Florida Board of Governors

News Clips 01/05/2009

Proving the Benefits of Peer Instruction

Source: *01/05/2009 © InsideHigherEd.com*
View Original Article

The University of Colorado at Boulder has gone clicker crazy. Thousands of its undergraduate students own the electronic devices, which instructors across the campus use to gauge how well students are grasping the material in their courses. The university has also been a leader in experimenting with emerging methods of teaching, as many professors incorporate "peer instruction" designed to encourage students to discuss concepts with, and learn from, each other. There, as elsewhere, though, many other professors remain skeptical about new technologies and new teaching methods.

Tin Tin Su, an associate professor in the university's molecular, cellular and developmental biology department and a participant in Boulder's Science Education Initiative, has been among the professors who use the clickers in their courses, surveying students throughout a lecture to ensure that they were understanding the concepts.

Her own use of the devices confirmed the conclusions of studies she'd read showing that students who answered in-class questions using clickers were more likely to answer a question correctly after they'd had a chance to discuss it among themselves and then revote. But those studies left her with a nagging doubt: "Is the percentage of correct answers going up because they're really learning from each other, or because a neighbor says, 'Oh, B's the right answer,' and they're adopting that student's answer?"

Without knowing that, Su says, "the study's only half done."

So she and several colleagues decided to do the rest of the job, the results of which appear in the January 2 issue of Science magazine, a special issue on education and technology (subscription required). In an undergraduate genetics course, students were, on 16 occasions during the course of a semester, asked a pair of "isomorphic" questions, which have different facts but require students to apply the same principles or concepts. Instructors asked students one of the questions, had them "click" their answers, discuss the question with their neighbors, and then revote. Then, they were asked to answer the second question individually, via the clickers.

A significantly higher percentage of students answered the second question correctly than did so on either the original question or the first question when it was asked a second time (without revealing the results from the first query). And of the students who answered the first question wrong, but got it right when it was re-asked, 77 percent answered Question 2 correctly.

"This result suggests that most students who initially did not understand a concept were able to apply information they learned during the group discussion and correctly answer an isomorphic question," the researchers write in their study. In addition, they note, 44 percent of students who answered the first question wrong both times it was asked still answered the second one correctly. "We speculate that when this group of students discussed [question 1], they were making sense of the information, but were unable to apply their new knowledge until presented with a fresh question on the same concept."

The study is noteworthy, the researchers suggest, because by seeking students' responses to a question that they have not answered before, and that they answer without directly discussing with their peers, the researchers show that students appear to improve their performance "primarily from student gains in conceptual understanding rather than simply from peer influence."

That is especially true, they note, because the study also shows that a majority of the discussion groups would have included no students who answered the first question correctly on the first try. So some of the students who answered that question right on the second try appear to have done so having gleaned important conceptual knowledge from the discussions with their peers.

Su, the Colorado professor, said she hoped that the study, by showing that peer instruction helps students learn, would encourage professors who are wedded to a lecture-only format to consider incorporating peer discussion and other more collaborative methods into their curriculums.

But the researchers said they recognized that yet another step would be necessary to show how peer instruction stacks up against instructor-only teaching. So as a followup study this last semester, says Michelle Smith, a science teaching fellow with the Science Education Initiative and a research associate in molecular and cell biology, the researchers repeated the experiment, substituting explanation by the instructor for peer discussion, and then adding a third test in which the students talk to each other, and then have the instructor add his or her own explanation of the concept.

The results are not yet in, Smith says, but early data suggest that a combination of peer instruction and professor-led discussion produces the best performance.