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### EVENTS CALENDAR

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### Cartoons touted to learn science

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Citizen Staff Writer

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**Cartoons** may be a key to better science education, a Nobel laureate told a Tucson audience yesterday.

Giving students images that can quickly transmit information on how electricity flows or how radio waves work can give novice learners an immediate grasp of realities that dry formulas might obscure, Carl E. Wieman said. He spoke at Breault Research Organization, an optics business at 6400 E. Grant Road.

Instead of turning students from novice learners into experts, traditional science education seems "to move students to be more novice than when they came in," he said.

Science education must improve, said Wieman, a professor of physics at the University of Colorado.

He won the Nobel Prize in physics in 2001 and the National Science Foundation's Director's Award for Distinguished Teaching Scholars in 2001.

"I'm on a crusade," he said.

In his talk, "Using the Tools of Science to Teach Science," he said teachers too often fail to recognize what students are thinking as they try to learn in traditional science classes.

That's why he has immersed himself in education research to find out how to replace traditional teaching with practices and principles based on rigorous measurement and new technology.

"It's not useful to pour facts into a passive student," he said. "Students must actively construct new ways of thinking, that is, learn how to organize and use facts.

"Find out where they are at and build on that."

Also, help students develop a stake in the answer and provide meaningful feedback.

"If they don't see why it might be wrong, they will be confused," he said.

Colleges and universities must lead the way, both in research and putting better teaching methods into practice, he said.

Public schools cannot afford to retrain teachers in elementary schools and high schools.

"Really, to bring those teachers up ... it takes an enormous investment of time and support," he said. "In the programs where it's been done, you do a little arithmetic. It's utterly out of the question.

"From what I've seen, there is no economically practical way to take the science teachers we have in our system and bring them up to the levels of expertise we need for effective science teaching." That's not to say they are poor teachers, he said.

"A big part of it is the organizational structure of schools. ... There are a whole bunch of obstacles in the way," he said.

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For more about improving science education, go online to [phet.colorado.edu](http://phet.colorado.edu).

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