How Course Redesign at the University of Maryland is Improving Learning, Lowering Costs, and Increasing Graduation Rates

Instructors and administrators give initiative high grades, making the University of Maryland a national leader in the program.

Four years ago, the University of Maryland (UM) Board of Regents responded to the national crisis in the college experience—the high incidence of student failure and dropout, the cost of a college degree, and the number of years it was taking to earn one—by contracting with Dr. Carol A. Twigg, president of the National Center for Academic Transformation (NCAT) and a nationally recognized expert in the field of university course design. Defined as the process of revamping entire courses to take advantage of information technology capabilities to achieve better learning outcomes, course redesign embraces modern methods of information dissemination and knowledge development, and rethinks the way instruction is delivered, especially in large-enrollment core classes.

Dr. Twigg formulated a pilot study of nine undergraduate courses with high dropout, withdrawal, or failure rates, or other measurable challenges, at nine universities within the UM system. Associate vice chancellors Dr. Nancy Shapiro and Dr. Donald Spicer directed the project, with the objective of taking the lead in the redesign of selected courses to increase graduation rates, decrease failures, shorten the length of time it takes to earn a degree, and lower costs—to both the students and the university.

The results of these course-redesign initiatives were transformative, and get high praise from UM professors and administrators active in the adapting of course-redesign ideas.

Success at University of Maryland Eastern Shore

Dr. Jennifer L. Hearne—an assistant professor of biochemistry in the Department of Natural Sciences at the School of Agriculture and Natural Sciences, University of Maryland Eastern Shore—became a believer back in the fall of 2006 when course redesign was put in place for her Chemistry 111 course. She recalls that UM Eastern Shore, along with all of the schools in the University System of Maryland (USM), was asked to participate in the course-redesign project. “I was not familiar with the process,” says Dr. Hearne. “When I read it, I found it to be very interesting.” So she approached Joseph M. Okoh, chairman of her department,
to see if they could participate. “He was very supportive and enthusiastic.”

A team of faculty members in Dr. Hearne’s department constructed their response, making a case for the redesign of Chemistry 111. “Our response addressed certain factors they were looking for, and in turn, posed the question: Which of our specific problems would course redesign address?”

They chose Chemistry 111, Dr. Hearne explains, because it is the first-semester course in a two-semester-sequence chemistry regimen designed for freshmen, and for science and health-profession majors. “You can imagine how popular that class was!”

Four sections were typically offered in the fall with 50 seats per section. In the spring, three sections were available also with about 50 seats each.

Dr. Hearne and her colleagues articulated four issues concerning Chemistry 111 that they hoped to address with the course-redesign project. The first identified issue was the department’s inconsistent knowledge of the academic background of incoming students. “Some of the students had had chemistry, some may never have had it; some may have had as many as three or four semesters of high school chemistry. Nobody knew.”

The second issue was the poor record for students’ mastering of the material, which resulted in approximately a 55 percent student-retention rate. “Only 55 percent of the students earning As through Cs was not exactly stellar,” notes Dr. Hearne.

Lack of coordination among the professors teaching the various course sections was the third issue because it was leading to inconsistent learning outcomes. “In the fall we could have four sections of Chemistry 111 and four different professors teaching the course. There was no coordination among the professors. Imagine the amount of time that could have been saved if they had coordinated their efforts.”

The fourth issue was not garnered from the group’s experience but rather from published literature on course redesign. “It was that the lecture-based format, which we were using, was ineffective in engaging students,” explains Dr. Hearne.

After attending a series of seminars on the project’s methodology, conducted by the USM as well as Dr. Twigg and Carolyn Jarmon, vice president of the NCAT, Dr. Hearne and her department were able to evaluate the various NCAT replacement models and select one they thought would be appropriate for solving the academic issues they had outlined in their abstract.

According to Dr. Hearne, the results of the course redesign for Chemistry 111 were significant. She says that a traditional Chemistry 111 class typically met three times a week for 50 minutes. With course redesign, that frequency was reduced to two meetings a week, each for 50 minutes, with a mandatory one-hour computer lab, which was established as a result of the course redesign, at the students’ discretion.

