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Teaching Tip
Peer Instruction

I often encounter faculty who are seriously involved in a debate with one another about the merits of the lecture and the role of the students in any given lecture. For me, the most interesting part of this debate is not who is right or wrong, but who can give clear examples of how their position is aligned with sound pedagogical ideas and practical ways to implement such ideas into any given classroom. For this teaching tip, I have included a listserve response to this debate by Professor Eric Mazur (Physics). In the following description, Professor Mazur sheds some light on this debate by articulating what he refers to as "peer instruction" in large lecture classes.

PEER INSTRUCTION

Introduction to Physics at Harvard University
Professor: Eric Mazur
Enrollment: Approximately 250 students

In 1989, I read an article in the *American Journal of Physics* that contained a test to assess understanding of Newtonian mechanics. I gave the test to my students at Harvard and was shocked by the results - the students had merely memorized equations and problem-solving procedures and
were unable to answer the basic questions, indicating a substantial lack of understanding of the material. I began to rethink how I was teaching and realized that students were deriving little benefit from my lectures even though they generally gave me high marks as a lecturer. So I decided to stop preaching and instead of teaching by telling, I switched to teaching by questioning using a teaching technique I have named "peer instruction."

My students now read the material before class. To get them to do the reading, I begin each class with a short reading quiz. The lecture periods are then broken down into a series of digestible snippets of 10 to 15 minutes. Rather than regurgitating the text, I concentrate on the basic concepts and every 10 or 15 minutes I project a "Concept Test" on the screen. These short conceptual questions generally require qualitative

rather than quantitative answers. The students get one minute to think and choose an answer. They are also expected to record their confidence in their answer. After they record their answers, I ask their students to turn to their neighbors and to convince them of their logic. Chaos erupts as students engage in lively and usually uninhibited discussion of the question. I run up and down the aisles to participate in some of the discussions - to find out how students explain the correct answer in their own words and to find out what mistakes they make.

After one or two minutes, I call time and ask students to record a revised answer and a revised confidence level. A show of hands then quickly reveals the percentage of correct answers. After the discussion, the number of correct answers and the confidence level typically rise dramatically. If I am not satisfied, I repeat the cycle with another question on the same subject. When the results indicate a mastery of the concept, I move on to the next subject.

I have been lecturing like this now for more than four years. During this time the students have taught me how best to teach them. As for the students, nothing clarifies their ideas as much as explaining them to others. As one student said in a recent interview,: "There is this ah-hah! Kind of feeling. It's not that someone just told me; I actually figured it out. And because I can figure it out now, that means I can figure it out on the exam. And I can figure it out for the rest of my life."

Teaching Tips is written by Dan Madigan (The Center for Teaching, Learning and Technology). If you have a teaching tip to share or if you would like to comment on any of the teaching tips, please write to Dan Madigan at dmadiga@bgsu.edu

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