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Making the Grade, Version 2.0: A Report on the Success of MyMathLab in Higher Education Math Instruction

By Michelle D. Speckler

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Introduction

Higher education is receiving a lot of press these days—most of it negative. The Spellings commission reports that the U.S. higher education system requires dramatic improvement in the areas of access, affordability, quality, and innovation. The commission also reports that as the United States moves further into the 21st century—a global knowledge economy in which 20 of the 30 fastest-growing occupations require at least an associate degree—a troubling number of students . . . never complete their degrees, at least in part because most colleges and universities don’t accept responsibility for making sure that those they admit actually succeed. Of those who do graduate, an “unacceptable number” enter the workforce lacking the skills required to succeed. The authors blow the whistle on an educational system in urgent need of reform, and they challenge postsecondary institutions to embrace new pedagogies, curricula, and technologies to improve student learning.

Mathematics courses have significantly higher enrollments—and historically lower course completion rates—than other remedial or prerequisite courses do. That lack of completion is perhaps the foremost barrier to student success and a contributing factor to the failure of nearly half of the 14.7 million undergraduates at two- and four-year institutions who never receive degrees. Its impact affects both the individual and society at large. “Individuals without some education beyond high school have essentially lost their ability to achieve a place in America’s middle class,” says Dennis Jones, president of the National Center for Higher Education Management Systems (NCHEMS). The failure to succeed in our educational system, he says, “deprives the nation of the skilled workforce needed in the coming decades. Higher education is a public—as well as private—good.”

Clearly, there’s work to be done before the United States can boast the position of worldwide postsecondary superiority it held in the past. “It will require,” says Garry Carruthers, dean of the College of Business at New Mexico State University and founding director of the National Center for Public Policy and Higher Education, “concerted efforts by government, by schools and colleges, and—much more so than in the past—by the public and its leaders, based on widespread understanding of the realities of the competitive global economic environment.”

The good news is that those leaders have already come to the fore. The National Center for Academic Transformation (NCAT), led by Dr. Carol Twigg and in partnership with more than 60 colleges and universities, has proved that using information technology to redesign courses can improve student learning while substantially reducing instructional costs. The NCAT is creating lasting, positive change through research-based solutions that improve quality, increase access, and promote more-effective use of resources.

Efforts like the NCAT initiatives are clarion calls to higher education. And at least 1,600 institutions across the nation are listening. Those institutions are integrating Pearson Education’s MyMathLab into both their seated-classroom and online programs. And they’re getting results: increased pass rates, increased retention rates, increased levels of success in subsequent courses, and increased achievement by underserved populations.

This report illustrates how rethinking our present model—by redesigning for integrated assessment and student-focused learning and by requiring the use of MyMathLab—can successfully reshape how math is taught and learned. In the words of Secretary of Education Margaret Spellings, “We must act now and continue the national dialogue and work together to find the right solutions.” MyMathLab is one such solution.

Taking Action

Effective use of information technology can improve student learning, reduce instructional costs, and meet critical workforce needs. We urge states and institutions to establish course redesign programs using technology-based, learner-centered principles that draw on the innovative work already being done by organizations such as the National Center for Academic Transformation.¹

(MML) is an innovative series of text-specific online courses designed to work hand in hand with Pearson Addison-Wesley and Pearson Prentice Hall mathematics and statistics textbooks. MML is a revolutionary new way of teaching and learning. It’s about measurable outcomes. And it works. Institutions across the country are reporting pass-rate increases of 30 to 40 percent and at less cost to the institution than traditional courses.

What Makes MyMathLab Different?
The linchpin of MML’s success is its focus on the student. MML is modularized, self-paced, customizable, deliverable anywhere with Web access, and adaptable to each student’s level of knowledge. Unlike the traditional, lecture-based model of course delivery, wherein students are passive recipients of information, MML enhances course delivery by engaging students in active learning. They learn at the time, in the place, and according to the style and pace that best suit them.

Instructors report that their students are, for the first time in their lives, engaged in learning math—and even enjoying it. "M y highlight this week was a student who had previously failed Math 200 and is now in Math 100," says Rudy Roberts, professor at San Joaquin Valley College in California. "I got her started in MyMathLab on Monday, and by midweek she said, ‘I never thought I would say this, but this is kind of fun. I’m starting to like math!’" Students surveyed about their experience with MML were overwhelmingly positive (see pages 4–5).

Faculty also benefit from MML. By transferring the tasks of content delivery, student assessment, and grading to a powerful suite of course management tools, MML enables faculty to spend more time with students doing what they do best—teaching. Pass rates, mastery of concepts, and affinity for learning all go up. “I absolutely love M yMathLab,” says Susan Haley of Florence D arlington Technical College in South Carolina. “I believe whole-heartedly that it has made a definite improvement in my students’ grades and understanding level. I recommend it to everybody I know!”

How MyMathLab Works
Since 2001 approximately 1.7 million students have used MML and an alternate version, MathXL. Today more than 1,600 colleges and universities use MML or MathXL, and since January 2005 more than 1 million students have enrolled in an MML or MathXL course. Virtually all the institutions have seen student success rates improve and in many instances, have even doubled their pass rates.

One of the reasons MML works so well for so many is that it places the responsibility for learning where it belongs: squarely on the shoulders of students. MML’s emphasis on active learning means that students quickly learn to connect time spent on task with achievement. Repetition of homework and frequent quizzes offer students the opportunity for 100 percent every time, a mastery of concepts that serves them in subsequent courses, and the self-confidence that comes with knowing that—sometimes for the first time in their academic

Since 2001 approximately 1.7 million students have used MyMathLab and an alternate version, MathXL. Today, more than 1,600 colleges and universities use MyMathLab, and since January 2005 more than 1 million students have enrolled in an MML or MathXL course.

career—they can succeed at math. “MyMathLab is the most exciting thing to happen to our preparatory math program in years,” says Jill Shirley of Cal Poly Pomona. “I was skeptical at first, but now that I’ve compared my MML-mediated sections with traditional, lecture-based classes, I’m sold. And my students are, too. Exam averages and course pass rates are up; students are actively engaged in practicing math, asking more and better questions, and enjoying the learning process. When it comes time to register for the next class, most students who have done both lecture-based and MyMathLab hybrid classes seek out the MyMathLab sections. They feel a real sense of accomplishment because they recognize and can take credit for the role they’ve played in their success.”

MM L’s rich set of course materials and adaptable instructor tools make it simple, easy, and fast to make the shift from traditional classroom teaching to an MML-enhanced classroom or online course. “It is so easy to set up and manage a MyMathLab course Web site,” says O. Pauline Chow of Harrisburg Area Community College. “Posting schedules and expiration dates of announcements, homework assignments, and online tests can all be done ahead of time.”

Online course content and customization tools. Content is tightly integrated with Pearson Education textbooks (Pearson Addison-Wesley and Pearson Prentice Hall), and can be easily added to, removed, or modified. MyMathLab also provides the communication tools needed to create a supportive online community such as a discussion board, a virtual classroom, and chat capabilities.

Individual student learning. Introductory course populations frequently represent a range of learning styles and abilities. Instructors can modify assignment settings for individual students—without other students seeing the changes or being affected by them. Whether your students are visual learners or auditory learners, MyMathLab works for them.

Management of large, standardized programs. Faculty can build a Coordinator course and thereby filter course changes and updates to a group of courses (members) throughout the semester. Coordinator courses enable departments to standardize content delivery and assessment, streamline communication, and save administrative time. “We’ve used the Coordinator course action from the first minute it was released,” says Dr. Jeanne Foley, UW-Stout. “It’s such a huge benefit to us that we helped UW-River Falls set up a similar program. They had such good success with it that they put all of their sections in this mode. Templates make setting up and maintaining courses much easier, are a tremendous time saver for instructors, and keep the department standardized. Our faculty appreciates that each Web site can be personalized, but quizzes and homework assignments need not be bothered with.”

Online homework. Many students experience their first success in math while doing homework online in MyMathLab. For each attempt, students receive immediate feedback and encouragement to try again until they master each concept or skill. One-click access to step-by-step tutorials, video lectures, animated presentations, and working examples means that unlocking the understanding of mathematical concepts is consistently easy and accessible.

Mymathlab’s emphasis on active learning means that students quickly learn to connect time spent on task with achievement.
Flexible assessment system. MyMathLab’s Test Manager enables instructors to create, import, and manage online assessments with chapter tests that are built in and editable. Instructors can also create tests by choosing from an online bank of test items that correlate to the textbook or by creating their own items. “The ease with which faculty can generate tests and export the results to a spreadsheet is fantastic,” says Trudy Streilein of Northern Virginia Community College. A range of options are available for assigning and managing online tests, including:

- Prerequisite settings for tests and homework, including minimum score
- Individual settings for students with learning disabilities
- How long tests are available to students
- How many times students can take a test
- Time limits for tests
- Passwords for proctored test environments
- Whether and how many times students are allowed to review a test
- Whether students can retake an incomplete test

Expansive Gradebook usability and reporting. MML’s online Gradebook—designed specifically for mathematics and statistics—automatically tracks students’ results on tests, homework, and tutorials. Instructors may export the results to a spreadsheet program such as Microsoft Excel. In addition, instructors can adjust their Gradebook view and choose to see two additional columns of assignment results, thereby viewing more assignments at once.

“We’re finding all sorts of new uses for the Gradebook, besides the standard posting of scores,” says Andreana Grimaldo of Quinsigamond Community College. “Gradebook’s tracking features help us intervene with students in trouble. We can identify them immediately, communicate with them, and get them help. It’s also an invaluable tool for defensible grading. Full documentation of time logged on—with no time or effort to track—backs up whether or not a student is doing the work.”