Following the recommendation of the replacement model, Dr. Hearne’s department mixed the staffing. “We used integrated staffing in the delivery of support,” she explains, “so that there were professors, undergraduate learning assistants, and graduate learning assistants. The undergraduate learning assistants and graduate learning assistants manned the chemistry computer labs for roughly 50 hours per week to provide students with individual, on-demand assistance at any time.”

In addition, by increasing the class size from 50 to 110, Dr. Hearne says there was a decrease in the number of section offerings as well as the time invested in the class by the professors and the overall number of professors. “We went from teaching seven sections of Chemistry 111 per academic year to teaching three sections of 111 per academic year. And we had more students than we had previously. The pass rate of the students increased by 15 percent, and we were able to
decrease the cost of offering the course by 70 percent to the institution.” Also, by working closely with the textbook publisher the department was able to help decrease the cost of the course by reducing the cost of materials required for it, from $250 to approximately $90—a reduction Dr. Hearne says was especially meaningful to her.

Success at Frostburg State University

The Eastern Shore campus is not the only one to reap the benefits of course redesign. Dr. Megan Bradley, an associate professor of psychology at the Frostburg State campus of the University of Maryland, recalls how course redesign became a presence in her academic life, and how it became a promising solution to problems she and her colleagues were wrestling with. Back in 2006, the university was experiencing tough economic times, explains Dr. Bradley. “Full-time faculty members were leaving and their positions were not being filled. We were struggling. It seemed like all departments were begging for help.”

Ideas to address remedies were in the air, and according to Dr. Bradley, “word was out among the faculty that the Board of Regents was in conversations with Carol Twigg and the National Council for Academic Transformation, about the benefits of something they called course redesign.” She attended a meeting on campus to hear about course redesign, with presentations made by the USM’s Dr. Spicer and Dr. Shapiro. Participants were told that there were likely to be 10 or 11 possibilities for funding course redesign. Each project could be funded at a cost of $20,000, which the university would match, bringing the funds available for any one course-redesign project to $40,000. “So the money was there to initiate reform,” recalls Dr. Bradley.

Attendees were also encouraged to gain additional information by logging on to the NCAT’s website. “Many of us did and found a considerable array of persuasive facts and findings,” she says. “The net result of what we learned at the meeting and on the website led us to define the problem we were most interested in addressing, and through the models offered by NCAT, held out the promise of solutions.”

Dr. Bradley and her colleagues concluded the most significant problem in their psychology department was course drift, which took the program in a direction that resulted in 18 separate sections with 50 students each. “If you went to a bookstore to buy a text for Psychology 150, you had to choose from 18 different textbooks, each a requirement specifically for a separate section within the larger course. There were 18 separate syllabi, and there was no coordination between the sections. The professors teaching had no communication, one with the other. So there were 18 versions being taught of the one course. Of course, this lack of coordination among the sections and the professors who taught them led to a strain on staff, as one section looked to avoid duplication with another. And to add to the complications and confusion on the part of the students, each was responsible for buying the right textbook and choosing the right syllabus, out of the 18 possibilities. Additionally, there was the problem of keeping the 18 teaching slots filled. We had to rely on adjunct professors to fill those positions and you have to remember where we are located—in western, really western, Western Maryland!”

Through course redesign, Dr. Bradley and her colleagues were able to reorganize those 18 separate sections into five sections, and to put into use one textbook and one syllabus for all five sections. Where it had been costing $89 a student, it was now costing $26 a student. Although class size tripled, Dr. Bradley insists that the department implemented techniques designed to make it easier for students to learn in the larger forums. In fact, average grades improved by seven points, from 68 in the old system to 75 in the new one.

“So I think we took a strong program and through course redesign made it stronger. We feel very positive about the program’s effectiveness in reducing costs—to the student and to the university—and improving learning.”

