Increasing Student Success: Smaller Classes, Innovative Pedagogy at UCF

When administrators at the University of Central Florida conducted an internal research study in early 2009 to determine how class size could affect student success and retention rates in gateway courses, they found that smaller classes probably wouldn’t affect student success—with two important exceptions. In introductory college algebra and English composition courses, their research suggested that smaller class sizes might make a significant difference. So starting in summer 2009, the university launched a pilot project in which some sections of first-year English composition and introductory algebra were revamped to reduce class size, but also to increase student support and introduce innovative pedagogical methods. So far, those changes have paid off—assessments indicate that students in the smaller sections using the new pedagogies and extra support earned higher grades and demonstrated increased achievement of learning outcomes than their peers in traditional sections of the same courses.

A Focus on Undergraduate Education

UCF President John Hitt wants the university—a public institution with more than 45,000 undergraduates—to be the premier institution for undergraduate teaching in the state of Florida, explains Alison Morrison-Shetlar, UCF’s former vice provost and dean of undergraduate studies, who recently began a new position as dean of Elon College, the College of Arts and Sciences at Elon University. It was this goal that prompted the university to look into factors influencing student success, and the subsequent pilot projects in algebra and English composition. Called the President’s Class Size Initiative, the plan’s goal is not simply to reduce class sizes, but to find new ways to teach high-demand courses in smaller settings. The pilot projects are supported by UCF’s differential tuition, which all undergraduate students now pay on top of their regular tuition at a rate of about $8 per credit hour. Seventy percent of the differential tuition payment goes to undergraduate teaching and learning initiatives, and 30 percent goes to need-based aid awards. “A lot of universities are forced to do nothing new, or even make reductions, during these tough economic times,” Morrison-Shetlar says. “I think it’s visionary of our president to see that even when times are difficult, it’s important to improve learning and fund things that will make our future citizens and graduate and professional students more capable and more confident.”

Building Better Introductory Courses

UCF’s work on college algebra pedagogy actually began in 2008, when a grant from the National Center for Academic Transformation allowed Tammy Muhs, UCF’s general education program mathematics coordinator, and some of her colleagues to attend a conference on improving outcomes in entry-level math courses. Their goals were to increase student success as measured by course grades, to decrease dropouts, and to reduce costs. When the original grant ran out, the President’s Class Size Initiative provided funding for additional research and innovation. The mathematics department hired four additional full-time instructors in 2009, selecting people with extensive undergraduate teaching experience and a desire to work within a professional cohort to improve undergraduate education. This cohort set about to develop an introductory college algebra course that worked in a fundamentally different way than traditional first-year math courses.

Historically, UCF algebra classes featured a large lecture of 380 to 400 students meeting three times a week, plus smaller groups of thirty-five students meeting one hour a week with a graduate assistant, Muhs explains. In the modified course, instructors
introduced a new pedagogical method: students meet for only one hour a week in the lecture hall with the instructor, and they sit in cohort groups of eighteen that allow more interaction and in-class collaborative problem solving. Then they spend three additional hours a week working in the Mathematical Assistance and Learning Lab—the MALL—at their own pace, with assistance available at all times. Morrison-Shetlar explains that entry-level math is many students’ stumbling block, and if they can’t get to calculus, they won’t be able to graduate in a STEM discipline. “We changed the traditional model of ‘watching math being done’ to focus on mandatory lab time with faculty and graduate mentors,” she says. Muhs had noticed that students studying on their own would often get stuck on a problem and not be able to move on, and she designed the MALL to provide immediate assistance in those situations. “Students learn by doing,” she says. “It’s not just geared toward ‘I can’t figure out problem seventeen,’ it’s geared toward, ‘I don’t understand the concept.’”