Student study plan for self-paced learning. The MML Study Plan feature generates personalized student study plans based on test and quiz results. I want to make sure that my next math teacher uses MathXL.

—Student, Hillsborough Community College, Florida

I was able to work at my own pace. I didn’t feel like I was pressured to keep up with anyone, and I didn’t feel like I was being held back by anyone.

—Student, Northern Virginia Community College

This class completely changed my views on math. Before this class I hated math and never wanted to do it. After this course I LOVE math and am considering a math minor. I’m even thinking of being a tutor in the Math TLC next year. I would never have imagined I could teaching and helping others with math.

—Student, University of Wisconsin-Stout

I really enjoyed using the math site because I was enjoying my homework and actually doing my homework.

I was never one to do my homework, but with this I had no choice and it was fun. I also like that it had guided solutions for everything. So if I got stuck I was easily pulled out with the help.

—Student, Onondaga Community College, New York

With MMyathLab, instructors can modify the program to retain their personal teaching style. It is adaptable and customizable not just for students, but for faculty, too.

—Andreana Grimaldo
Quinsigamond Community College
Taking Action

links directly to tutorial exercises, which cover topics that have yet to be mastered. Those exercises regenerate algorithmically to provide unlimited practice. The plan is updated each time a student takes a test or quiz—enabling students to monitor their progress throughout the course.

Multimedia learning aids. In addition to extensive online tutorial exercises, MML courses include multimedia resources—such as video lectures and animations—that are accessible from an online version of the textbook, homework, and study plan exercises. Videos and animations are also accessible from individual online homework and practice exercises. “I’ve noticed a distinct improvement in my students’ overall performance,” says Jim Voss, professor at Front Range Community College in Colorado. “The key to success for math students is practice, practice, practice, and MathXL provides that opportunity through algorithmically generated problems with excellent videos, animations, and textbook references.”

Tutoring for students from the Math Tutor Center. Students using MML can sign up at no additional charge for math tutoring from Pearson’s Math Tutor Center. The center is staffed by qualified mathematics instructors who provide one-on-one tutoring via toll-free phone lines, e-mail, and real-time Internet sessions. Tutors can assist students by explaining examples and reviewing solutions.

Chart 1. Percentage of UW-Stout Math TLC/MyMathLab students surveyed at the end of the semester, who responded that they learned as much or more than they expected to learn coming into the course. n = 500

Chart 2. Percentage of UW-Stout Math TLC/MyMathLab students surveyed at the end of the semester, who responded that they would be likely to take a course using this structure again. n = 500

MyMathLab has been an essential part of my academic and mathematical success. I earned a 4.0 GPA, and without MyMathLab I probably wouldn’t have been this successful at math.
—Student, University of Central Arkansas

This has been the only thing ever to help me grasp concepts in math. I hope that you keep it for future semesters.
—Student, University of Missouri-Columbia

It is extremely easy to find everything. I enjoyed the tutorials most of all.
—Student, Coastline Community College, California

I have suffered from math anxiety and have never done well in math until now. MyMathLab removed the anxiety of traditional math classes where tests are timed and often instructors have time constraints.
—Student, Florence-Darlington Technical College, South Carolina

I’m a nontraditional student. It’s hard to get to campus for lectures that are not part of the weekly meeting. MyMathLab lectures filled in the gaps. I utilized the multimedia textbook almost daily.
—Student, Kellogg Community College, Michigan

I just really appreciate all your help. Thank you for making me come to class every day.
—Student, University of Wisconsin-Stout

www.mymathlab.com • 5
Integrated Assessment and the Case for Redesign

Time plus energy equals learning. There is no substitute for time on task. Learning to use one’s time well is critical for students and professionals alike. Students need help in learning effective time management. Allocating realistic amounts of time means effective learning for students and effective teaching for faculty.\(^5\)

Today’s higher education system is increasingly challenged by issues of access, quality, and cost. Although attempts have been made to create technology-rich educational environments and delivery systems, past decades have produced little more than an educational disparity gulf. Academics are recognizing that how we use information technology is as important as—or more important than—if we use it at all. In order to realize the potential of information technology for improving the quality of education, reducing cost, and increasing access, we must rethink and reshape our traditional models of teaching and learning.

Program in Course Redesign (PCR) was the brainchild of Dr. Carol Twigg, education innovator and president of the National Center for Academic Transformation (NCAT), an independent nonprofit organization dedicated to the effective use of information technology to improve student learning outcomes and reduce the cost of higher education. According to NCAT’s Web site,\(^6\) 25 of 30 course redesign projects in various disciplines showed significant increases in student learning. Of the 24 projects that measured retention, 18 reported a noticeable decrease in drop-failure-withdrawal rates (from 10 to 20 percent), as well as higher course-completion rates. Most dramatically, all 30 institutions reduced their costs by 37 percent on average—ranging from 20 to 77 percent—and produced a collective annual savings of about $3 million. Other outcomes included better student attitudes toward the subject matter and increased student and faculty satisfaction with the new mode of instruction.

Money saved via course redesign can be applied to ways to further improve the teaching and learning experience for students and faculty:

- Continuous course improvement and/or redesign of other courses
- Offer of distance sections
- Greater range of offerings at upper-division or graduate level
- Accommodation of greater numbers of students with same resources
- Reduction in teaching load and more time for research
- Reduction in rental expenditures
- Improvement in training of part-time faculty

Dr. Joe Benson, senior associate dean in the College of Arts and Sciences at the University of Alabama (UA) recounts that although cost was not—and is not—the motivating factor for redesign at UA, the cost savings have been substantial and useful. “The money we save stays in the department,” says Benson. “It’s tied up in people. Because we had less need in some classes, we didn’t take the people away. We kept the teachers and put them in other sections.”

<table>
<thead>
<tr>
<th>Traditional Course</th>
<th>$116 per student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redesigned Course</td>
<td>$83 per student</td>
</tr>
<tr>
<td><strong>COST SAVINGS</strong></td>
<td>$33 per student (a 28% savings)</td>
</tr>
</tbody>
</table>

Table 1. Cost of Redesigned versus Traditional Courses (2001-02)


\(^6\)For more information on the National Center for Academic Transformation, visit www.thencat.org.
How Redesign Works

The University of Missouri–St. Louis (UMSL) is a powerful example of the effect of course redesign. Faced with the challenges common to large, introductory mathematics courses—in the form of inconsistent student academic preparation, low success rates (as low as 50 percent), high drop/fail/withdrawal rates, and inconsistent student outcomes due to multiple sections—UMSL redesigned its college algebra course in 2002–03 by using MyMathLab (MML).

The course was originally taught in a traditional model in which 35 to 40 students attended three 50-minute lectures per week. Faculty and administration met with PCR staff and redesigned the course to comprise:

- One 75-minute session with 75 students weekly to provide overview, assignment review, troubleshooting, and help for keeping students on track
- Two 75-minute required labs a week in UMSL’s Math Technology Learning Center
- Required use of MyMathLab online courseware, selected for its videos, examples, exercises, homework features, and low-stakes quizzing
- Individual assistance, available as needed

The outcomes were inspiring: a 75 percent increase in the number of students earning an A or B, a 40 percent decrease in the drop/fail/withdrawal rate, and a cost savings of 30 percent. Today, UMSL is piloting a similar redesign for calculus and statistics.

By UMSL’s examination of each of its foundational philosophies, it’s clear to see why the one-two punch of redesign and required use of MML is an institution-wide success: both are grounded in methods and models that improve the quality of student learning and break the credit-for-contact model. Use of MML in a redesign model successfully creates the following proven characteristics for student achievement:

- Active learning
- Student engagement with the material
- Reduced number of lectures/class meetings
- On-demand, individualized assistance
- 24-7 access to online learning resources
- Adaptability to differences in learning style
- Course management software to monitor student performance
- Consistent practice and reinforcement
- Immediate feedback from automated grading of homework, quizzes, and exams
- Replacement of single-mode instruction with differentiated personnel strategies

Lessons Learned

According to the April 2006 issue of the Learning MarketSpace, the quarterly electronic newsletter of the National Center for Academic Transformation, while most academics agree that students need to spend two hours studying outside class for every hour spent in class, national surveys report that only 5 to 7 percent of students actually do so. Approximately 57 percent spend half of that amount, and 35 percent spend about one-third of that amount.

Without the aid of technology, it is difficult, if not impossible, for faculty to ascertain how much time a student is actually spending on task. MML provides detailed tracking features, thereby enabling faculty to reliably and automatically monitor students’ time and intervene at the first sign of trouble. It comes as no surprise that all of the NCAT course redesign projects have seen a “strong, direct correlation between student success and time on task,” as reported by Twigg in “Freshmen Don’t Do Optional,” the NCAT newsletter’s main feature. “Each [institution] has discovered that students need structure (especially first-year students and especially in disciplines that may be required rather than
chosen) and that most students simply will not make it in a totally self-paced environment."

Twigg's article lists the following lessons that NCAT Program for Course Redesign institutions have learned regarding regular assessment as motivation for students to spend more time on task—and truly master the skills at hand. Institutions across the country are consistently finding that these lessons, when implemented with M M L, result in achievement rates far and above even the significant successes we’ve come to expect with the product alone.

Lesson 1. If you know that engaging in a particular learning activity will result in increased learning, you must require students to participate in it. M andatory attendance in the lab is necessary to ensure that students spend sufficient time on task.