– Dr. Megan Bradley, associate professor of psychology

Success at University of Maryland Baltimore County

Chemistry and psychology are just two of the first-year courses that Dr. Freeman Hrabowski, president of the
University of Maryland Baltimore County (UMBC), has been examining for at least four years, to rethink teaching and learning, with the purpose of improving student performance. “The fact is, in certain courses a large number of students were not earning at least a C,” he says. “It’s a national problem, and the report that I worked on with the National Academies and shared in the creation of, showed that half of all students who begin a major in science and engineering in American colleges leave the major within the first two years. The number-one reason most students give for this dropout rate is that they feel they are not doing well academically.”

But the problems were particularly acute for UMBC because more than half of its students are interested in science and engineering. “We have had some success in learning about strategies that make a difference,” explains Dr. Hrabowski. “What we have learned from the Meyerhoff scholars program over the past decades is that group work and collaboration improve student performance, and this focus, this emphasis, fits well within the course-redesign model,” which, he says, places heavy emphasis on faculty members serving as facilitators, and students sharing in the problem-solving experience, using technology in a physical space that encourages cooperation.

Results indicate a significantly greater number of students earning As and Bs and passing the courses, with fewer dropouts. “We adapted some of the techniques of course redesign to help bring about this much-improved record,” reports Dr. Hrabowski. “For example, we renovated space that would allow students to work in small groups of four at round tables with a computer on each table and a board at which someone can work with a manager overseeing the use of the technology. We have discovered that this kind of more active learning is more effective than the traditional technique where students sit back and take notes. Students become pro-active in discovering theories. Focus on collaboration came out of course redesign.”

For Dr. Hrabowski, course redesign passes with flying colors. “I give course redesign an A for two reasons. First, students in chemistry and psychology are doing well in larger numbers. Second, and even more important, that success has led other departments into course redesign… .”

– Dr. Freeman Hrabowski, president of University of Maryland Baltimore County

Course Redesign as Pedagogical Innovation

Dr. Elliot Hirshman, provost at UMBC, views course redesign in light of the tremendous amount of research that has been conducted in cognitive science, research that is focused on various ways of learning as well as techniques that produce the most learning for a given amount of effort. “When students actively generate material by themselves, they remember it better than if it is just read to them,” he says. “When students space material out across longer periods of time rather than cramming it in, they achieve better results. Because of these factors at work there have been a series of innovations either in the way classrooms are structured, or in the way instructors proceed, or in the way online materials might be structured.”

According to Dr. Hirshman, incorporating these methods into the classroom is a national movement, and cites the example of increased focus on situations that help students become active learners, rather than the traditional lecture format. “One area prominent in our Chemistry Discovery Center is in group work,” he says. “Group work has proven effective in engaging students with each other.”

Dr. Hirshman believes that these innovations have been generated from many sources, with course redesign being important in certain areas. He credits course redesign for the psychology department’s move away from the lecture format in introductory classes and toward increased peer interaction and smaller recitations. The ethos of the institution is also a factor, he says, and points to the faculty members at the Chemistry Discovery Center, whose goal is to get students to graduate.

“I recognize the influence of course redesign, absolutely,” admits Dr. Hirshman, and adds that there have been direct and immediate
results of these approaches. “The proportion of ‘deficiencies,’ ‘failures,’ and ‘withdrawals’ are reduced. What we have seen is a 15 percent reduction in Ds, Fs, and Ws. Fifteen out of 100 students who were failing are now passing, staying within the program, and graduating. Students spent tuition and got something back.”

For Dr. Hirschman, it all comes down to how students are taught. “Pedagogical innovation is a critical part of our strategies for increasing our graduation rate. There have to be many strategies—admission strategies, financial-aid strategies, advising strategies—but pedagogical innovation is one of our key strategies, and course redesign in all of its forms is an essential component of pedagogical innovation.”

Dr. William “Brit” Kirwan, chancellor of the USM, is the one who initiated course redesign about four years ago, although his first exposure to Dr. Twigg’s course-redesign ideas occurred some 10 years ago when he was president of Ohio State University (OSU). According to Dr. Kirwan, Dr. Twigg received a grant from the Pew Charitable Trusts, which allowed her to pilot her approach with about 30 higher-education institutions, including community colleges, small liberal arts schools, large public research universities, and elite private institutions. OSU was involved in this initial experiment—which was “done in a very rigorous way,” says Dr. Kirwan—to test these new strategies. He recalls that a stipulation for participation was the institution’s willingness to dramatically change lower-division, large-lecture, multi-section courses, and through the utilization of technology, peer tutors, and immediate feedback on student progress, transform them from passive to active learning environments. “I characterize the courses targeted for redesign as ones where students’ dislike of the courses is matched only by the professors’ disdain for teaching them,” says Dr. Kirwan.

