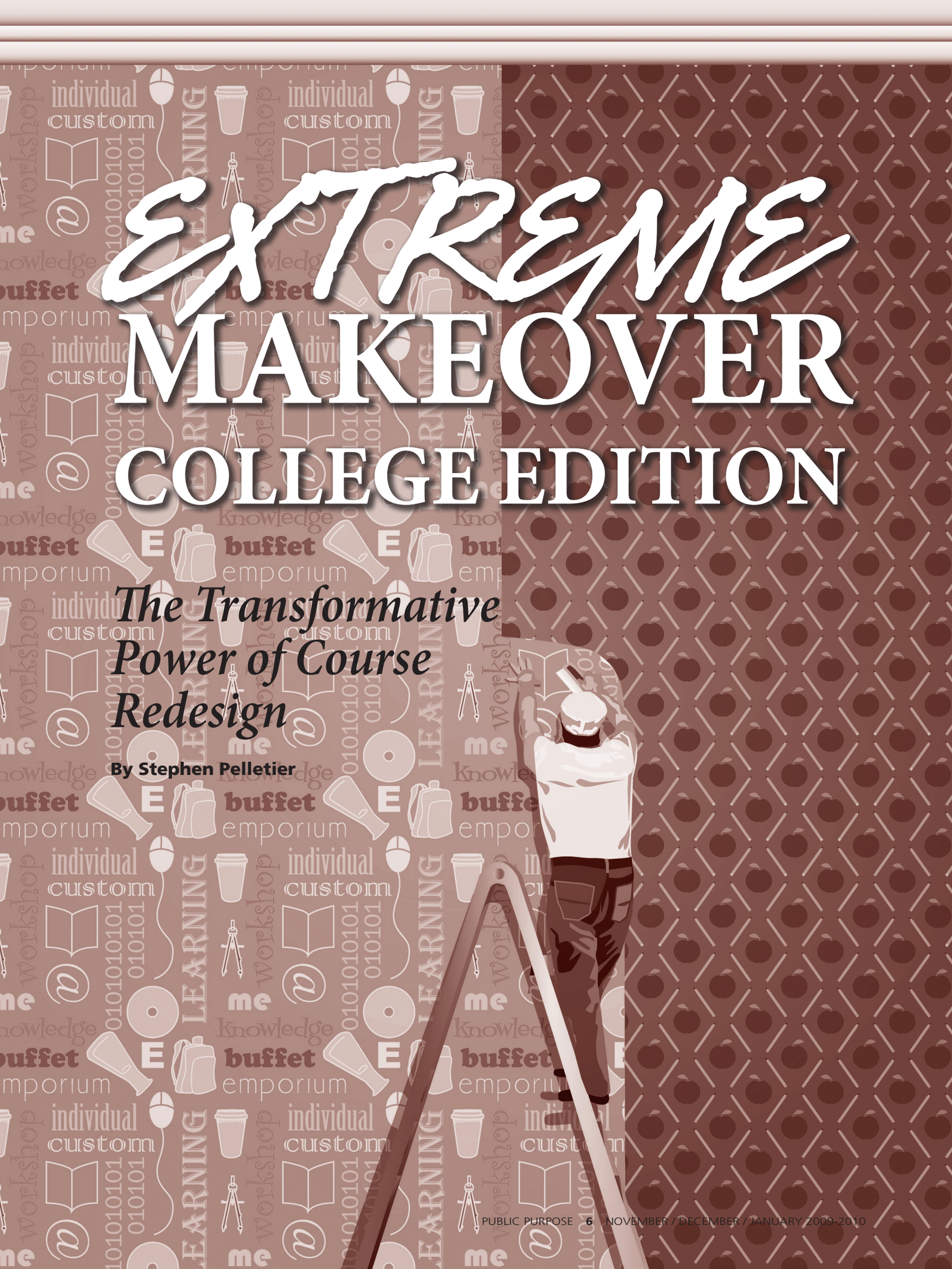
EXTREME MAKEOVER COLLEGE EDITION

The Transformative Power of Course Redesign

By Stephen Pelletier



In 2002, a whopping 45 percent of students taking introductory "College Algebra" at the University of Missouri-St. Louis (UMSL) failed the course. Of concern just on principle, that statistic was even more troubling given that the course was required for students majoring in business, nursing, education, engineering and many other disciplines.