The Universities of Alabama and Idaho require students to spend a minimum of 3.5 hours and 2.5 hours, respectively, per week in the lab. In addition, both universities require students to attend weekly group meetings. Alabama students are required to attend a 30-minute session, which focuses on students’ problems and allows instructors to follow up in areas where testing has identified weaknesses. Idaho students are assigned to focus groups of 40 to 50 students each, grouped according to their majors so that particular applications can be emphasized. Groups meet once a week to coordinate activities and discuss experiences and expectations. Both universities believe that the group activities help build community among students and between students and instructors.

Lesson 2. It’s not enough to require participation; you must give course points for doing so. Many redesign projects found that supplementing classroom time with mastery quizzes leads to increased achievement—if they require student participation, if they give points for doing so, and if they count only the highest grade.

To determine whether quizzes that were mandatory (i.e., required for course credit) or voluntary (no course credit) would differentially affect exam and grade performance, University of New Mexico (UNM) faculty conducted an experiment. Students in one section received course points for completing weekly online mastery quizzes; students in the other section were encouraged to take the mastery quizzes but received no course points for doing so. On in-class exams, students who were required to complete quizzes for credit always outperformed students in the section where taking quizzes was voluntary. Students took more quizzes, scored higher, and spent longer on quizzes when course credit was at stake than did students in the section where quizzes were not linked to credit. Moreover, relatively few students successfully completed quizzes when credit was not a consequence, and some students chose not to take quizzes at all.

Lesson 3. It’s not enough to require participation and to give points for doing so—you must also monitor whether

Since requiring online homework, I’ve seen a tremendous improvement in student success. Pass rates have gone up 10 percent, test averages have increased 9 percent, and the number of students earning As has gone up an astounding 25 percent!

— Brooke Quinlan
Hillsborough Community College
students are engaged and be prepared to intervene if they are not. Students who are slow to engage in course activities can quickly find themselves too far behind to catch up. Other students simply never begin.

In analyzing data from its spring 2005 redesign pilot, Eastern Washington University (EWU) discovered that students who failed the course had not participated in scheduled learning activities (e.g., they had not taken online mastery quizzes). Approximately 90 percent of students passed the course if they had participated in taking online quizzes in each of the first three weeks. An analysis of what EWU calls “nonparticipating students” (roughly 30 percent of the course enrollment) revealed that 50 percent of students who had not logged on for a mastery quiz during the first week failed the course.

Developing “early alert intervention strategies” to motivate these students will lead to increased student success. Some institutions report having established baseline performance standards, and students who fall too far behind them are contacted. For example, UNM students who score 75 percent or less on the first exam at the end of the third week are required to attend a weekly 50-minute studio for the remainder of the semester. Those students who were advised to attend a studio but failed to do so typically failed the course. In contrast, UNM data shows that the more studios that students attend, the better their course performance.

Adapted from a Student Blog
Jefferson Community College, Louisville, Kentucky

It’s Saturday night and I’m…
...sitting at home, doing math homework.

I have to say, math instruction has improved a LOT since 1994. I am deeply impressed with the online service MathXL. All my homework is on the Internet. If I don’t understand a problem, the system will walk me through it step-by-step, then give me a new problem (for credit) based on the same principles. One out of every 10 problems comes with a five-minute QuickTime video of a teacher working it out on a blackboard—then you get to try at home. Best of all, you have INSTANT feedback.

That’s the thing that killed me back in the day. There were plenty of times I thought I understood the principles. When I got my homework back two weeks later, I was genuinely surprised to see I’d failed miserably. The teacher had already moved on to new material by the time we had feedback on the old stuff, so if you misunderstood one of the building blocks, you were out of luck. With this, if the walk-through and book and videos aren’t enough to explain the homework, you know EXACTLY what to ask the teacher in class.

Instead of coasting through for the sake of a grade, I’m actually learning some math for the first time in my life. Wow. I can’t believe how optimistic I feel about a subject that has repeatedly kicked me in the [expletive deleted]. This is awesome.

—Sharon Testone
Onondaga Community College

MyMathLab and Integrated Assessment as an Integral Part of Instructional Practice

The Gatti Study

To explore the connection between M M L’s integrated assessment and student achievement, Pearson Education hired Gatti Evaluation at the start of the 2006 winter semester to conduct a formal evaluation. The study
employed a control versus treatment pre- and posttest design and asked: Do college mathematics students making regular use of M ML or M athXL demonstrate higher achievement and skill mastery than do their peers who are not making regular use of M ML or M athXL?

The study comprised four college systems and 17 instructors. Treatment instructors were selected on the basis of experience with M ML or M athXL; control instructors were selected on the basis of course structures that closely followed those of corresponding course treatment instructors.

Students in the control classrooms completed paper-based assignments and did not make use of the M ML or M athXL program in any way. Students in treatment classes made regular use of M ML or M athXL to complete course assignments, and teachers required online assignments for each section covered, which counted toward the final course grade.

Elementary, intermediate, and college algebra mathematics students were pretested at the beginning of the semester by using the ACT Explore test. At the end of the semester, prealgebra students took the ACT Explore test a second time; intermediate and college algebra students took the ETS Assessment of Algebraic Understanding.

Results of the first phase of the study—an effect size of .36—represent a statistically significant advantage for integrated assessment using M ML in elementary, intermediate, and college algebra math instruction. At the printing of this report, the study was in its second phase.

### The DeVry Experience

DeVry University, using a much larger sample than the Gatti study did, elicited overwhelmingly convincing results—reinforcing that the inclusion of repetitive assessment in M ML course curricula significantly increases student achievement and retention.

After years of analyzing and revising its mathematics curriculum, DeVry experienced improved student success—specifically in developmental math, prerequisite skills math, and standard math courses. However, analysis of graduation rates and C/D/F rates, and the root causes of each, made it clear that there remained room for improvement—and that the problem lay not with the faculty but with the traditional system of teaching and learning mathematics. DeVry faculty and administration agreed that the traditional approach was failing many of their entry-level math students.

A team of lead math faculty was charged with determining the math requirements for DeVry’s technology, business, and management programs. The team worked with a course architect and Pearson Education to custom design four courses on the MyMathLab platform. The courses were configured to create a self-paced, mastery-learning environment, which DeVry calls system-supported mastery learning (SSML):

- There is no overlap of content coverage across courses.
- At each level, tests loop back to check on retention of prior content.
- Prior content can be refreshed, on demand, by returning to the content of prior courses.

In addition to realigning pedagogical methods, DeVry’s SSML solution addressed and reframed some of the conceptual issues surrounding the teaching and learning of entry-level mathematics. The solution accomplished the following:

<table>
<thead>
<tr>
<th></th>
<th>P Value</th>
<th>Degrees of Freedom</th>
<th>Hedges’ g</th>
<th>Standard Error</th>
<th>Lower Limit</th>
<th>Upper Limit</th>
<th>95% CI</th>
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<td>0.029</td>
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Table 2. ANCOVA Posttest Score Results for MyMathLab Use in Elementary, Intermediate, and College Algebra Math Instruction

Results of the first phase of the study—an effect size of .36—represent a statistically significant advantage for integrated assessment using M ML in elementary, intermediate, and college algebra math instruction. At the printing of this report, the study was in its second phase.

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A standardized (Hedges’ g) effect size was reported for a straight gain score model with both a standardized and the common language effect size (CLES) reported for the ANCOVA model.

Weighted combinations of the effect sizes were also reported. All effect sizes were reported with standard errors, two-sided statistical significance P values, and confidence limits. Positive composite effects were observed for the gain score (g = 0.201) and ANCOVA (g = 0.360) models for primary math, with the ANCOVA model effect reaching statistical significance at the P = 0.05 level. Composite groups were not statistically different at baseline.
• Acknowledged and helped students who had math phobia
• Established a partnership relationship between students and faculty in the learning process
• Provided students with encouragement, positive feedback, and structure

Following the lead of M M L’s student-centered focus, the role of the instructor in the SSML program shifted from one of “sage on the stage” to one of “guide on the side.”

• The responsibility for learning is placed on the shoulders of the students.
• Study plans are generated by M M L.
• Homework and tests are graded by M M L.
• Student data is collected in M M L’s Gradebook.
• Mini-lectures of 15 to 20 minutes are used for small-group instruction.
• Faculty and students communicate online as well as on-site.

The results show unequivocally that the SSML approach, with its regular schedule of automated assessment and immediate feedback, served students significantly better than the traditional model did. For the three courses in which the shift had been made (introduction to algebra, basic algebra, and algebra for college students), the percentage of students who passed (received a grade of A or B) increased an average of 57 percent; the percentage of students who failed to pass (received a grade of C, D, F, or I) decreased by 49 percent; and the number of students who withdrew from the class decreased by 24 percent.

Faculty across the nation concur that low math achievement in high schools is endemic. Rectifying this issue could take years. Meanwhile, colleges and universities cannot ignore it. Methodology like DeVry’s SSML has proved that the low-achievement issue can be addressed head-on and with success. Students with remedial math skills can catch up, can fulfill their college math requirements, and can even go further.

Serving the Underserved

The graduation rates among our country’s most underserved students—those of color, of low income, and of remedial skills, as well as those returning to school—are lower than overall student numbers and illustrate gross disparity of educational achievement. National Center for Education Statistics data cited in NCAT’s groundbreaking monograph, *Increasing Success for Underserved Students*, indicates that one-quarter of freshmen are from low-income backgrounds, almost one-third are nonwhite, and 40 percent are the first in their families to attend college. It reports that these students are more prone to drop out—that 45 percent of African-American students and 39 percent of Hispanic students, on average, leave four-year institutions within six years without earning degrees, compared with 33 percent

![Chart 3. Summary data of fall 2004 traditional courses and fall 2005 SSML courses.](chart3.png)

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The biggest difference has been the help for students with learning differences. MyMathLab’s ability to offer repetitions until the skill has been mastered helped one woman get her first A in mathematics.

