedback about these initial responses, not even the distribution. You should review these distributions later to improve the questions.
4. Students discuss their responses with a neighbor. Try to persuade the other person that their answer is correct and should explain why all the other options are incorrect.
5. Collect a second round of responses.
6. Reveal the correct answer, show the distributions, and discuss.

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## Classroom Assessment Techniques (CATs)

### Student-generated test questions

Ask the students to generate test questions for concepts previously discussed. This technique provides insight regarding what students consider important concepts. It also encourages students to consider subtle aspects of the material that they or their peers might get wrong.

1. Give students to write two (or more) test questions individually.
2. Questions can be multiple choice, short answer, or other appropriate forms. Provide students with clear guidelines about these directions. [Optional] Show students some sort of rubric for how to determine good questions from bad questions.
3. Collect the questions and immediately quiz the other members of the class. The format of this is very flexible. One option is to form groups and have each group pick at least one question; the questions are then posed to the other groups. Or select random questions and present them on an overhead projector.
4. If other students are stumped, ask question's author to explain the correct response.
5. Identify common themes of the concepts and learning taxonomy levels. Use this information to shape additional discussions of the material.

### Process analysis

In this technique, students keep records of the actual steps they perform to carry out a representative assignment. After documenting these steps, students reflect on their process and draw conclusions about their approach. This process can help to identify problems in their methods of approaching the problems.

1. Choose an important task that is complex enough to provide interesting analysis.
2. Inform students to keep a detailed record of their process, including the actual steps taken, the time for each step, and a description of what each step accomplished.
3. Have students hand in the process analysis along with the assignment.
4. Identify steps where students spent the most time and missing steps of the processes.
5. Report findings back to students and/or have students share process with each other.

### Think-pair-share (TPS)

TPS is designed to give all students—especially introverts and those who like to think before speaking—an opportunity to respond to open-ended prompts. This technique begins with individual responses and proceeds to pair discussions, before a full-class debrief.

1. Give a clear indication that you want all students to respond before asking an open-ended or complex question. This will prevent motivated students from immediately responding or blurting out answers.
2. Ask the question and tell students to take a minute to think about their response.
3. [Optional] Have students write their response before moving on to the pair.
4. Have students turn to a single neighbor and share their answer verbally with each other. Allow 1-3 minutes for discussion.
5. Ask students to share common insights and answers with the full class.