Three years later, though, UMSL's pass rate for "College Algebra" had improved to 75 percent. What's more, better scores on comprehensive tests showed that student learning had improved. At the same time, university administrators were able to document a 30 percent reduction in the cost of instruction for the course.

What sparked that remarkable progress? UMSL essentially turned the way it delivered College Algebra inside out. The course was redesigned from three 50-minute lectures per week to one class meeting and two lab sessions. The labs take place in a new computerized math technology learning center, where students complete software-based online homework assignments and tests and can get one-on-one help from tutors and faculty. Class meetings now focus on the introduction of new material, assignment review and troubleshooting student problems.

UMSL and other AASCU schools have found that fundamentally redesigning certain courses creates a compelling path to better pedagogy, improved learning and—sometimes—lower costs for instruction. For institutions that want to improve quality and trim budgets, that's a powerful trifecta.

From instruction to learning

Fourteen years ago, Robert B. Barr and John Tagg argued in *Change* magazine[1] for turning higher education upside down. Their beef was with what they called the "Instruction Paradigm"—the familiar model in which professors dispense knowledge and students listen passively. Barr and Tagg argued instead for a "Learning Paradigm," a model that put students, not professors, at the center as "active discoverers and constructors of their own knowledge."

Barr and Tagg's bold suggestions struck a nerve. Often cited even today, their paper continues to inspire reform-minded administrators and faculty members. Perhaps serendipitously, the *Change* article landed on people's desks in an era when universities were beginning to see in earnest how educators could use a new tool—technology—to improve teaching and learning.

The University of Central Florida offers a good case in point. UCF started providing online courses in 1996. One main motivation was to provide better class access for students off campus. The university also needed to address a substantial shortage of classroom space, a byproduct of UCF's rapid growth.

Once it started, the integration of technology into courses at UCF became a force of its own, says Joel L. Hartman, vice provost for information technologies and resources. Before long, he says, UCF recognized that courses that blended class time and online work were "potentially a strategic tool of some power." Accordingly, he recalls, administrators started to work to "more deliberately connect this capability with institutional needs and goals in access, quality, cost and accountability."

Toward that end, for example, UCF started work in the late 1990s, through the National Center for Academic Transformation (NCAT), to redesign an introductory-level course, "American National Government." No less than 75 percent of UCF's students took the course to fulfill a general education requirement. Motivated in large part by a desire to save instructional space, UCF pilot tested a redesign of the course that reduced in-class time by 50 percent, complementing lectures with student learning via online modules.

The results were significant. While lecture-based sections had a 78 percent student pass rate, 85 percent of students passed sections with web-based modules. Comparative assessments showed that students in redesigned sections also tested better on content.

With the reduction in required class time, UCF was able to bundle students into fewer sections of the course, making more efficient use of large classrooms. In one early report, UCF calculated overall savings at $68,466.

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A key lesson in the evolution of course design is that technology is a powerful tool in improving student learning. Students can research and problem-solve online, while computer- and web-based resources enrich their learning experience.

Course Redesign the AASCU Way

A few examples of course redesign at AASCU institutions:

Frostburg State University

The introductory "General Psychology" course, a requirement for psychology and five other majors, was offered in 18 sections each year. That structure did not make the best use of either full-time or adjunct staff, and also led to a lack of coherence and standardization in syllabi, course objectives and course materials. There was also a sense that student learning could be improved. Associate Professor Megan Bradley and colleagues in the psychology department collapsed the course's 18 sections into six, reducing a student's in-class meetings by half but adding time in a computer lab where online assignments were designed to promote active learning and higher-level thinking. Trained undergraduate learning assistants provide peer tutoring and guide discussions. Technology gives students virtually instant assessments about their progress. Testing the redesign against the traditional course, FSU found that students performed significantly better in the new model. The redesigned course requires fewer faculty members, reducing the cost-per-student by 71 percent and freeing full-time faculty to teach higher level courses. Moreover, Bradley says, "Now we have one text book, one syllabus, and one class schedule, and everybody's on the same page."