—Greta Harris-Hardland
Tarrant Community College
Making the Grade, Version 2.0: A Report on the Success of MyMathLab in Higher Education Math Instruction

of white students and 26 percent of Asian-American students. The monograph notes that similar gaps exist by income: students from lower-income backgrounds are significantly less likely than students from higher-income backgrounds to earn bachelor’s degrees. According to Peter Ewell, vice president of the National Center for Higher Education Management Systems, three things must occur for these students to gain competitive educational footing: more of them must successfully make it through the critical, first year of college; they must effectively master the skills and knowledge that first-year courses encompass, because most of these courses are prerequisites for the rest of the undergraduate curriculum; and both of these things must occur on a large scale and at an affordable price.

In 2004, supported by a grant from Lumina Foundation for Education, NCAT conducted an in-depth study to document the impact of course redesign on underserved populations. The results were heartening. “Although the PCR was directed at a broad first-year student population at all types of institutions, NCAT knows that its redesign techniques have been particularly effective with underserved students: low-income students, students of color, and adults.” Following are some highlights of the monograph.

- Rio Salado College, a community college in the Maricopa County Community College District, focuses on distance education for adult learners. By redesigning four of its online introductory math courses, Rio Salado increased course completion rates from 59 percent to 65 percent.
- The University of Idaho increased success rates in intermediate algebra for Hispanic students from 70 percent to 80 percent—thus surpassing the success rate for the entire algebra population as a whole.

Five out of six pedagogical techniques that the NCAT study identified as most effectively contributing to improving the learning and to increasing the success of underserved students are the very aspects of MyMathLab that faculty and students say they most appreciate.

- Online tutorials
- Continuous assessment and feedback
- Increased interaction among students

Students with learning disabilities benefit the most from My MathLab. One described it as “Simply awesome!” Another said that this was his second time through the course and that if he had had MyMathLab the first time, he would have passed the course then.

— Faculty member
University of Missouri-Columbia

Marvin’s Story

Marvin, alongside 5 to 10 percent of his freshman class, placed into introductory algebra (Math 010). He was disappointed—and daunted—by the remedial math requirement. But not for long. In Math 010, Marvin was introduced to MyMathLab, a cornerstone of UW-Stout’s Math Teaching and Learning Center (Math TLC).

Within one year, Marvin went from floundering at math—and contemplating dropping out of college—to being near the top of his class. What’s more, he was so excited by his own potential that he chose to continue his mathematics learning and enrolled in intermediate algebra even though it wasn’t required for his major. He scored in the top third of his class.

MyMathLab impacts students in ways far more personal than the good grades they receive. Increased self-confidence enables students like Marvin to stay in school, explore the outer limits of their potential, and garner the kind of tools that will assist them in building economically viable lives for themselves.

Marvin used his own unique style to thank his first-year math instructors and express his thoughts about the Math TLC and MyMathLab: he wrote and performed a rap song. “If you’re struggling with your math and you want to succeed, then the Math Lab is the place for you to be. M-A-T-H-L-A-B. It’s the Math Lab. It will help you achieve.”
Integrated Assessment and the Case for Redesign

- Individualized, on-demand support
- Structural supports that ensure student engagement and progress

The combination of redesign and MML gave institutions in the NCAT study the kind of pedagogical and technological boosts that enabled their students to learn more, achieve more, and experience success in ways previously unattainable. Says T wigg, “The software supports verbal, visual, and discovery-based learning styles and can be accessed anytime at home or in a lab. M yM at hLab enables instructors to see the work that students are actually doing and to easily monitor their progress. Students found the software easy to use, and they achieved a comfort level in a short amount of time. Students especially liked the instant feedback they received when working problems and the guided solutions available when their answers were incorrect.”

Interviews with and data culled from institutions contacted for this paper also point to the strong correlation among M M L, redesign, and success for underserved and nontraditional populations.

**Wayne State University.** “We have a high population of low-income students,” says Becca M organ, manager of the mathematics computer lab at Wayne State University. “What makes a difference for them is M M L’s videos. They keep them focused and remove any confusion that might arise from graduate assistants or instructors who have accents. M M L also helps increase self-confidence. M any of these students don’t want to ask for help. M M L offers them an option. And it works.”

**University of Alabama.** Since implementation of the M M L-redesigned model, pass rates for intermediate algebra have increased by more than 50 percent. “Students who come in more poorly prepared benefit more from this format,” says Benson. “On average, our African-American students are less prepared than our Caucasian students. T hey’re very sharp kids, but many have weak math backgrounds. In the traditional teaching model, their success rates were slightly below the Caucasian students’. Since we initiated M yM at hLab and the mandated-lab setting, they’ve been performing as well as or better than the Caucasian students. I believe this is related to the availability of support. Students don’t have to worry about stigma or what seems like a dumb question. T he key with M M L is willingness to do the work. T hey can—and they do.”

<table>
<thead>
<tr>
<th></th>
<th>Traditional</th>
<th>Re-designed</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Fall 1998</td>
<td>Fall 1999</td>
</tr>
<tr>
<td>African-American</td>
<td>46.2%</td>
<td>35.0%</td>
</tr>
<tr>
<td>Caucasian</td>
<td>46.9%</td>
<td>41.1%</td>
</tr>
</tbody>
</table>

Table 3. Pass Rates by Ethnicity for Fall Semesters 1998–2002

**Moving Forward: NCAT’s Redesign Alliance and Colleagues Committed to Redesign**

The National Center for Academic Transformation has shown how using information technology to redesign courses can improve student learning while reducing instructional costs. To further support institutions that have already redesigned and those that are planning to, NCAT has created two programs: the Redesign Alliance and Colleagues Committed to Redesign (C²R).

**Redesign Alliance.** Comprising 42 institutions and organizations, the Redesign Alliance will facilitate the exchange of ideas, experiences, resources, and strategies among institutions interested in course redesign.

**Colleagues Committed to Redesign.** A three-year program sponsored by the Fund for the Improvement of Postsecondary Education, Colleagues Committed to Redesign will support the new redesign efforts of 60 colleges and universities over the course of three years.

For a full description of the Redesign Alliance, see www.thencat.org/RA.htm. For a full description of the C²R program and the application guidelines, see www.thencat.org/RedesignAlliance/DissemProgram.htm. For more information on either initiative, e-mail info@theNCAT.org.

The key with M M L is willingness to do the work. [Students] can—and they do.

— Joe Benson
University of Alabama

www.mymathlab.com • 13
Creating Community and Providing Support

Information technology vendors and service providers should position themselves as business partners that offer strategic competencies to help institutions achieve academic and business goals that support the mission of the institution rather than being only providers of software, hardware, or services.11

MyMathLab Faculty Advocates

Faculty are unequivocal about their support for MyMathLab (MML). And the MML Faculty Advocate program is one reason why. Built upon the proven effectiveness of peer-to-peer advising, the program offers access to a nationwide network of more than 80 faculty advocates—college instructors experienced in teaching with MyMathLab—who advise and counsel either math faculty currently using MML or those interested in incorporating it into their courses. Faculty advocates provide phone coaching and teaching support, conduct campus training sessions, and present MML student results at conferences and workshops.

As power users of MML, faculty advocates provide the Pearson Math Media Development team with critical user information to steer upgrades and enhancements to the platform. Advocates and Pearson staff meet formally and informally throughout the year in person and via telephone, e-mail, and online demonstrations. As one staff member described it, “It’s a constant feedback loop.”

“Pearson has created a community for us, a supportive environment in which faculty from different institutions can learn from each other’s experience,” says Dr. Margo Alexander of Georgia State University. “MML focus groups, workshops, and panels promote communication and creative thinking about what we’re teaching, how we’re teaching it—and how it and we can be better.”

Responsive Customer Service

Faculty users of MyMathLab can be confident that both they and their students will receive top-notch customer service. Interviews for this article indicate that faculty find Pearson support accessible, reliable, and friendly.

“So many places you call these days you have to go through an automated process and then wait 20 minutes or more,” says Susan Haley of Florence-Darlington Technical College. “With MML you always reach a person—and it’s always quick.” Jeanne Foley of UW-Stout agrees. “[Technical support] is easy to get a hold of, extremely knowledgeable, and very personable. Questions are attended to immediately or within the day. She even answers the phone herself, which is rare these days!”

But perhaps what really sets Pearson technical support apart from the rest is that they care. “We receive simply tremendous support from the technical staff,” says Haley. “They stay in constant contact with us. They seem truly concerned.”

There is no comparison between Pearson training and support and the competition. When I call or e-mail for help, I always get the help I need. I’ve never had an experience of not hearing back from someone.

—Janet M. Macaluso
Eastern New Mexico University, Roswell Campus

11Gartner’s Top Predictions for Industry Leaders, 2007 and Beyond, Jorge Lopez, Todd Eyler, Joanne Galimi, David Furlonger, Peter Redshaw, Barry R. Hieb, M.D., Michael Zastrocky, Marti Harris, Bill Rust, Zarko Sumic, James Spiers, 2006.
Institutions around the Country Weigh In

Chart 4. Louisiana State University college algebra drop rates comparing fall 2003 (last traditionally taught college algebra class) and fall 2006 (first fully-redesigned-with-MML college algebra class).

Chart 5. Onondaga Community College departmental exam scores.

Chart 6. Gadsden State Community College success, unsatisfactory, and drop rates in traditional and MyMathLab courses.