Each institution was also required to redesign some sections while still teaching others with the traditional methods. However, to ensure that there was a means of measuring the impact of the new teaching and learning strategies, all sections had to take the same final. Dr. Kirwan notes the experiment’s success. “At Ohio State University, our contribution to the study was a basic entry-level statistics course. The students in the redesigned sections did better on the common final, and the cost of instruction was lower than in the traditional sections.” And, he adds, Ohio State was no exception. “In every one of the 30 institutions in the study the same thing happened: Students in the redesigned courses did better on the uniform final than students who were not in the redesigned courses, and the instructional costs were lower.”

Course Redesign Takes Hold in the University System of Maryland

So in 2002, when Dr. Kirwan came back to the USM, he explored the possibility of embracing course redesign. As a result, they hired Dr. Twigg as a consultant for three years, and introduced a course-redesign pilot program on every campus. “Basically, we replicated the original experiment,” he says. “In every one of our pilots, the students in the redesigned sections did better and the cost of instruction was lower.”

According to Dr. Kirwan, the USM has now decided to turn course redesign into a strategic initiative, and has raised several million dollars in private funds to launch a systemwide effort to redesign all of the “gatekeeper” courses, those lower-division courses that typically present obstacles to students’ success. “Our expectation with this initiative is that we can improve learning and simultaneously lower costs,” he says. “That’s a hard combination to beat.”

So what is it about course redesign that makes it so effective? “One big reason that course redesign works is because the learning strategy aligns with the culture of the current generation of the students,” explains Dr. Kirwan. “This generation is very Internet-centric, and used to constant stimuli through texting, Twitter, and other forms of social networking. They are not good at sitting passively and listening to lectures. The course-redesign strategy makes them active participants in the learning process. The traditional paradigm is the ‘sage on the stage’ learning environment where students sit passively and listen to a professor lecture for 50 minutes. This isn’t working with the current

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– Dr. Elliot Hirshman, provost at University of Maryland Baltimore County
generation. The genius of the course-redesign approach is that it makes the classroom an active learning environment, compatible with the students' need for direct engagement. In redesigned sections, we have learned that student retention and learning are greater and, remarkably, instructional costs are lower.”

Course redesign, however, does have its shortcomings. When asked for instances where course redesign has failed, Dr. Kirwan is frank. “Yes, there have been failures,” he says. “This is not a total success story. The model works best in areas such as the physical sciences, math, and the social sciences, but not as well with humanities courses such as English, history, and philosophy. I’m not aware of a successful redesign effort in these areas.”

The Financial Costs and Rewards of Course Redesign

So what does it cost to implement course redesign? “We have to make an initial investment,” says Dr. Kirwan. “We set aside some money in the USM system to invest in the pilot project, making available start-up money for our campuses as they embrace the concept. We are providing half the funds—$20,000 to $25,000—and the institutions match the other half. It takes $40,000 to $50,000 to redesign a course, primarily for faculty release time, the purchase of technology, and tutor training. The total investment to date is close to $2,000,000 but the return on that investment is extraordinary in terms of better student performance and lower instructional costs once the redesign is accomplished.

“USM has been recognized at the national level for its course-redesign efforts, and last year won a $1,000,000 grant from the Lumina Foundation, spread over four years, to expand the program and disseminate models to the rest of the Maryland higher-education community.”

There may also be short-term or upfront costs to implementing course redesign. Dr. Hirshman cites the expense of creating a new facility, such as the new chemistry computer lab at UM Eastern Shore, as a possible upfront cost. “Everybody doesn’t create a new facility,” he says, “but in at least one of our cases we did.”