Indiana University-Purdue University at Indianapolis

Starting nearly a decade ago, IUPUI redesigned "Introduction to Sociology," a requirement for students in nursing and social work and an elective for many other disciplines. One motivation was that too many students were getting D's or lower in the course. At the same time, with more than a dozen sections, the course suffered from too little coordination and standardization. IUPUI was also interested in developing faculty skills with technology. The redesigned course collapsed the number of sections. Using technology as a tool, IUPUI introduced a common, standard research module that focused on data collection and analysis. That approach created new opportunities for students to work both independently and collaboratively. A common software system and interactive testing helped faculty manage course material and monitor student performance. Another innovation was that some sections were linked to another required course, "Elementary English Composition," to strengthen student writing skills. Among the results, more students passed the course and both student learning and writing improved. The reduction in course sections offered, coupled with the fact the fewer students needed to repeat the course, resulted in initial savings in instructional costs of more than $53,000. In that it helped faculty get more engaged with technology, the project "put us ahead of a curve that everyone had to face," says IUPUI Professor Robert W. White. This pioneering effort became a model for course redesign across campus.

University of Southern Mississippi

In an NCAT project several years ago, USM redesigned "World Literature," a required general education course. The university replaced 16 minimally coordinated sections with a hybrid design that offers online access to all course content—including instructors' presentations, quizzes, writing assignments, web resources and audiovisual materials—blended with optional classroom discussions twice a week. The idea is to build on strengths of traditional classroom work while enriching student understanding of literature through web-based, media-enriched learning. When USM first tested the redesign, they found that class retention improved, the percentage of students failing the course dropped, and student assessments tracked gains in reading comprehension and writing skills. Today, USM offers students an option of the hybrid version of the course or a more traditional model.

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—Carol A. Twigg

technology proved to be a powerful tool in improving student learning. Innately comfortable with computers, students had little trouble using technology to research and problem-solve online—in effect taking a more active role in their own learning. Computer- and web-based resources enriched their learning experience. Technology made it possible for students to assess their own progress instantly. In this new model, faculty could spend more time helping students individually rather than just delivering content. In many respects, this was a manifestation of Barr and Tagg's "Learning Paradigm."

One principle that guides UCF's approach to course redesign is that "students need to be doing the work, not watching the work," says Alison Morrison-Shetlar, vice provost and dean of the office of undergraduate studies. UCF recently retooled a course in English composition, for example, to give students more opportunities to practice writing, including work in a writing center where they can consult with mentors. Morrison-Shetlar says that in addition to tracking improved student learning and retention, the university is starting to see evidence that the confidence students gain from their successful self-directed learning spills over to other courses.

Outcomes and Costs

As the leading national advocate for course redesign, NCAT has a straightforward mission: it promotes the use of information technology to improve student learning outcomes and reduce the cost of higher education.

"In essence what we do is take advantage of the capabilities that technology offers," says NCAT President and CEO Carol A. Twigg. One way that NCAT meets its goals is by substituting technology for tasks that need not necessarily be completed by a human being. For example, she says, computers can be far more effective than a lone faculty member in giving instant feedback across large groups of students. "You are making substitutions for things that prior to the development of instruction software and other capabilities people had to do all by hand," she says.

In projects funded by the Pew Charitable Trusts and the Fund for the Improvement of Postsecondary Education (FIPSE), NCAT has worked with scores of universities that have redesigned courses. Recently, the organization's work has engaged groups of universities working through state offices of higher education and similar agencies. For example, eight state universities are part of the SUNY Course Redesign Initiative and seven institutions are part of a similar project through the University System of Maryland.

NCAT's Web site documents case after case of institutions that have redesigned courses across a range of disciplines and in the process improved learning, raised retention rates and—at least in some cases—lowered instruction costs. (For more examples, see the sidebar on page 8.)