Hillsborough Community College
Since 2005, after requiring the use of MathXL:
- Pass rates have increased 10 percent
- Test averages have increased 9 percent
- Number of students receiving an A has increased 25 percent
- Withdrawal rates have decreased 10 to 15 percent


Chart 8. Youngstown State University beginning algebra course success rates.
Measurable Results

Most of the institutions interviewed for the 2007 report were sold on MyMathLab (MML) years ago. They held a strong grasp of the basic advantages of the MML online courseware model and had already seen solid success in the areas of increased pass rates, decreased drop/fail/withdrawal rates, and cost containment, as well as in the ability to scale their successes into expanding class sizes. Like the institutions interviewed for the 2005 Making the Grade report (www.mymathlab.com/success_report.html), the institutions interviewed this year are confident that MML is the most effective tool to ensure that their students not only pass their math classes the first time but also fully master both the mathematical concepts and the ability to actively and self-responsibly learn.

This report goes beyond the benefits listed above and delves more deeply into the ways MML helps students succeed and how some institutions are leveraging MML for even more substantial success. It examines the effects of integrated assessment and department standardization and explores the positive influence of MML on subsequent success, underserved students, and one of the most important issues facing higher education today: retention.

The implications of improving student retention are far-reaching for both the economy as a whole and anyone seeking personal economic stability. According to the National Center for Academic Transformation (NCAT), 60 percent of students at public institutions fail to complete degrees within five years, and 50 percent of those students leave school during their freshman year. According to the National Center for Education Statistics, nearly half of first-time students who leave their initial institutions by the end of their first year never return to higher education. Our nation’s job market is shifting under the weight of a growing knowledge economy. One of the most pressing issues within higher education—keeping students on track and in school—is one of the ways MML helps change lives beyond the classroom.

Two of six of the institutions interviewed not only integrated MML into their curricula but also embarked on full-fledged course redesigns as prescribed by NCAT’s Roadmap to Redesign program. These institutions serve as academic pioneers, having forged ahead, heeding a nationwide call—from the federal government, industry analysts, and students themselves—toward the unknown horizons of technology and new and improved ways of presenting and packaging mathematics instruction. We look forward to sharing these upcoming best practices with you in our next report.

Florence-Darlington Technical College

Florence-Darlington Technical College (FDTC) is a two-year public technical college whose main campus is located between the South Carolina cities of Florence and Darlington. It offers its roughly 4,000 on-campus and 30,000 online students a variety of certification and degree programs up to the associate degree level, as well as continuing education courses and workforce development programs.

FDTC is a member of the Southern Association of Colleges and Schools (SACS). As such, when time came for reaccreditation, FDTC discovered SACS had a newly initiated compliance standard: the quality...
Measurable Results

enhancement plan (QEP)—an ongoing plan of continuous improvement done on a five-year reporting cycle. It meant FDTC had to create for immediate implementation within every department on campus a multiphase plan with measurable outcomes. FDTC was uniquely up to the task, because the philosophy and repercussions of QEP dovetailed with one of the institution’s stated goals: “to transform the traditional approach into a flexible, customer-oriented learning environment emphasizing certifications, work experience credit, competency-based outcomes, self-paced, individualized instruction, and the infusion of technology in all programs of study.” Faculty and administration at FDTC started work immediately.

The mathematics department was particularly ripe for the challenge. Nationwide statistics indicate that mathematics courses have significantly higher enrollment than do other remedial or prerequisite courses and have historically low course completion rates. What’s more, the statistics indicate that lack of completion of remedial and prerequisite mathematics courses is perhaps the foremost barrier to student success. In fall 2004, 75 percent of FDTC students enrolled in a math class were enrolled in remedial or prerequisite classes (MAT 031, 032, 101, or 102). The pass rate of C or better for those students was 50.5 percent.

FDTC’s QEP comprises three main aspects: a set of four goals, creation of a Mathematics and Technology Hub, and implementation of MyMathLab.

QEP goals addressed issues concerning course competency, pass rates, and subsequent success.

- Primary Goal: to increase student knowledge of course competencies in remedial and prerequisite courses by at least 5 percent
- Secondary Goal 1: to increase by at least 5 percent the course completion rate of students in remedial and prerequisite courses
- Secondary Goal 2: to increase by at least 5 percent the course completion rate of students in curriculum math courses who took the prerequisite math course
- Secondary Goal 3: to increase by at least 5 percent students’ average on the final exam of each remedial and prerequisite math course

The Mathematics and Technology Hub is a computer learning center comprising traditional class lecture, mandatory use of MyMathLab, guided instruction in a supervised environment, and one-on-one instructor/student interaction. Students were required to commit a minimum of five hours per week per course: one hour of lecture, at least three hours in the hub, and at least one hour of one-on-one interaction with an instructor. Of particular interest is that in the studies described later, even classes labeled traditional include the option of MyMathLab. Therefore, the data serves to illustrate not only the difference between traditional and MyMathLab classes but (without formal controls) also the difference between required use of MyMathLab and nonrequired use. “I see a big difference between optional and required usage,” says Susan Haley, a math instructor at FDTC.

Haley cites many of the same reasons most cite for selecting MyMathLab as FDTC’s interactive technology: an instructor-guided curriculum focusing on individual learning needs, a unique and flexible set of course materials, and a broad range of intuitive, time-saving features, including tutorials, a multimedia textbook, assessment capabilities, and an online grade book. By combining MyMathLab’s proven teaching and learning system with the time requirements of the hub, FDTC created a winning approach that offered the following key aspects of student achievement:

- Active learning
- One-on-one help
- Encouragement of additional hours

Students learn quickly that there’s a cause-effect relationship between time and success. We see more kids at the computer as the weeks pass; they know it’s all up to them.

— Susan Haley
Florence-Darlington Technical College

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— Susan Haley
Florence-Darlington Technical College
• Development of self-confidence
• Self-paced study that facilitates course acceleration

And it’s worked. FDTC has far surpassed nearly all of its goals and is certain to attain them completely in the coming semesters.

**Primary Goal.** Data gleaned from primary-goal studies suggests that students learn more with MML than in the traditional classroom. MML 031, 032, and 101 students increased their competency skills by 23.56 percent, 29.52 percent, and 39.97 percent, respectively—more than traditional 031, 032, and 101 students and far beyond FDTC’s stated goal of 5 percent per course. (Note: MML 102 students did not improve as much as traditional 102 students. Spring 2006 was the first semester MAT 102 was taught with MML. There were only 14 students in the MML test group—an insufficient number to suggest hub 102 students are improving more or less.)

**Secondary Goal 1.** Data gleaned from secondary goal 1 strongly suggests that the completion rate is related directly to the learning environment chosen by the student. Completion rates for MML students were 17.3 percent higher than rates for students in traditional classrooms. This well exceeds FDTC’s stated goal of 5 percent—and bodes well for the economic viability of those students later in life in light of the well-established correlation between remedial and prerequisite course completion rates and student retention.

“We see increases in retention,” says Haley. “The students are definitely sticking around, sticking with the work, and graduating.” Equally as exciting, students are making the switch from a focus purely on grades to one on learning. Haley describes one student who, when informed that she more than likely couldn’t complete the course requirements in time and when advised to drop the course so as to avoid an F, replied, “No. I’ll stay in class. Even if I don’t finish it and I have to get an F, I’m learning this material.”

**Secondary Goal 2.** Although data for secondary goal 2 is limited, preliminary results suggest that the completion rate for MML students is higher in subsequent courses than is the completion rate for those whose remedial or prerequisite course was taught in a traditional manner. “Students who used the MML approach in their remedial or prerequisite classes enter subsequent classes with both high expectations and a desire to learn,” says Haley. “They’re ready to work and have the homework and study skills to back them up. They succeed not only because they learned the math but also because MML taught them how to study and how to learn.”

<table>
<thead>
<tr>
<th>Course</th>
<th>Students Who Took Pre-Course</th>
<th>Number Who Completed the Curriculum</th>
<th>Completion Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>College Algebra</td>
<td>42</td>
<td>34</td>
<td>80.95</td>
</tr>
<tr>
<td>Intermediate Algebra</td>
<td>231</td>
<td>105</td>
<td>45.45</td>
</tr>
<tr>
<td>Contemporary Math</td>
<td>106</td>
<td>88</td>
<td>83.02</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>379</td>
<td>227</td>
<td>59.89</td>
</tr>
</tbody>
</table>

Table 5. Secondary Goal 2 Results

**Secondary Goal 3.** The data for secondary goal 3 suggests that students who use MML perform better on the final exam than traditional students do. MML 031, 032, 101, and 102 final exam averages were 6.7 percent, 0.8 percent, 15.0 percent, and 10.2 percent higher, respectively, than the final exam averages of the traditional classes. Only the 032 class did not reach the goal of 5 percent improvement.

What isn’t apparent by an examination solely of the previous statistics is the positive impact MML has had on FDTC’s nontraditional and underserved students. “Some of our older students have never touched a computer,” says Haley. “They’re scared to death. But the MML program is so user-friendly that by the end of the
Measurable Results

First week, they know exactly what to do. And when they hit the ‘Help Me Solve This’ button and are able to figure out a problem on their own, you see it on their faces. Their self-esteem just soars.”

— Susan Haley
Florence-Darlington Technical College

FDTC was created nearly four decades ago with the mission of providing technical education and assisting in the economic development of its service area. As one of the fastest-growing institutions of higher education in South Carolina, FDTC understands the pressing need to continually look ahead for those products that—in measurable tests—are proven to ensure that students receive the highest quality of instruction at the lowest cost. M M L is helping FDTC fulfill its goals, and while it’s clearly working, FDTC isn’t satisfied yet. Plans for 2007 include expanding the mathematics QEP from 8 sections of remedial math using 25 computers to 24 sections using 50 computers.

For more information, see http://qep.indrihovic.com/.

