

Interaction key to learning, Nobel laureate says

By Seth Borenstein
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WASHINGTON — Who's better at teaching difficult physics to a class of more than 250 college students: the highly rated veteran professor using time-tested lecturing, or the inexperienced graduate students interacting with kids via devices that look like TV remotes? The answer could rattle ivy on college walls.

A study by Nobel Prize-winning physicist Carl Wieman, now a science adviser to President Barack Obama, suggests that how you teach is more important than who does the teaching.

He found that in nearly identical classes, Canadian college students learned a lot more from teaching assistants using interactive tools than they did from a veteran professor giving a traditional lecture.

The students who had to engage interactively using the TV remotelike devices scored about twice as high on a test compared with those who heard the normal lecture, said a study published yesterday in the journal *Science*.

The interactive method had almost no lecturing. It involved short, small-group discussions, in-class "clicker" quizzes, demonstrations and question-answer sessions.

The teachers got real-time graphic feedback on what the students were learning and what they weren't getting.

"It's really what's going on in the students' minds rather than who is instructing them," said Wieman of the University of British Columbia, who shared a Nobel physics prize in 2001. "This is clearly more effective learning. Everybody should be doing this. ... You're practicing bad teaching if you are not doing this."

The study compared just two sections of physics classes for just one week, but Wieman said the technique would work for other sciences as well, and even for

history.

Previous research has produced similar results. But this study, appearing in a major scientific journal and written by a Nobel laureate, can make a big difference in the field of teaching science, said Robert Beichner, a physicist and professor of science education at North Carolina State University.

Beichner, who was named the 2010 U.S. undergraduate science professor of the year by the Society for College Science Teachers, wasn't part of the study but praised Wieman's work.

"He's got the scientific chops" to make other professors consider retooling their

approaches, Beichner said.

Wieman heads the science education programs at both the University of British Columbia and the University of Colorado. He's also associate director in the White House Office of Science and Technology Policy.

Beichner, who uses the more hands-on method, likened it to the difference between being told how to ride a bike versus getting on and riding it.

A prominent proponent of the traditional physics teaching method declined to talk about the study. Walter Lewin of MIT wrote in an email, "I have a rather unique lecture style which they could not

cover in their tests."

In the spring 2010 experiment, Wieman and his colleagues followed two nearly identical classes that were taught the usual way three hours a week for 11 weeks. In the 12th week, one class stuck with the long-tenured professor in lecture mode. The second class was taught by two of Wieman's grad students using the interactive method.

The classes' test scores were nearly identical before the interactive sessions, but there was an obvious difference after the students took a quiz on what they were taught during the experimental week of instruction.