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Released: Tue 01-Mar-2005, 05:00 ET

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Professor Examines Practical Ways to Use PDAs in Classroom

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Description

K-State physics professors are developing ways to deliver to their students "nearly individualized information" that allow them to communicate with their students and the students with each other digitally.

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Newswise — Dean Zollman and Sanjay Rebello have done it again.

Zollman, University Distinguished Professor of physics at Kansas State University, has spent his career searching for new and exciting ways to teach physics in the classroom. He has used a variety of methods and practical applications to interest students including using videos and CD-ROMs, as well as applying physics to situations they understand. He also has concentrated on providing materials to physics teachers, particularly those teachers whose background does not include a significant amount of physics. Because of his work, he has been recognized with many awards.

Rebello, a K-State assistant professor of physics, has conducted research that focuses on learning by college students and involves developing physics curricula for future elementary teachers.

The pair's latest "find" provides them ways to deliver to their students "nearly individualized information" that allows Zollman and Rebello to communicate with their students and the students in turn with each other digitally, giving the instructors a better understanding of if the students are comprehending a lecture.

A grant from the Hewlett-Packard Company provides Zollman and Rebello 40 hand-held, high-end, personal digital assistants. "The only thing they don't have is a global positioning systems built in," Zollman said. The company also provided a small tablet PC, a computer projector, a printer and a cart to store and recharge the hand-held units. The grant is estimated to be worth \$60,000.

Using software developed for K-State Online the personal digital assistants, with just a Web server, asks students either a straight forward, multiple choice question, an actual calculation problem or an open-ended question to answer. Rebello or Zollman can then see what kind of responses students are giving.

If the students are comprehending the material, the instructors can proceed; if not the instructors will stop and go over the material again in a slightly different way. The technology also allows the pair to have students talk to fellow classmates about their answers or to have the next question be different for various students, depending on the previous answers.

"The idea there is that you're trying to get things that are very similar to each other, put them together and have them compare and see where things really are similar and different," Zollman said. "The students get a social interaction in the classroom about the topic rather than just having me sit there and talk about it and then the next day they can't remember anything that I've said. We know that from research and how students learn this kind of thing."

According to Zollman, in some ways the technology can make teaching a bigger challenge. When the instructor gets back a response that indicates there is a comprehension problem, they must figure out

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"on the fly," how to react to the students' responses.

"If a student has a problem and isn't quite comprehending the material, sometimes it's something I've seen before and so I know how to respond to it," Zollman said. "Other times I have to say I've got to throw it out. In a recent class session I got going, asked a couple of questions and suddenly I'm headed in a different direction than my game plan for the day was. But that's what I've got to do, I've got to respond to them."

"If we say 'oh, you guys didn't do well on this question; you better study,' that's pretty useless for them and they're not going to take the system very seriously," Rebello said. "They take it seriously when I look at them and say 'oh, I see. This didn't quite sit well. Now let's think about what we can do next.'"

Zollman said at times students will have questions about the material, but do not feel comfortable holding up their hands in front of the class to ask him to explain it further. The technology allows him to go back to the front of the room and look at what the response is and also say, by the way, a couple of people asked me this question.

"So I really get a feeling for how they're doing," he said.

The Web-based technology, is not limited to the personal digital assistants. Students can also use their own laptop computer or a cell phone that has Internet capability. While Zollman is currently the only instructor using the technology, it has possible application for students outside of Zollman's and Rebello's classes.

"We are somewhat obligated under the grant to try to get other people outside of physics involved," Rebello said. "It can be valuable in any class. In a class as small as 12 students you can get a lot of interaction going but you can still have two or three students that are sitting back and letting the other people do the interacting. I find that even in a small class it can give me a feeling for how this silent majority or silent minority of students is thinking about things that I wouldn't get even if I was just interacting with the class unless I'm picking people and asking questions; asking them to respond and figure out what's going on."

In 1995, Zollman received the Robert A. Millikan medal from the American Association of Physics Teachers for his notable and creative contributions to teaching physics. In 1996, he was recognized by the Carnegie Foundation for the Advancement of Teaching, as the Professor of the Year - Research and Doctoral Universities from the Council for Advancement and Support of Education. He was named K-State's 1996 University Teaching Scholar Chair for his innovation and excellence in undergraduate teaching.

Rebello was presented with the Presidential Early Career Award for Scientists and Engineers at a White House ceremony in 2004. The award honors and supports the extraordinary achievements of young professionals at the outset of their independent research careers in the fields of science and technology.

Rebello was previously awarded a \$436,000 CAREER award in 2002 from the National Science Foundation for research that focuses on learning by college students and involves developing physics curricula for future elementary teachers. CAREER awards were presented to about 300 researchers. Of the 2,900 CAREER awards made since the program began in 1996, only 140 have received presidential recognition.