Table 6. Secondary Goal 3 Results

<table>
<thead>
<tr>
<th>Course</th>
<th>Environment</th>
<th>Number of Students Taking the Exam</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 031</td>
<td>Hub</td>
<td>71</td>
<td>81.7</td>
<td>6.7</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>400</td>
<td>76.6</td>
<td>12.6</td>
</tr>
<tr>
<td>MAT 032</td>
<td>Hub</td>
<td>117</td>
<td>71.4</td>
<td>9.6</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>608</td>
<td>70.8</td>
<td>13.7</td>
</tr>
<tr>
<td>MAT 101</td>
<td>Hub</td>
<td>46</td>
<td>74.5</td>
<td>11.3</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>574</td>
<td>64.0</td>
<td>15.0</td>
</tr>
<tr>
<td>MAT 102</td>
<td>Hub</td>
<td>16</td>
<td>75.4</td>
<td>16.2</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>335</td>
<td>68.4</td>
<td>13.2</td>
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“Many of our low-income and minority students don’t have computer access at home. We want to ensure that they aren’t hindered by that,” says Haley. To that end, FDTC’s hub is staffed with tutors and available for walk-in help afternoons and evenings until 9 p.m. The privacy of the computer and the one-on-one tutor approach also serve to decrease the stigma of asking questions and being perceived as bothersome. Requiring that students work in the hub ensures that they see others asking questions, too. “With M M L, answers are also available online via Help buttons and different media, such as videos. A great thing about these features is that they illustrate that it’s possible to find the answers by oneself. Students get very excited when this happens. M M L encourages and builds their confidence and willingness to continue.”

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</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>608</td>
<td>70.8</td>
<td>13.7</td>
</tr>
<tr>
<td>MAT 101</td>
<td>Hub</td>
<td>46</td>
<td>74.5</td>
<td>11.3</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>574</td>
<td>64.0</td>
<td>15.0</td>
</tr>
<tr>
<td>MAT 102</td>
<td>Hub</td>
<td>16</td>
<td>75.4</td>
<td>16.2</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>335</td>
<td>68.4</td>
<td>13.2</td>
</tr>
</tbody>
</table>

“Many of our low-income and minority students don’t have computer access at home. We want to ensure that they aren’t hindered by that,” says Haley. To that end, FDTC’s hub is staffed with tutors and available for walk-in help afternoons and evenings until 9 p.m. The privacy of the computer and the one-on-one tutor approach also serve to decrease the stigma of asking questions and being perceived as bothersome. Requiring that students work in the hub ensures that they see others asking questions, too. “With M M L, answers are also available online via Help buttons and different media, such as videos. A great thing about these features is that they illustrate that it’s possible to find the answers by oneself. Students get very excited when this happens. M M L encourages and builds their confidence and willingness to continue.”

FDTC was created nearly four decades ago with the mission of providing technical education and assisting in the economic development of its service area. As one of the fastest-growing institutions of higher education in South Carolina, FDTC understands the pressing need to continually look ahead for those products that—in measurable tests—are proven to ensure that students receive the highest quality of instruction at the lowest cost. M M L is helping FDTC fulfill its goals, and while it’s clearly working, FDTC isn’t satisfied yet. Plans for 2007 include expanding the mathematics QEP from 8 sections of remedial math using 25 computers to 24 sections using 50 computers.

For more information, see http://qep.indrihovic.com/.

Table 6. Secondary Goal 3 Results

<table>
<thead>
<tr>
<th>Course</th>
<th>Environment</th>
<th>Number of Students Taking the Exam</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 031</td>
<td>Hub</td>
<td>71</td>
<td>81.7</td>
<td>6.7</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>400</td>
<td>76.6</td>
<td>12.6</td>
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<tr>
<td>MAT 032</td>
<td>Hub</td>
<td>117</td>
<td>71.4</td>
<td>9.6</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>608</td>
<td>70.8</td>
<td>13.7</td>
</tr>
<tr>
<td>MAT 101</td>
<td>Hub</td>
<td>46</td>
<td>74.5</td>
<td>11.3</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>574</td>
<td>64.0</td>
<td>15.0</td>
</tr>
<tr>
<td>MAT 102</td>
<td>Hub</td>
<td>16</td>
<td>75.4</td>
<td>16.2</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>335</td>
<td>68.4</td>
<td>13.2</td>
</tr>
</tbody>
</table>
An integral component of GSU’s redesign was the creation of the Mathematics Interactive Learning Environment (MILE)—a student-centered computer lab with 84 student computer stations, one of which is compliant with the Americans with Disabilities Act. Every computer has access to MyMathLab, and the lab is staffed by instructors and graduate research assistants. “The lab was designed not just to teach math but also to shift the learning paradigm from ‘tell me’ to ‘involve me,’” says Alexander. “Students in both college algebra and precalculus are required to attend one lecture a week and one lab session a week. The lab provides them with an environment of one-on-one support, in which they can ask anything from any lesson; and if they don’t finish a lesson, they can stay or come back later.” All work performed in GSU’s MILE lab is performed on MML. Says Alexander, “The entire lab, from structure to staffing, is focused on students and their success.”

Redesign was a multiphase process that took place from fall 2004 through spring 2005—with dramatic results: college algebra pass rates increased 37.5 percent, and fail/withdrawal rates decreased 40.7 percent. Precalculus rates were equally as impressive: pass rates increased 25.5 percent, and fail/withdrawal rates decreased 29.7 percent.

GSU is also seeing its pass-rate success translate to subsequent classes. When comparing the calculus pass rates of students who came from traditional courses with those from MML-redesigned precalculus courses, Alexander discovered that students from MML-redesigned precalculus courses achieved a 23.3 percent higher pass rate than did those from traditional courses. Not surprisingly, drop/fail/withdrawal rates were lower for students from the MML-redesigned courses—by 8.5 percent.

High success rates in both algebra and precalculus have inspired GSU to restructure its calculus courses to include MML. “If you’re seeing that students are using MML to do homework and study more, why not offer it as an option?” says Alexander. “To start, we’ve mandated only that students do MML homework and quizzes. Knowing the success in the other two courses, we’re pushing our students to the next level by asking them to take an even more proactive role in their learning.”

Retention was a specific concern of GSU. “We’re trying to increase retention and graduation rates,” says Alexan-
Measurable Results

“We want our students to retain their knowledge and carry their success beyond college.” To that end, she’s building a peer tutoring program involving students who’ve participated in the MML-redesigned courses. “A student helping a student is more effective than faculty helping a student,” she says.

“Redesigning with MML has also helped standardize the classes and syllabi,” says Alexander. “The administration particularly likes the way it keeps everyone on the same page, ensures that all the objectives and goals of a course are met, and eliminates the variables of grade inflation. Now we can be confident about what our students know when they graduate.”

A certain substantial but behind-the-scenes benefit of the MML redesign has been a pleasant surprise to Alexander and the rest of the faculty: increased communication and collaboration among staff. “Since the redesign, we meet as a group to decide things; everything is a collective effort,” says Alexander. “Faculty and administration come together for discussion and learn from each other and from each other’s experiences. It’s truly a group effort. I very rarely do something on my own without asking the group, ‘What do we all see?’ or ‘How do we want to proceed?’ It’s really helped eliminate politics and power and control issues.”

By requiring and standardizing the use of MyMathLab and leveraging its unique power to engage students in active learning, accommodate a breadth of learning styles, and provide ongoing assessment and individualized assistance, GSU achieved its objectives—and more!

- Reduction of drop/fail/withdrawal rates
- Reduction of annual cost
- Positive student attitudes about mathematics and students’ own ability
- Improved quality of instruction
- Consistency of performance standards
- Uniformity of content presentation
- Uniformity of assessment across sections
- Administration support
- Development of the MILE

Alexander is justifiably proud of GSU’s redesign project. “The fact that everything is coordinated and we’re discussing things and communicating—for faculty to get together like this, it’s such a positive thing,” she says. “The only place we can go is up. I just wish more people could come into the lab and see the students working together and talking mathematics. It’s overwhelming!”

Montgomery College

At Montgomery College (MC) in Conroe, Texas, approximately two-thirds of entering students test into developmental mathematics. Recognizing that success in both academia and the workforce is unattainable without success in mathematics, MC faculty investigated alternative pedagogy aimed at increasing student success. They kept coming back to assessment—and how today’s literature repeatedly asserts that the traditional, one-shot final approach is an ineffective tool for student learning. With that in mind, faculty teamed with Pearson Education and devised the Mathematics Learning Outcomes Assessment Laboratory program (MLOAL). The program was piloted in spring 2003, beginning with the lowest-level developmental course. It was then evaluated, improved, and implemented on a broader level, and by fall 2004 approximately 100 developmental math sections with 2,500 students were participating in the program. Today faculty and students overwhelmingly embrace the Mathematics Learning Outcomes Assessment Laboratory program, which is now a standardized program across the department for all developmental math courses.

What’s the best method to increase student success? We think we’ve found it. And it’s called MyMathLab.

—Margo Alexander
Georgia State University

www.mymathlab.com 21
The MLOAL is the heart of a student-friendly program that utilizes MyMathLab to deliver assessments based on desired course outcomes. Lab hours span from early morning to late at night Monday through Thursday, with morning hours on Friday and Saturday. Students may take the assessments at any time the lab is open, may make as many as seven attempts at any one assessment, and are required to pass all outcomes lab assessments in order to pass the course. MyMathLab’s grade distribution program sends grades to instructors on a weekly basis, thereby enabling instructors to track student participation and progress and to intervene if necessary with tutoring or other support services.

Courses typically require 8 to 10 concept-based assessments. This kind of regular assessment empowers students to take charge of their learning. By continuously evaluating their strengths and weaknesses via the immediate feedback provided by MyMathLab, students know exactly where they need further study and are less likely to fall behind early in the semester, when it is hardest to rebound.

