

Increasing Student Engagement in Lectures

All of you who have lectured to WUMS2s before know that attendance typically hovers at around 50%. This doesn't mean the time you devote to preparing for your talks is wasted or is not appreciated by the students—the vast majority of students who don't regularly attend class (and many who do) watch the lecture recordings, which includes video of the lecture slides and audio of your voice. As we learned from a survey we performed about attendance attitudes among faculty and students, students tend to believe that their primary task in the preclinical years is to learn factual material and that the means of mastery should be immaterial. While they recognize that poor attendance may negatively impact faculty enthusiasm for teaching and don't mean to be disrespectful of lecturers' time, many have found that they can learn more effectively and efficiently by tailoring the way they receive and interact with the material.

I, like many of the faculty who participated in the survey, believe the classroom affords important functions in professional socialization and that absenteeism negatively impacts the learning community. But I believe that if the classroom is to be of value to the students, we need to make efforts to increase its educational yield and consider research on how adults learn. Here are a few notable points from that research:

- 1) **Traditional lectures using a Powerpoint bullet-point approach encourage passive learning at the lowest level of cognitive function** and provide for a low rate of knowledge retention.
- 2) **Students cannot pay attention continuously during a 50-minute lecture.** Attention alternates between engagement and non-engagement with attention lapses beginning as early as the first minute of a lecture and recurring in cycles that progressively shorten as the lecture progresses.
- 3) **Attention is higher during non-lecture methods/active learning techniques** such as demonstrations, clicker questions, and student discussions, and there is a carryover effect of the benefit of such student-centered techniques into subsequent lecture segments.
- 4) Relative to a traditional lecture format, **active learning strategies improve academic performance, knowledge retention, and student attitudes.**

Bunce DM et al. J Chem Educ 2010;87:1438-43, Deslauriers L et al. Science 2011;332:862-4, Armbruster P et al. CBE Life Sci Educ 2009;8:203-13, Rao SP, DiCarlo SE. Adv Physiol Educ 2001;25:127-33.

The goals of active learning strategies are to use a cycle of activity and feedback to give students opportunities to apply their learning and to develop higher cognitive skills and critical thinking. You may have heard talk about the “flipped classroom,” in which students learn new content outside the classroom via some combination of reading and pre-recorded lectures or other electronic materials; then class time is used to assimilate that knowledge through problem-solving, discussion, debates, peer education, etc. Team-based Learning (TBL) is one such flipped classroom technique that our medical students are familiar with and appreciate. Even if the idea of flipping the classroom flips your stomach, **I encourage you to consider whether parts of your lectures can be learned just as easily on the students' own time with classroom time used for an active learning technique that assesses, consolidates, or expands on that knowledge.** An example we have used in the past is in our Visual Pathways lecture, where students were asked to review the afferent visual pathways outside class, freeing up class time for them to quiz themselves on a series of Goldmann visual field results. Here are some other active learning strategies that can be incorporated into lecture to improve attention and engagement:

Active learning strategies

- 1) **Group problem solving.** Present a conceptual problem or case at some point during the lecture to be discussed by groups of students. Give them ~5 minutes to work on the problem, during which time you walk around the auditorium, monitoring progress. Randomly call on a group or two to report on their results/explanation.
- 2) **Audience response questions** (Poll Everywhere). These can be used to poll attitudes, as a pre-test at the beginning of class or before lecture segments, sprinkled throughout lecture, or as a post-test at the end of lecture.
- 3) **“Think-pair-share” with a student neighbor.** What these collaborative techniques have in common is that an often open-ended question is posed to the class and each student is given ~1 minute to *think* about the question before *pairing* with a student neighbor to discuss their ideas for

a couple minutes, then the pairs *share* their answer with the rest of the class via solicitation of comments or a class vote.

- a) Open-ended question: Pose a question that requires reflection on material presented rather than simple recall.
Example: Given what you know about the pathophysiology of ICH, why do you think trials of hematoma resection have been negative?
 - b) Sentence starter/fill in the blank: Present a sentence that needs completion in order to reflect an accurate statement. Ask students to complete the sentence, then compare answer with a neighbor. Best if sentence starter requires reflection that goes beyond recall to levels of application or analysis.
Example: (Show image of occipital stroke) A stroke here would most likely cause impairment of _____.
 - c) Compare or contrast: identify 2 important parallel elements from the lesson and ask students to identify similarities and differences. Works best if the instructor has not already provided the comparison.
Example: Show video of parkinsonian tremor and essential tremor and ask students to compare what they see.
 - d) What's your diagnosis? Present a case vignette or short video and ask students to provide a diagnosis or answer other question related to the disease
 - e) Re-order steps: Present a series of steps in mixed order and ask students to re-order them to the correct sequence.
Example: Re-order the following locations to trace the pathway of the corticospinal tract from start to finish
 - a. Internal capsule
 - b. Motor cortex
 - c. Cerebral peduncle
 - d. Spinal cord
 - e. Corona radiata
 - f) Paraphrase an idea: Present an idea and ask students to rephrase it using their own words.
Example: Paraphrase this statement so a non-medical family member of your patient with neglect would understand the patient's behavior: Spatial neglect is a heterogeneous syndrome composed of lateralized spatial attention and non-lateralized vigilance deficits
 - g) Support a statement: Create a statement for which students must provide supporting evidence.
Example: Provide 3 pieces of evidence to support the following statement: Multiple sclerosis is a multifactorial disease caused by the interplay of environmental, genetic, and immune factors.
 - h) Reach a conclusion: Present facts or opinions, asking students to make a logical inference. Such statements may result in multiple correct responses.
Example: If upon irrigating a comatose patient's left ear with ice cold water, both eyes deviate to the left, you can conclude that _____.
- 4) **Role playing**. Use to demonstrate how to elicit symptoms, how to perform exam techniques, how to explain a procedure or the meaning of test results or a diagnosis. This can involve having student volunteers take on the role of patient and physician (or the lecturer take on the role of patient and student as physician). Students generally enjoy seeing their classmates get up in front of the class.
 - 5) **Interactive games**. Use game show format to review material and assess ability to apply information. This doesn't need to be an elaborate production like DNS Jeopardy is at the end of the course, but could be just a few questions. A little fun competition can be motivating, particularly if you let people work together,
 - 6) **Debate**. This could be formal with preparatory work or informal with students asked on the spot to provide an argument on the pro or con side. Would work for controversial concepts, opinion, or factual material.

Other non-lecture strategies to improve attention

- 1) Patient presentation
- 2) Short videos
- 3) Demonstrations

If you are motivated and flexible, another excellent technique is to have students complete a short online nongraded quiz or questionnaire *prior to class*, then use their performance on the quiz/responses to questions to guide what you cover in class. There is no point in spending 15 minutes of class time discussing a topic that 99% of the class already understands well.

Since most students have spent the majority of their school career in a passive learning environment, they may be uncomfortable with or intimidated by some active learning strategies. Thus it is important that students be prepared in advance for what will be expected of them. For example, many students do not routinely read lecture handouts or other preparatory materials before class, so if your class plans require that they have background knowledge in order to fully participate, then they need to be instructed in what materials they should prepare.