

February 26, 2005

Teaching Tip

Peer Instruction & Concept Tests for Large Classes

Most academics would agree that teaching large classes in a lecture hall is not the same as teaching smaller classes in the more intimate setting of a twenty-thirty-seat classroom. However, teaching large classes does not necessarily mean that lecturing is the only method an instructor can use effectively for student learning. Across the country and internationally, science faculty have been quietly improving the way undergraduate education in higher ed is being taught in lower-level science courses. We all can learn from these science faculty on how to improve undergraduate education at our universities.

This teaching tip reminds us that large lectures (whether in the sciences, humanities, arts, etc.) can indeed be more interactive and focused more on learning concepts rather than, for example, just learning nomenclature. Specifically, this teaching tip briefly introduces us to the concept of *Peer Instruction* and the *Concept Test*. These methods are detailed at **Project Galileo**—a National Science Foundation-funded web server, the mission of which is to provide materials and strategies for improving undergraduate education.

Don't forget to visit Project Galileo's website and directories that are highlighted at the end of this tip.

*The following is taken from the **Project Galileo** website:*

“One problem with conventional teaching lies in the presentation of the material. Frequently, it comes straight out of textbooks and/or lecture notes, giving students little incentive to attend class. That the traditional presentation is nearly always delivered as a monologue in front of a passive audience compounds the problem. Only exceptional lecturers are capable of holding students' attention for an entire lecture period. It is even more difficult to provide adequate opportunity for students to critically think through the arguments being developed. Consequently, lectures simply reinforce students' feelings that the most important step in mastering the material is memorizing a zoo of apparently unrelated examples.

In order to address these misconceptions about learning, we developed a method, Peer Instruction, which involves students in their own learning during lecture and focuses their attention on underlying concepts. Lectures are interspersed with conceptual questions, called ConcepTests, designed to expose common difficulties in understanding the material. The students are given one to two minutes to think about the question and formulate their own answers; they then spend two to three minutes discussing their answers in groups of three to four, attempting to reach consensus on the correct answer. This process forces the students to think through the arguments being developed, and enables them (as well as the instructor) to assess their understanding of the concepts even before they leave the classroom.

We have taught two different levels of introductory physics at Harvard using this strategy and have found that students make significant gains in conceptual understanding (as measured by standardized tests) as well as gaining problem solving skills comparable to those acquired in traditionally taught classes. Dozens of instructors at other institutions have implemented Peer Instruction with their own students and found similar results.

Peer Instruction is easy to implement in almost any subject and class. It doesn't require retooling of entire courses or curricula, or significant expenditures of time or money. All that is required is a collection of ConceptTests (available on **Project Galileo**) and a willingness to spend some of class time on student discussion.”

See the following websites for more information on **Project Galileo** and particularly information about the teaching of Concept Tests in large classes.

Project Galileo <http://galileo.harvard.edu/>

Sample course: <http://galileo.harvard.edu/galileo/course/>

Choose Concept Test topics <http://galileo.harvard.edu/galileo/lgm/pi/topics.taf>