But, as Dr. Kirwan stated earlier, the return on the investment is worth every penny. “When we think about the investment in the course redesign,” says Dr. Hrabowski, “we have to think about the fact that as a consequence of the course-redesign reforms, many more students are doing well and remaining at the university and going on to earn their degrees. Every time a student drops out it costs the university $9,000. But when students remain in the program, it’s clear that the university’s dollars have been made to work hard and effectively, and that is where, in the long run, course redesign effects savings to the university.”

Dr. Hirshman agrees. “It’s when students drop out and do not graduate—that is where waste comes in. The student has wasted his money paying for a degree he isn’t getting, and the institution is wasting money paying the cost of teachers and facilities to educate students who do not graduate. This circumstance actually raises the cost per degree produced; what we look to do over the long run is reduce the cost per degree produced.”

According to Dr. Hirshman, the cost gain is generally the number of degrees produced in terms of dollars invested. “At UMBC, students are now moving forward and getting degrees,” he says, “and from an institutional perspective they will be paying tuition next semester that they would otherwise not be.” Dr. Hirshman points to this model’s multiple cost shift, and explains that for every dollar invested—whether it’s from the state or the students—there is an increase in the number of degrees produced. “My overall view is that is where you are realizing the savings—in the more efficient expenditure of dollars to produce degrees,” he says.

Individual course redesign may also result in a cost benefit. “If you were to replace faculty time in lecture with student peer time where students are paid an hourly wage as opposed to faculty salaries,” says Dr. Hirshman, “you can get some cost savings in that specific course though that arrangement tends to be variable.”

The Future of Course Redesign

Because the USM has begun the implementation of course redesign
earlier than most institutions, and has made course redesign a USM-wide priority, it is way ahead of other colleges and universities with redesign efforts, notes Dr. Kirwan. “My colleagues and I are asked to speak at national conferences on this topic because others want to learn from what we are doing.” Along with the NCAT, the USM recently co-sponsored a workshop at UMBC that attracted colleges and universities from across the country. “Demand was so high that we have scheduled a second session in January.”

“It appears the sky’s the limit when it comes to what is on the horizon for course redesign. “To indicate my enthusiasm for course redesign, I would say that in the disciplines where it works, it is the most exciting innovation to come into teaching and learning since the invention of the blackboard,” says Dr. Kirwan. “We’ve clearly demonstrated the success of this approach, so much so that we have established the USM as a national leader in this area. For sure others will follow because no one can afford to ignore the impact of the redesign efforts: greater learning, lower costs.”

ABELL SALUTES

was once drug and crime ridden and in total disrepair and abandonment—there will be a viable community of families living and playing in a safe and comfortable area.”

The area is bounded on the north by North Avenue, on the east by Broadway, on the south by Preston Street, and on the west by Greenmount Cemetery.

To get to the end of that rainbow, a lot of resources have to come together. There have to be houses for sale; builders in the business of rehabbing them; families interested in moving into them; community-service professionals to advocate for them; and from the beginning of the process to the end of it, the lenders—the entrepreneurs who put investment dollars to work moving the process along until the day a family moves in. One of the lenders helping to make the Oliver Street neighborhood come into being is Bridge Private Lending.

Bridge Private Lending was started in 2006 by attorney David Borinsky, with a $14 million loan pool of investor funding. Over the last four years, Bridge has granted hundreds of loans to small housing renovation contractors throughout Baltimore City, making new loans as houses are sold and existing loans are repaid.

In the past year, Bridge has increasingly focused lending in the Oliver neighborhood, concentrating loan investment within a two-block area along Bond Street where vacant houses that are fully renovated are receiving appraisals of $140,000-180,000, and where interest and demand from homebuyers has resulted in eight homeowner sales and eight homeowner contracts to purchase.

Bridge has worked with eight different contractors, providing loans toward renovation of the houses in the Oliver neighborhood. Most of the contractors are local residents who have ties to the neighborhood, employ local resident labor, and do not have access to conventional bank financing because of their need to pay subcontractors and labor weekly.

