Blah? Traditional lecture classes have higher undergraduate failure rates than those using active learning techniques, new research finds.

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Lectures aren't just boring, they're Ineffective, too, study finds

By Aleszu Bajak | May. 12, 2014 , 3:00 PM

Are your lectures droning on? Change it up every 10 minutes with more active teaching techniques and more students will succeed, researchers say. **A new study** finds that undergraduate students in classes with traditional stand-and-deliver lectures are 1.5 times more likely to fail than students in classes that use more stimulating, so-called active learning methods.

"Universities were founded in Western Europe in 1050 and lecturing has been the predominant form of teaching ever since," says biologist Scott Freeman of the University of Washington, Seattle. But many scholars have challenged the "sage on a stage" approach to teaching science, technology, engineering, and math (STEM) courses, arguing that engaging students with questions or group activities is more effective.

To weigh the evidence, Freeman and a group of colleagues analyzed 225 studies of undergraduate STEM teaching methods. The meta-analysis, published online today in the *Proceedings of the National Academy of Sciences*, concluded that teaching approaches that turned students into active participants rather than passive listeners **reduced failure rates and boosted scores on exams by almost one-half a standard deviation.** "The change in the failure rates is whopping," Freeman says. And the exam improvement—about 6%—could, for example, "bump [a student's] grades from a B– to a B."

"This is a really important article—the impression I get is that it's almost unethical to be lecturing if you have this data," says Eric Mazur, a physicist at Harvard University who has campaigned against stale lecturing techniques for 27 years and was not involved in the work. "It's good to see such a cohesive picture emerge from their meta-analysis—an abundance of proof that lecturing is outmoded, outdated, and inefficient."

Although there is no single definition of active learning approaches, they include asking students to answer questions by using handheld clickers, calling on individuals or groups randomly, or having students clarify concepts to each other and reach a consensus on an issue.

Freeman says he's started using such techniques even in large classes. "My introductory biology course has gotten up to 700 students," he says. "For the ultimate class session—I don't say lecture—I'm showing PowerPoint slides, but everything is a question and I use clickers and random calling. Somebody droning on for 15 minutes at a time and then doing cookbook labs isn't interesting." Freeman estimates that scaling up such active learning approaches could enable success for tens of thousands of students who might otherwise drop or fail STEM courses.

Despite its advantages, active learning isn't likely to completely kill the lecture, says Noah Finkelstein, a physics professor who directs the Center for STEM Learning at the University of Colorado, Boulder, and was not involved in the study. The new study "is consistent with what the benefits of active learning are showing us," he says. "But I don't think there should be a monolithic stance about lecture or no lecture. There are still times when lectures will be needed, but the traditional mode of stand-and-deliver is being demonstrated as less effective at promoting student learning and preparing future teachers."

The current study didn't directly address the effectiveness of one new twist in the traditional lecturing format: massive open online courses that can beam talks to thousands or even millions of students. But Freeman says the U.S. Department of Education has conducted its own meta-analysis of distance learning, and it found there was no difference in being lectured at in a classroom versus through a computer screen at home. So, Freeman says: "If you're going to get lectured at, you might as well be at home in bunny slippers."

Posted in: **Education**

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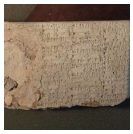

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