Three of MC’s primary goals were to increase the success of mathematics students at all levels, to increase the number of students enrolled in higher-level mathematics courses, and to increase levels of student satisfaction with the educational process. Faculty, students, and administration agree: MLOAL has fulfilled these goals and more. From fall 2004 to spring 2005 there was a statistically significant difference between the pass rates of students who had completed outcomes assessment in the previous course and those of students who had not. College algebra saw the most significant pass rate difference: 73 percent for those who had successfully completed outcomes versus 55 percent for those who did not. Other positive outcomes include subsequent success and an increase in mathematics course enrollment. For example, enrollment figures for calculus have increased 80 percent since last spring.

The MLOAL-powered MLOAL has resulted in a win-win-win situation for the college: The faculty is delighted with the increased pass rates. The administration is thrilled with the recognition the program is gaining for the college. (So far, the program has been nominated for the prestigious Bellwether Award; has earned a 2007 Award from the National Council of Instructional Administrators, an affiliate of the American Association of Community Colleges; and is currently awaiting word on an award from the 2007 International Conference on Technology in Collegiate Mathematics.) And, perhaps most important, the students love it. Maureen Loiacano, mathematics and education department chair, says,

While going through our program, one student said to me, “Wow, I’ve never seen so many people who care about my learning math.”

— Maureen Loiacano
Montgomery College

<table>
<thead>
<tr>
<th>Semester</th>
<th>Percentage of Students Who Passed without MLOAL</th>
<th>Percentage of Students Who Passed with MLOAL</th>
<th>Percent Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2005</td>
<td>45</td>
<td>54</td>
<td>20</td>
</tr>
<tr>
<td>Summer 2005</td>
<td>63</td>
<td>68</td>
<td>8</td>
</tr>
<tr>
<td>Fall 2005</td>
<td>57</td>
<td>59</td>
<td>3.5</td>
</tr>
<tr>
<td>Spring 2006</td>
<td>54</td>
<td>59</td>
<td>9.25</td>
</tr>
</tbody>
</table>

Table 7. Longitudinal Study Comparing Introductory Algebra Students without and with Outcomes Testing.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Percentage of Students Who Passed without MLOAL</th>
<th>Percentage of Students Who Passed with MLOAL</th>
<th>Percent Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2005</td>
<td>36</td>
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<td>Summer 2005</td>
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<td>Fall 2005</td>
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<td>55</td>
<td>10</td>
</tr>
<tr>
<td>Spring 2006</td>
<td>50</td>
<td>60</td>
<td>20</td>
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Table 8. Longitudinal Study Comparing Intermediate Algebra Students without and with Outcomes Testing.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Percentage of Students Who Passed without MLOAL</th>
<th>Percentage of Students Who Passed with MLOAL</th>
<th>Percent Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2005</td>
<td>55</td>
<td>73</td>
<td>31</td>
</tr>
<tr>
<td>Summer 2005</td>
<td>69</td>
<td>77</td>
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<td>Fall 2005</td>
<td>76</td>
<td>84</td>
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</tr>
<tr>
<td>Spring 2006</td>
<td>72</td>
<td>80</td>
<td>11</td>
</tr>
</tbody>
</table>

Table 9. Longitudinal Study Comparing College Algebra Students without and with Outcomes Testing.
The award of a $1.7-million, five-year Title III grant gave the school the resources they needed to do just that.

Faculty and administration assessed the challenges that lay ahead—large numbers of developmental math sections, large numbers of part-time faculty, inconsistent delivery of objectives and grading, poor student performance, and diverse student educational goals—and in 2002 embarked on the Developmental Math Program. The program borrows heavily from the theory of Universal Design for Learning,12 with MyMathLab as one of its delivery vehicles.

Pass rates in all three developmental math classes—basic math, beginning algebra, and intermediate algebra—significantly increased, with beginning algebra showing the most striking average increase from the program pilot in 2003 through spring 2006: nearly 42 percent!

Steadily rising pass rates convinced even the most skeptical faculty members, and today MyMathLab is standardized across the QCC developmental math program. Master Courses, created with MML, enable all instructors to copy a complete, predesigned course.

One of the most visible changes has been an increase in the number of students utilizing math resources on campus. “Math Resource Center attendance figures went up significantly,” says Andreana Grimaldo, assistant pro-

12Universal Design for Learning is an approach to design of course instruction, materials, and content to benefit people of all learning styles. It provides equal access to learning by allowing the student to control the method of accessing information while the teacher monitors the learning process and initiates beneficial methods. The design enables the student to be self-sufficient, although the teacher is responsible for imparting knowledge and facilitating the learning process. Those who benefit the most from this approach include students who speak English as a second language, international students, older students, and students with disabilities.
Professor of mathematics and developmental mathematics coach at QCC. “The increase was dramatic and an indication that students are taking responsibility for their learning. They’re engaged in math and enjoy the immediate feedback of getting 100 percent on their homework.”

Standardized courses give students more options when help is needed. “Faculty, math center tutors, the textbooks, MML, and the students are all on the same page,” says Grimaldo. “Everyone knows what everyone else is doing, which means students have any number of resources for help.”

Faculty and adjuncts appreciate the standardization. “Everyone knows exactly what they need to do—no guesswork,” says Grimaldo. “It saves time—time that can be spent teaching and working one-on-one with students.” And by combining MML and QCC’s unique instructor resource manual, QCC can keep nearly 70 faculty and adjunct instructors on target and communicating. Instructors have many opportunities to meet and discuss what works best in the classroom and to share how they use MML to keep students excited.

“Standardizing the courses has opened a space for sharing and discussion and enabled us to learn from each other. In a community college, the population is always changing and the dynamics are always shifting. The constant sharing of new ideas is important for us,” says Grimaldo.

MML is also helping QCC improve retention. Its Gradebook and multiple reporting features facilitate close tracking of students’ attendance and performance, thereby leading to early intervention. “The moment they start slipping, you can see it,” says Grimaldo. “There’s no need to wait for an exam to find out.” MML’s e-mail feature enables instructors to communicate with students. “Every time you connect with students, you increase your chances of retaining them. It lets the students know that you care.”

The average age of a QCC student is 27 years old. The college has a high proportion of adult, learning-disabled, part-time, nonnative English-speaking, and evening students. These generally underserved populations have benefited as well.

“About 10 percent of our population have accommodations for learning,” says Grimaldo. “MML provides us with the resources to help them. They have video options and audio options, and they can enlarge text to a size that suits them. I have a student who is very intelligent and has cerebral palsy. She can run the computer beautifully, but she has trouble interacting with people. Because homework is almost exclusively online, she’s been able to succeed in my class.” English as a Second Language students also find extra support in MML.

“T hey can go back and practice English, review assignments, and listen to the audio as many times as they need to,” she says.

Community college students come from hugely diverse backgrounds and skill levels—from traditional high school graduates to adults returning to school. MyMathLab fits them all.
—Andreana Grimaldo
Quinsigamond Community College

Even those students who’ve had frustrating experiences and faced constant failure in math are empowered by MML. “It’s incredible to see them succeed,” says Grimaldo. “It increases their self-esteem and their potential to succeed in life. They learn math, but also technical reading and comprehension. MML teaches them how to follow directions, use a math symbol palette, and overlay it on a present need. These skills will serve them the rest of their lives.”

MML works with every type of student and every student’s learning style: those who are embarrassed to ask questions in class can send an e-mail, returning students who need more support can watch videos, and those who have the ability appreciate that they can get in and get out without repeating what they already know or can quickly learn. “They all like using it,” says Grimaldo.

Grimaldo and the rest of the QCC faculty are pleased with the successes they’ve derived from standardized use of MML on campus and online. Students are achieving at higher levels and instructors are thriving in an atmosphere of professionalism and collaboration.
Says Grimaldo, “This couldn’t happen if everyone wasn’t on the same page.”

In summer 2000, through a $200,000 Pew grant, UA’s College of Arts and Sciences assigned a 70-seat computer lab to the course, established the Mathematics Technology Learning Center (MTLC), and taught five sections of Math 100 using the redesigned format. Fall 2000 saw 18 sections of Math 100 being taught in the MTLC. “We started with very low pass rates: below 50 percent,” says Benson. “In the fall of 2000, we went from 40 to 50 percent. And we learned that it takes time. Administrations need to realize that redesign is unique to each institution. And you have to be patient. Our progress has continued; our numbers go up more every semester. Today our pass rates are in the mid 70 percent.”

By spring 2006, Math 100 pass rates had risen an average of 20.2 percent from 2000 rates, with the percentage of As and Bs increasing from 36.7 percent to 58.3 percent. For those courses in which the department had not fully made the switch to redesign, side-by-side data was compelling: not only did the MML-redesigned Math 121 course have a significantly increased pass rate compared with its traditional counterpart (64.7 percent versus 51.3), but also its failure rate decreased and its withdrawal rate dropped by more than half.

As time passes and studies become more longitudinal, institutions like UA move toward a greater awareness of how MML works best—namely, as part of a larger redesign that includes mandated and standardized use by students. “There's no doubt about it; required attendance in the labs means higher success rates,” says Benson.

Math 112—UA’s pesky precalculus class—is the cohort to Math 100. Those students who came out of an instructor mindset need to take the time to learn how to most effectively use MyMathLab, learn its nuances, and learn how to make it fit their personal teaching style.