Similar thought went into the redesign of first-year English composition classes. Using funding from the Presidents’ Class Size Initiative, the English department hired six new full-time instructors, all with extensive teaching experience and a willingness to do ongoing professional development. Courses were capped at twenty-five students, and some sections were even smaller, capped at nineteen, to allow instructors to spend more time providing detailed feedback on student papers. “Classes used to be capped at twenty-seven students, and just taking it down eight students per teacher makes a huge difference—at a four-four course load, the difference is at least thirty-two fewer papers per teacher,” explains Elizabeth Wardle, an associate professor of English and director of writing programs at UCF. The nineteen-student classes were taught using a new curriculum that focused on writing concepts and practices that were transferable across the curriculum. “We call it writing about writing,” Wardle says. “We try to give students a flexible understanding of how writing works and how different situations require different rhetorical approaches. The idea is that they’re reflecting on their writing, they have meta-awareness, and they can adapt.” In one assignment, students write an autoethnography; in another, they study scholarship about how writers and readers construct and approach texts. “We want them to own the writing process and be active agents, instead of floating along and asking the teacher, ‘What do you want me to do?’” Wardle says.

The university writing center also received a boost with funds from the class size initiative, hiring additional undergraduate and graduate tutors to provide more than seven hundred tutoring slots per week (up from about 450 in past years). “The idea behind this initiative is that students do better with more support,” Wardle says. “Students used to have to wait up to two hours for a writing tutor. More tutors mean students get the help they need.”

Assessing Pilot Project Classes

UCF conducted assessments of both pilot programs to determine whether the pedagogical innovations and reduced class sizes paid off. In a fall 2009 comparison of traditional versus new sections of introductory college algebra, students in the new sections demonstrated higher percentages of success, defined as achievement of a C or higher. Of students in traditional courses, 62 percent succeeded, while 75 percent of students in the new sections succeeded. And more students earned A’s or B’s in the new section, too—62 percent, versus 56 percent in the traditional class sections. Muhs notes that there are several intervening factors to consider, including the fact that students who are STEM majors tend to select the traditional classes, and also tend to demonstrate better preparation for the algebra course than their non-STEM-major peers. Even so, she says, the new course format shows that it’s possible to bring less-prepared students up to and beyond the success level of their better-prepared peers. Muhs also assessed whether students felt the new course design provided sufficient interaction with faculty members. A fall 2009 survey found that 91 percent of respondents in the new course said the format provided at least as much faculty interaction as their other, traditional classes, while 61 percent said the new format actually provided more interaction that their traditional courses. “That really answered some of the critics who might say, ‘You’re taking away the teacher and the computer is doing all the teaching,’” Muhs says. “A strong student will probably be successful in college algebra regardless of the format. But we’re providing the resources for a weak student to also be successful.”

In the English department, Wardle and her colleagues compared learning outcomes for students taking the redesigned English composition course and the traditional course. They also investigated differences in the three class sizes—twenty-seven students, twenty-five students, and nineteen students. Using student portfolios randomly sampled from all introductory composition classes, a panel of trained raters read each work sample and rated its demonstration of ten criteria, including college-level thinking, rhetorical analysis, and
correct use of citations. The assessment team found that the new curriculum consistently outperformed the old curriculum, and that the nineteen-student classes using the new curriculum performed best on measures of higher-order thinking. "The new curriculum is having the effect we wanted, and when you have fewer students, they do even better on the measures that matter," Wardle says.

Both Muhs and Wardle stress that dedicated, experienced instructors who are paid fairly are a requirement for success, and that without support from the university's highest levels, especially the president's office, the gains their pilot programs demonstrated would not be possible. The university is now working to develop a plan to expand the methods used in English and algebra to other high-demand courses primarily for first-year students. "The take-home point is that it's the combination of the new curriculum plus full-time, committed teachers and smaller class size that makes the difference," Wardle says. "Smaller class size isn't the Holy Grail on its own. You need committed teachers making living wages, too."

Visit the UCF Mathematics Lab Web page and the University Writing Center Web page for more information.