As part of the NCAT Maryland initiative, for example, Assistant Professor Jennifer L. Hearne spearheaded a redesign of the introductory course "Principles of Chemistry I" at the University of Maryland Eastern Shore (UMES). Several issues pointed to a need for change. Students came into the course with wide variances of prerequisite knowledge. Once in the course, they had trouble retaining what they learned, and the lecture format was not engaging them effectively. A full 45 percent of students failed the course, despite the fact that is required for science, technology, engineering, or mathematics (STEM) majors. Moreover, lack of coordination among professors teaching the course's seven different sections created inconsistency in course content, leading ultimately to inconsistent learning outcomes.

Following NCAT's "replacement" model for course redesign (see sidebar), Hearne and colleagues ultimately decided to completely redo the way the course was structured. Its format of three 50-minute lectures a week was replaced with one 75-minute lecture and two required hours in a chemistry computer lab. The lab offered help from a variety of teaching assistants as well as web-based chemistry tutorials that encourage individualized, active learning and provide prompt feedback on student progress. Students who weren't doing well in the course were required to take part in an additional recitation section that they aptly nicknamed "resuscitation."

Hearne pilot tested the new model herself in the spring of 2008, teaching one section in the new format and another in the traditional way, but using the same materials, homework and exams. She even taught the two sections at roughly the same time of day. The differences were

Six Approaches to Course Redesign

Through extensive practical experience at universities, the National Center for Academic Transformation has identified six approaches to course redesign:

Supplemental Model – retains the basic structure of the traditional course and adds lectures and textbooks with technology-based, out-of-class activities or creates an active learning environment in the setting of a large lecture hall.

Replacement Model – reduces the number of in-class meetings, replaces some in-class time with out-of-class, online, interactive learning activities, and makes significant changes in remaining in-class meetings.

Emporium Model – eliminates all class meetings and replaces them with a learning resource center featuring online materials and on-demand personalized assistance.

Fully Online Model – eliminates all in-class meetings, moving all learning experiences online, using Web-based, multi-media resources, commercial software, automatically evaluated assessments with guided feedback and alternative staffing models.

Buffet Model – customizes the learning environment for each student based on background, learning preference, and academic/professional goals, and offers students an assortment of individualized paths to reach the same learning outcomes.

Linked Workshop Model – provides remedial/developmental instruction by linking workshops that offer students on-demand supplemental academic support to core college-level courses.

notable. In the redesigned pilot course, the number of students who earned a grade of C or better totaled 66 percent—versus 55 percent in the traditional format.

Experience led UMES to fine-tune its new model. Students proved unable to concentrate on chemistry for one long lecture period, so the course was broken into two lecture sections supplemented with a required hour in the chemistry computer lab. The recitation was eliminated, in part because it was perceived to demoralize students who were bunched with others who weren't succeeding in the course. The modifications improved results even further: When UMES offered the course exclusively in the new format this past spring, the pass rate rose to nearly 70 percent.

The redesign also led to lower instructional costs. The cost-per-student in the redesigned course's pilot phase was $151, 44 percent less than the traditional format. Once the redesign was fully implemented, that cost dropped to $80 per student, a 70 percent savings. (That proved a mixed blessing. While the increased savings from the additional students enabled UMES to enroll larger sections for the lecture part of the course, that influx of students severely taxed the capacity of the chemistry computer lab.)

"Essentially what one person is doing now, seven people were doing individually before," Hearne says. "We see a huge cost savings in course preparation and course delivery." In addition to budget savings for the institution, there are also savings for students. Before the redesign of "Principles of Chemistry I," students paid $200 for textbooks. That cost rose to $265 in the pilot phase—for textbooks and the access code to the web-based program. For the final implementation, however, Hearne worked with the course materials' publisher and came up with a bundle of course materials that costs students just $105.

Bumps in the Road

Change in academe is seldom straightforward or easy, and efforts to redesign courses confront their own bumps in the road.

For example, while faculty have championed course redesign at some institutions, some of their peers have resisted such change. At one school, faculty were convinced that poor student performance in math had to do with the quality of students, not the effectiveness of instruction. Bring us better students, they said, and you will see performance improve. The success of a pilot redesigned course swayed their thinking, though, and the school jettisoned its old course model in favor of the new design. Other schools have had to address faculty fears that computers would create a chasm between professors and students.

