Evidence Suggests Improved Student Outcomes in Collaborative Learning Spaces

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Growing evidence suggests that collaborative learning spaces on the University of Arizona campus are having the desired effect: better student learning outcomes.

In 2013, with funding from the Leona M. and Harry B. Helmsley Charitable Trust, the Association of American Universities awarded the UA $500,000 over three years to support the University's efforts to improve undergraduate science, technology, engineering and mathematics education.

As part of the UA's AAU Undergraduate STEM Education Project, the UA began converting a number of traditional classrooms across campus into collaborative learning spaces that support a more active learning environment for students.

Data collected by the UA indicates improved student performance in several courses that were transformed from a traditional lecture format to a collaborative learning format. The courses examined in the AAU STEM project included five disciplines: physics, chemistry, molecular and cellular biology, electrical and computer engineering, and chemical and environmental engineering.

Since 2014, the University has successfully transformed 30 traditional classrooms on campus to collaborative learning spaces, which are designed to engage students in more active learning through features such as flexible seating arrangements and various classroom technologies. Another space, in the Ina E. Gittings Building, is slated to open in January.

So far, more than 400 individual faculty members have taught in these classrooms, and the demand is growing.

"The faculty are re-engaged, and it's not just the young professors; it's people who have been teaching in the same way for many, many years and want to try something different," said Gail Burd, senior vice provost for academic affairs and principal investigator on the UA's AAU Undergraduate STEM Education grant.

In addition to the collaborative learning spaces, the UA also has introduced five "flexible" classrooms on campus, designed for courses with fewer students, that have attached chairs and desks on wheels to allow students to easily move around and work together.

The idea of the collaborative and flexible spaces is to move away from traditional lectures and toward a format that engages students more actively in the learning process and, in turn, improve their learning outcomes, Burd said.
"Students do better when they're collaborating and the learning is deeper," she said.

The UA AAU Undergraduate STEM Education Project report, compiled by Burd, shows that students in the following active learning courses generally outperformed their peers in traditional lecture courses on exams: Physics 141, Molecular and Cellular Biology 181, and Electrical and Computer Engineering 175.

In addition, Chemistry 151 and 152 students who took the collaborative Chemical Thinking class performed better on a conceptual exam offered by the American Chemical Society, and in a follow-up organic chemistry class, than students in traditional classrooms.

Finally, students in collaborative versions of the courses Chemical and Environmental Engineering 201, 202 and 203 had significantly lower levels of D and E (failing) grades and withdrawals from class than those in traditional versions of the same courses.

While more research and analysis are needed to fully understand the impact of the collaborative learning approach on student success, early indicators are encouraging. And feedback from faculty who have made the move to collaborative classrooms has been overwhelmingly positive, Burd said.

In a survey of 700 faculty members, collaborative learning spaces were the No. 1 preferred style of classroom on campus. In survey comments, many faculty members said that the spaces improve not only student outcomes, but also their teaching quality and their relationships and interactions with students.

George Davis, who has been at the UA since 1970, taught for the first time in a collaborative learning space in 2016 and became an instant fan. He says the spaces have transformed how he thinks about his courses, and have allowed him to bring activities into the classroom that, in the past, he only could have done in a lab or in the field.

"The nature of the space is one that underscores engagement as the primary focus, as opposed to one PowerPoint after the other," said Davis, Regents' Professor and provost emeritus, who teaches in the Department of Geosciences. "For me, it's been a transition from a primarily lecture approach to one that has progressively more engagement activities."

He said collaborative classrooms make it easier to see evidence, in real time, of student understanding — something that faculty members crave.

"The collaborative setting creates the opportunity for more hands-on, practical activities, and I think most of us have had experiences in which we would say it's one thing to listen, but if you really want to learn you have to do some things, you have to try it out," he said. "There is the desire of faculty, including me, to somehow perceive that students are actually growing and understanding. If you can get a reaction from students based upon an engagement activity that shows they see what we're talking about, that's a reward for a teacher."

For those considering teaching in a collaborative learning space, the Office of Instruction and Assessment offers workshops and other resources to help make the transition.

The UA also has launched the ISLE program, which stands for Innovative Spaces for Learning and Engagement, to provide funding support to departments that wish to convert departmentally controlled classrooms into collaborative learning spaces. The first round of
funding was awarded this semester for spaces in the College of Education; the Department of Soil, Water and Environmental Sciences; the Department of Math; the Department of Speech, Language and Hearing Sciences; and the Department of Mining Engineering.

Applications for the next round of funding are due Dec. 3, and details can be found on the ISLE Program [5] website.

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