Each contractor commits to a quality standard of construction as determined by Bridge, which includes high-end kitchens and bathrooms, and energy-saving features such as added insulation, high-efficiency heating and air conditioning systems, energy-efficient appliances, and tankless water heaters.

Bridge offers the contractors a marketing and sales plan through a single real estate agent and website, which serves to “brand” the energy-

EDITOR’S NOTE: A copy of the report, How Course Redesign at the University of Maryland is Improving Learning, Lowering Costs, and Increasing Graduation Rates, is available in “Publications” on the Abell website, www.abell.org.
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efficient, “green” features of the homes. Buyers of the completed houses include a married couple with two small children, a former resident and retiree returning to the neighborhood, and a buyer relocating from the East Baltimore Development Initiative (EBDI) area. The homes’ sales prices have ranged from $140,000 to $187,000, all without public subsidy.

Recognizing that crime and safety are major considerations for potential purchasers and existing residents, security cameras with live feed to the Baltimore City Police Department have been effective in deterring drug activity in the several-block area. In addition, Bridge is working with the city’s Weatherization Office within the Department of Housing and Community Development to make federal funding for energy-efficient improvements available to existing residents to increase the level of investment in the target blocks.

Kevin Kelvin had been living in a neighborhood that he felt was going down, and he wanted out. To find a house and neighborhood that better suited his expectations, he went online to search for houses in his price range of $155,000, and up popped 1439 North Bond Street. “I could not believe my eyes,” says Mr. Kelvin. He immediately contacted real estate agent Martin Richardson.

“I told the agent that I wanted to see the neighborhood before I toured the model, and so one day I drove over to North Bond Street, and again I couldn’t believe my eyes—the street was wide and clean, and people were out walking. I saw the cameras up, and that arrangement at work made me feel very comfortable, very safe. And as I pulled in front of 1439, a truck pulled up right behind me, and the driver got out and approached me, and asked if I wanted to see the house. He appeared to be one of the construction workers.”

Lloyd Williams explains why the worker was so interested in the potential buyer. “That worker lives in the neighborhood. So like our other workers who live in the neighborhood and are helping to rehab those houses, he has a large stake in who buys the houses. In his heart of hearts, he knows he has an interest in the buyer, not only as a customer but as a neighbor.”

“So together,” Mr. Kelvin continues, “we went through the model. Things worked out well.”

“It was Mr. David Borinsky and his Bridge Private Lending group who arranged for the financing…”

– Lloyd Williams, developer

But the process would not have worked so well, or worked at all, were it not for the financing of the project. Mr. Williams explains, “It was Mr. David Borinsky and his Bridge Private Lending group who arranged for the financing of the purchase of the house, one of a group of eight, that the Verde Group bought from the city.”

Mr. Borinsky adds, “Lloyd’s successful sale of a renovated house to a middle-income buyer impressed me and we agreed to combine his knowledge of the neighborhood and his inspired design choices with my loan fund and my relationship with other builders.

“And we agreed that it would only work if we took into account the social and economic dynamics of the neighborhood. Our approach is to ask organizations interested in job training, weatherization, education, aging in place, and so on to consider whether their mission can be enhanced by joining us in Oliver, and the response has been intense. And the Oliver Community Association and its executive director, Nina Harper, have been instrumental in bringing together the stakeholders. This self-organizing collaboration has propelled everyone’s thinking beyond the traditional approaches to urban development. That, combined with our ‘Come Home Baltimore’ sales theme, is catching the attention of people in outlying areas for whom Oliver would not otherwise be on the radar.”

Mr. Kelvin says, “I fell in love with that house and that neighborhood—it was everything we were looking for. I got a mortgage through Wells Fargo and we moved in September 24. Life’s good here.”

“This is succeeding beyond what any of us dared hope when we started,” Mr. Borinsky says. “The goal is an economically integrated neighborhood with no displacement of existing residents, no gentrification, and it looks like we’re getting there.”

The Abell Foundation salutes Bridge Private Lending and its president, David Borinsky, for helping to revive the Oliver neighborhood in Baltimore City—where a neighbor can look out of a window of a house in a once-abandoned inner-city neighborhood and see children walking along, feeling comfortable and safe.