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In Class, the Audience Weighs In



Photographs by Tom Stratman for The New York Times, left and center; Mike Simons for The New York Times, right
ZAP Melissa Wilde, center, a sociology professor at Indiana University, allows students to answer multiple-choice questions with wireless keypads.

By **KATIE HAFNER**

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PAUL CARON, a law professor at the University of Cincinnati, uses them to break through what he calls the "cone of silence" in his classroom. For Wendy Tietz, who teaches accounting at Kent State, they are a way to encourage teamwork and give credit for class participation. Melissa Wilde, a sociology professor at Indiana University, says they help her students feel a connection to the subject.

For these and other professors across the nation, the newest aid in the classroom is a small wireless keypad, linked to a computer. Students answer questions not by raising their hands but by punching buttons, with the results appearing on a screen in the front of the room.

Although some skeptics dismiss the devices as novelties more suited to a TV game show than a lecture hall, educators who use them say their classrooms come alive as never before. Shy students have no choice but to participate, the instructors say, and the know-it-alls lose their monopoly on the classroom dialogue.

Professor Wilde has her students answer multiple-choice questions to gauge whether she is getting her point across and adjusts her lectures accordingly. "I can instantly see

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that three-quarters of the class doesn't get it," she said.

Perhaps more profoundly, however, she uses the devices to turn the 400-student class into a sociological laboratory.

At the beginning of this semester, she had the class use the clickers to answer several basic questions about themselves, including their race, household income and political affiliation. Thanks to the clicker technology, she could collate the data immediately. At the next class, she posted the results, which showed that, compared with the average for the nation, the class had three times as many wealthy students and one-fifth as many poor students.

"They were really surprised and tried to figure out why," Professor Wilde said. "For 20 or 30 minutes, they got really fired up."

"Basically I get them doing sociology of themselves," she added.

The devices look and work much as a television remote does, sending infrared signals to a receiver at the front of the classroom. The receiver is connected to a computer, which tabulates and analyzes the responses. The data can be displayed by an overhead projector, incorporated into a spreadsheet or posted on a class Web site. Responses are anonymous among the students, but not to the teachers, who can identify students by the serial numbers of their clickers.

Professor Wilde acknowledged that because she can attach names to each answer, "there's a real potential for abuse." She says she promises the students that for the sensitive survey questions she asks, "I will not connect that serial number to their name." So far, she said, there have been no complaints.

To the contrary, students appear to love the clickers. Since January, Professor Tietz has been using instant polling in her three managerial accounting classes at Kent State in Ohio. In a quick survey (conducted by clicker, of course), she found that 71 percent of her students said they liked using the clickers.

Professor Tietz originally used the clickers to keep her students alert. But she has found other benefits as well. By introducing a heavy dose of audience participation, she said, students are more motivated to seek the correct answer. She will post a question, then tell students to consult with one another before answering.

"I believe these devices have absolutely revolutionized my class," she said.

Trina Floyd, a junior who took Professor Tietz's course, said she was grasping concepts more easily "because we keep reiterating the information by using the clicker."

Dan Billick, a freshman at Indiana who takes Professor Wilde's sociology course, said he was wary of the devices at first, out of worry that they might make the class too


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Photographs by Mike Simons for The New York Times

Paul Caron, top, a professor at the University of Cincinnati, attributes a teacher-of-the-year award he won to the effective use of wireless keypads in his law class, above.

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impersonal. But he has found the opposite to be true.

"It's not just some statistical information we're reading in a book that some other people did five or 10 years ago," Mr. Billick said. "It's statistical information gathered 10 minutes ago, and the people providing the information are people you're sitting next to, and that makes it that much more interesting."

The similarity to game shows is not lost on some students. "It's really amusing to click and then see the answer right away," Ms. Floyd said. "And you're on pins and needles to see if the score comes back right."

Ms. Floyd's biggest gripe with the device is that she can easily forget to bring it with her. If she forgets to do so on the day of a quiz, she has to fill in an answer sheet with a No. 2 pencil, a method she has come to dislike now that she has used the clicker.