At some schools, too, administrators have been slow to see the value of course redesign, or to support nascent change efforts in departments. Finding the funding for redesign is always an issue.

While there is solid evidence that course redesign can improve student learning outcomes, the picture for another key NCAT goal—saving money—is somewhat murkier. Even some final reports on NCAT-modeled course redesigns gloss over discussion of dollars saved.

Despite some evidence that NCAT's models have realized cost savings,

institutions have been slow to inculcate that part of the redesign equation. In some cases, too, course redesign has required additional investment, such as hardware, software and infrastructure for a new learning lab.

Another factor, Twigg says, is that "most people in higher education think that if you reduce costs, you reduce quality." She rejects that argument. NCAT projects, she says, have "demonstrated absolutely, conclusively, on a large scale, that that's not the case."

Convinced that NCAT's approach can save universities money—a carrot that ought to be especially attractive in this era of fiscal belt-tightening—Twigg is perplexed that more institutions aren't pursuing cost savings through course redesign. In an October article in *Inside Higher Education*, she expressed frustration that higher education "won't get serious about reducing cost without 'external pressure.'" Legislators are, of course, one potential source of such leverage.

Where the movement toward course redesign goes from here is hard to predict. In the meantime, though, the model has resulted in a growing number of rejuvenated courses, the practice of more active learning on the part of students and a host of other accomplishments, including lower costs for instruction.

UCF's Hartman suggests that for course redesign to realize its potential across an institution, "there has to be a sense of institutional purpose and commitment. Why are we doing it? What does success look like? What are we prepared to invest in it?" Hartman believes a university's executive leadership should engage faculty in course redesign within the framework of a university's overarching goals. "It has to be done in the context of the faculty culture," he says, and "done with them, not to them." Hartman also notes that course redesign requires allocations of staff time to manage the change.

Twigg believes course redesign needs stronger leadership. In her work with state agencies, for example, she says she regularly encounters "chancellors or commissioners for higher education who really have a vision and want to do something about high failure rates. They want innovative solutions to the cost problem rather than just saying 'give me more money.' That's leadership." Unfortunately, she says, "most of them don't demonstrate those qualities."

University presidents and deans need to take the reins to lead their institutions toward the advantages of course redesign, Twigg argues. She says campus leaders "need to step up to the plate and not just say 'the faculty won't do it.' The problem in this is not faculty members, it's academic leaders—or the lack of leadership."

"Many presidents are familiar with what we are doing," Twigg says. "We're showing that there are concrete ways that you can reduce the cost of instruction while not harming quality but indeed improving it." The central issue, she says, is "why aren't they doing something about this?"

For More Information

For more information, here are select resources linked to people mentioned in this article.

"Addressing the Challenge in College Mathematics: Designing Courses for Student Success." Teresa Thiel, Shahla Peterman and Monica Brown. *Change* Magazine, July/August 2008.

Course Redesign at Frostburg State University: www.frostburg.edu/courseredesign/index.htm

"*Course Redesign Improves Learning and Reduces Cost.*" Twigg, Carol A. *Policy Alert*, National Center for Public Policy and Higher Education, June 2005.

From Teaching to Learning--A New Paradigm for Undergraduate Education. Robert B Barr and John Tagg. *Change* Magazine, November/December, 1995

"Improving Learning and Reducing Costs: Models for Online Learning." Carol A. Twigg. *EDUCAUSE Review*, September/October 2003.

Maryland Course Redesign Initiative: www.usmd.edu/usm/academicaffairs/courseredesign.

National Center for Academic Transformation: www.thencat.org/index.html

Web-based resources at the University of Central Florida: office of course development and web services: http://cdws.ucf.edu/aboutus.html; faculty development in distributed learning: http://teach.ucf.edu/.

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1 "From Teaching to Learning: A New Paradigm for Undergraduate Education." Robert B. Barr and John Tagg. *Change*, November/December 1995.