

UA at 'Forefront' of Innovation in Teaching and Learning, Expert Says

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The UA's collaborative learning spaces, like the one above, put the UA ahead of peers in improving teaching and student learning.

Improving student learning doesn't require a dramatic overhaul, and some tactics can be immediately applied in any undergraduate course, an expert on memory and learning said during a symposium held by the University of Arizona on Friday.

Mark McDaniel, professor of psychology and director of the **Center for Integrative Research on Cognition, Learning and Education** at Washington University in St. Louis, was the keynote speaker at "Learning Better," which was held by the newly created UA Center for University Education Scholarship.

Providing multiple examples across a wide spectrum of disciplines, McDaniel debunked common study tactics – such as cramming and rereading textbooks and class notes. As alternatives, he presented research-backed strategies that help students better understand, retain and apply concepts learned in class.

McDaniel also pointed to efforts already underway at the UA, such as **collaborative learning spaces, faculty learning communities** and courses designed to help students develop effective learning skills.

"You're at the forefront of teaching innovation and learning," said McDaniel, co-author of "Make It Stick: The Science of Successful Learning," which has been praised for its readability and practical approach to successful teaching and learning. "You have stars in terms of evidence-based instructors."



Mark McDaniel

The Center for University Education and Scholarship

More than 250 faculty, instructors, graduate students, staff and others attended the symposium, which was presented by CUES only two months after the establishment of the center.

The center was created with a gift of more than \$3 million from a donor who wanted to see real change in how teaching and learning "happens on the ground," said Provost **Andrew Comrie**.

"There is such a growing body of work that can inform improvement in teaching and learning," said **Debra Tomanek**, the center's director and a professor of molecular and cellular biology. But "there are so few opportunities for faculty to know about this stuff unless they already happen to be playing in the field."

CUES, she said, has three major goals: create cross-disciplinary synergies among faculty members who share interests in innovation and scholarship on teaching, learning and assessment; provide a central unit for intellectual leadership and operational support for the activities that embody those synergies; and support UA efforts in being recognized as a national leader in innovation and scholarship on teaching, learning and assessment.

The center's activities will include:

- An **annual symposium** that will be opened in the future to other institutions.
- A **seminar series** that highlights UA teaching and learning scholars, as well as scholars from other universities. Faculty, staff and graduate students who teach will be invited to attend.
- **Teaching scholar circles** in which faculty and others come together around a common interest, such as how to use virtual reality to teach their courses.
- **Assistance** in locating funding for scholarly activities related to teaching and learning as well as online resources for scholarly exchange of ideas.

In addition to the endowed director's position, the center will have several CUES distinguished professors, who will receive three years of funding and retain their CUES titles after the funding period ends. Together with the director, the CUES distinguished professors will form a think tank to grow and improve the center. They also will be active in the seminar series.

Exploring and applying best practices in teaching and learning "can lead to all kinds of innovations," Tomanek said. "It can lead to improved learning outcomes and greater levels of satisfaction with teaching and, of course, innovations that can lead to more interested students."

A lot already is known about good teaching, Comrie said. "We need to enumerate the scholarship and pass it along."

"This is a really big deal," he told the symposium's attendees. "You all are part of a revolution."

Teaching and Learning Better

The No. 1 study activity, as reported by students, is rereading textbooks and class notes. Unfortunately, it's not effective, McDaniel said.

He cited an experiment in which half of the students read a chapter once and half read it twice. Both groups were given short-answer and multiple-choice questions. Their scores were almost identical, even when the students were tested again a day later.

Research shows that reverse classrooms – where lectures are brief and the majority of class time is spent on discussion, exercises and projects – can be very effective in boosting student learning. But they can be daunting, he said, because instructors have to determine which topics are best addressed with an active-learning approach as opposed to lecture.

In an ideal setting, faculty would work with behavioral psychologists to set up classroom experiments, analyze the results and use that evidence to inform their teaching, McDaniel said. But even with no outside resources, faculty can make research-supported modifications to improve student learning. He outlined four tactics:

- **Help students build their understanding** – Ask why, how and what-if questions. Have students prepare to teach someone else. Give short in-class writing assignments.
- **Space study and instruction** – Instead of blocking (covering related material in one block and then moving on to new material), space it over time. Retention is better when students are taught, and when they study this way, he said. Example: Surgical residents who learned a technique over four sessions held once a week for four weeks performed better than those who were taught in four sessions given on a single day.
- **Mix related concepts/problems in homework** – Don't group related concepts/problems together. Using math homework as an example, McDaniel said students become more adept at learning which computations should be used with which problems when problem types are mixed.
- **Give quizzes, often** – Not only do quizzes help reduce test anxiety, but they also result in more frequent studying, which improves study effectiveness, McDaniel said. Quizzes also make memories more robust and increase students' awareness of what they don't know. He suggested using low-stakes quizzes as a learning activity.

For more information about CUES, contact cues@arizona.edu.