She said it was also easy to confuse it with other gadgets. She recounted a day not long ago when she arrived home exhausted after hours and hours of classes. "I was so tired, I had the clicker in my hand and started trying to change the TV with it," she said.

Darren Ward, vice president of business development at eInstruction, based in Denton, Tex., said his company had sold some 125,000 clickers to more than 450 universities (the company also sells them to elementary and secondary schools, where they are used primarily for test-taking). EduCue, eInstruction's main competitor, has sold around 200,000 clickers, half of which were delivered in the past year. The devices generally sell for about \$5 and are in most cases purchased by the students along with their books. In fact, [McGraw-Hill Education](#), a division of the [McGraw-Hill Companies](#), sells eInstruction's devices to colleges and universities, packaging them with textbooks.

Mr. Ward of eInstruction played down the game-show parallel and pointed to class attendance, which he said rose sharply when instructors started using the clickers.

Professor Caron of the University of Cincinnati, who uses the clickers in his tax and estate law courses, agreed that the devices could boost attendance. "The reason attendance hovers near 100 percent in my classes is because students know if they miss class they do not get credit for answering the questions correctly that day," he said.

In the pre-clicker past, he said, many students were embarrassed to speak out in class, especially if it meant admitting they did not understand something.

"They were petrified of looking dumb in the eyes of their classmates," he said. Using the clickers, Professor Caron can keep better track of a student's performance and embrace the Socratic method by engaging all the students in his law class at once, not one at a time.

Professor Caron has become something of a hero among his students. "I won the teacher-of-the-year award," he said, "and it had to be the technology, because I'm not that good. I've been teaching 13 years and never won it, then I'm using this thing and I'm Mister Popularity."

Another benefit, Professor Caron and others who use the clickers say, is that it cuts down on the amount of in-class instant messaging and Web browsing by students with laptops.

"Believe me, no one is going to shop on L. L. Bean while I'm talking because they know they'll have to answer a question," Professor Caron said.

Chris Jernstedt, a professor of psychological and brain sciences at Dartmouth College, has

used hand-held organizers as a similar kind of teaching aid in his intermediate psychology course since 2001.

The intense interactivity fostered by the organizers has led him to rethink fundamental notions on how learning takes place.

"We know that physical changes occur in the brain when you learn, and that most of the brain's activity occurs outside our conscious awareness," Professor Jernstedt said. "If you put all that together, you say, 'We really have to redesign how we do learning,' and the key issue from all that work says learners have to be engaged."

Professor Jernstedt said that when he prepares for class now, he thinks not so much about what he is going to tell the students as what he is going to ask them to do. "What am I going to encourage to have happen in their head - that's what matters," he said. "And I've found that it fundamentally changes how I teach."

He said that when he posts the collective answers to a question, students with less self confidence feel more encouraged. "I'll hear students say, 'I got that wrong and I see I'm not the only one, and that's reassuring,'" he said.

One of the open questions, Professor Jernstedt said, is whether, once they have used the technology to participate, shy students will be emboldened to raise their hands more. He suspects they will be. "What I hear from students is more empowerment," he said.

Of course, there are skeptics.

"The innovative professors will desperately scramble for things that keep students involved and avoid the e-mail and instant messaging," said Larry Cuban, professor emeritus of education at Stanford University and the author of "Oversold and Underused: Computers in Classrooms" (Harvard 2001).

Dr. Cuban said the devices were unlikely to become a permanent classroom fixture. "A lot of this is what I would call the novelty effect," he said. "It enhances instruction, but it really comes down to the teacher who has organized the material and made it interesting."

Dr. Cuban recalled an experiment at Stanford 30 years ago, when similar remote control devices were installed at desks in an engineering building. Professors teaching in that building used the devices a few times, then abandoned them. Eventually the devices were removed.

Then again, a lot can change in three decades.

Tim Gnatek contributed reporting for this article.

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