— Joe Benson
University of Alabama

<table>
<thead>
<tr>
<th>Math 121 (Traditional)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Fail</th>
<th>Withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 121 (Redesigned)</td>
<td>17.4</td>
<td>20.4</td>
<td>26.9</td>
<td>11.4</td>
<td>9.6</td>
<td>14.4</td>
</tr>
</tbody>
</table>

Table 10. Math 121 Grade Distributions for Fall 2005
MML-redesigned Math 100 class passed their subsequent class, Math 112, at an average rate of 71.3 percent compared with the overall average of 48.3 percent. Pre-calculus is no longer frustrating faculty and students.

Today UA is experiencing a planned growth in enrollment—and has added approximately 5,000 students in the past four years. “MML and the redesign model have enabled us to deal with our rapid growth in an efficient manner,” says Benson. “In our mind, this is a better way to present the material. Students learn math by doing math. MML requires students to do more math—and thereby achieve greater and deeper learning. I’m not aware of anyone who’s made the change who’s seen a decline in success rates. Everyone’s pass rates may not increase as dramatically as ours, but we’ve been at this for many years. Instructors simply need to be patient.”

University of Wisconsin-Stout
The University of Wisconsin-Stout was founded in 1891 and serves roughly 8,000 students from its Menomonie, Wisconsin, campus. Most students live on campus and follow the national trend: 5 to 10 percent of a typical incoming class of 1,500–1,700 first-year students place into Math 010, a remedial algebra course, and another 35 percent place into Math 110, an intermediate algebra course and prerequisite to courses satisfying the university’s general math requirement. Over the eight semesters prior to fall 2004, failure/withdrawal rates in these courses averaged a combined 29 percent (beginning algebra) and 29.2 percent (intermediate algebra).

Because studies indicate that success in first-year math courses is a strong predictor of retention into the second year of college, UW-Stout had strong incentive to invest resources in a program designed to decrease its failure/withdrawal rates. “If we can get kids through math, they’ll stay in school and stay at UW-Stout,” says Dr. Jeanne Foley, director of UW-Stout’s Math Teaching and Learning Center (Math TLC). The Math TLC was created via a special allocation by the chancellor’s office in fall 2004 to develop a comprehensive approach combining online work with required daily classroom sessions and a new tutoring service devoted specifically to introductory algebra courses. During the past two and a half years, the center has served more than 1,600 students and achieved a 62 percent reduction in failure/withdrawal rates in beginning algebra, and a 32 percent reduction in intermediate algebra.

Pearson is very responsive to our feedback. When new updates of MyMathLab come out, I see our changes in there.

— Jeanne Foley
University of Wisconsin-Stout

Chart 11. Fail/Withdrawal Rates for Beginning Algebra (Math 010).

Prior to 2004, beginning algebra and intermediate algebra were taught in the traditional style by using classroom lectures, daily take-home problem sets, and paper tests and quizzes. A departmental task force identified students’ failure to regularly complete homework assignments as the primary cause of the low success rates in these two courses. Students’ poor attendance at class sessions and limited use of office hours and free tutoring services were also cited as major obstacles to success. To remedy the problem, the mathematics department (1) capitalized on UW-Stout’s E-Scholar initiative—which has provided laptop computers, all-campus wireless Internet access, and comprehensive integration of technology across curricula for all incoming students since fall 2002—and (2) implemented MyMathLab as a cornerstone of Math TLC. Every day, MML automatically grades homework that counts significantly (about 25 percent) toward the course grade. MML’s Gradebook and reporting features also enable instructors to monitor student progress and actively intervene the moment a student shows signs of trouble. “This keeps students from falling behind,” says Foley. “We know on a daily basis what is happening and can get them help immediately.”

M M L also helped the faculty at UW-Stout standardize their classes. Each class within a course has the same syllabus, homework assignments, tests, and quizzes; offers the same content; and enforces the same grading standard and level of passing. “This has promoted collaboration among the instructors, which has been a very good thing,” says Foley. “More collaboration and more communication bring our talents together, maximize the talent pool of teachers, and ensure that every student is going to learn and be taught the same objectives at the same high level of quality.”

Classes are hybrids of online homework and tests and required daily classroom sessions in a technology-enhanced classroom/tutor lab complex, and section sizes are small so as to facilitate personal interaction among students, instructors, and tutors. Another integral component of the program is a tutoring service dedicated exclusively to supporting students in these two courses and in which teaching staff are actively positioned as partners in learning and advocates for success. Foley creates special MyMathLab review and training courses with weekly assignments for her undergraduate peer tutors to prepare them to answer both content and software questions that the students taking the two courses are likely to have. His approach has required committing more resources to lower-level courses than is typical, but evidence shows that the investment is paying off in improved student success—and is thus likely to improve retention rates.

The Math TLC program has served 1,603 students since fall 2004. The combined failure/withdrawal rate for Math 010 students under the new system has plummeted 62 percent—from an average of 29 percent over the four years prior to the advent of the Math TLC program—to an average of 11 percent since that inception. Results for Math 110 showed a less dramatic but still significant, 32 percent reduction in failure/withdrawal rates: from 29.2 percent to 19.8 percent. Note that the improvement was achieved despite elevated passing standards; the minimum changed to requiring a grade of at least C (versus D) to pass the class. In addition, the amount of required homework was increased, and the testing and grading standards made more rigorous.

The administration at UW-Stout wasn’t initially targeting any specific student population, “but as time passed, I noticed that the students who were benefiting the most from the new approach were the nontraditional and minority students,” says Foley. “Minority students generally make up a relatively small portion—about 6 to 7 percent—of our student population, and increasing the diversity of our student body is a priority goal. Before the new program started, the minority student subgroup was failing these two introductory math classes at a rate even higher than that for the general student population.

We get a lot of nontraditional students—single parents and others who’ve been out of the educational system for a time. Initially, they’re terrified by the computer aspect. Within a week, they’re hooked.

—Jeanne Foley
University of Wisconsin-Stout
Now we’re finding that the percentage gap between minority and nonminority students has been cut by more than half. Reduction in math failure/withdrawal rates among nontraditional and minority students is the biggest thing universities can do toward keeping these students in school in general. Its implications reach far beyond the individual student. “The impact of those who can finally get a degree and get ahead financially is huge,” says Foley. “They become role models for others.”

UW-Stout’s faculty credits the success of the program to three key factors.

- **MyMathLab** provides immediate feedback, allows multiple attempts, and offers several sources of online help for each assigned problem. The online grading system means that instructors can require daily homework assignments. And instructors can continually monitor students’ progress on the daily work and weekly tests and intervene promptly with extra assistance and study strategies as needed.

- **Attendance** is required at sections with the students’ own teacher. These daily sessions consist of a brief lecture on the day’s topic followed by in-class time to begin M My MML homework with assistance from the teacher and an undergraduate tutor. (Students are given the option of earning the right to sign an individual contract for independent work if standards of 100 percent on all homework and at least 90 percent on all tests and quizzes are maintained. Instructors report, however, that less than half of the students who qualify for independent status exercise their privilege to skip class.) The program thus gives intensive hands-on help to those who need it most while at the same time allowing better-prepared students to work ahead and even finish the course early while still having help available when needed.

- **All sections** are taught in a single, dedicated, technology-enhanced classroom that is adjacent to the third key feature of the program: a tutor lab staffed 44 hours a week by the course instructors and by trained undergraduate peer tutors. Through the use of M My MML’s tracking features, instructors have seen that 95 percent of students are submitting all homework assignments, with an average score of 92 percent. Students are spending an average of 95 minutes on each day’s homework assignment—a figure for which no previous comparison data exist but that most teachers of remedial and prerequisite math courses anywhere would find astonishing. Attendance rates now average 94 percent for M Math 110, and 85 percent for M Math 010. And the tutor lab logs 150–200 student visits per week.

In addition to passing these two courses at unprecedented rates, students are also registering greater engagement and satisfaction with the learning experience—despite the greater demands placed on them. On an anonymous and voluntary survey distributed to M Math TLC students at the end of each semester, 91 percent of respondents indicated they had learned as much as or more than they expected to learn coming into the course; 96 percent said they’d be likely to again take a course using this structure; and a majority—55 percent—said they liked the class more than they expected to like it.

Of particular interest is that despite the prominence of online homework and learning tools, students still rated “my teacher” as the top factor influencing their learning (out of seven choices: online homework, online help, lectures, tutors, my teacher, open lab, textbook). Says Foley, “M My MML frees teachers from routine grading and affords them more time to talk with the students.”

UW-Stout’s successes haven’t gone unnoticed. The U.S. Department of Education recently awarded the Math TLC a three-year, $450,000 grant from the Fund for the Improvement of Postsecondary Education, citing the 61 percent reduction in failure/withdrawal rates in beginning algebra and 23 percent in intermediate algebra achieved by this new approach during its first two years of operation. UW-Stout officials plan to (1) use the grant to assess whether the Math TLC experience encourages more students to pursue courses in science, technology, engineering, and mathematics; (2) expand the program to higher-level math courses and to a summer precollege preparatory program for incoming at-risk students; and (3) provide workshops to teach other universities within the UW System how to adapt the program on their campuses.

If the Math TLC program is any indication of the rest of the school, UW-Stout is surely living up to its tagline: The School of Choice for the 21st Century.
Issues in higher education exist across the board. There’s no denying it—a growing arsenal of reports, studies, and articles expose a system mired in outdated teaching and learning paradigms. And students are paying the cost—via higher-than-ever drop/fail rates, inadequate preparation for the workforce, and the financial strain of taking a course two and three times before passing.

But all is not lost. Far from it. As the preceding pages indicate, there are solutions. Cost-effective, data-driven, and results-proven solutions. Forward-looking institutions across the country, including the six spotlighted in this report, are drastically reforming the way they teach math—some with the assistance of the National Center for Academic Transformation (NCAT) and others in myriad unique ways. But what they’re all doing is putting the student and the student’s ongoing success first, making MyMathLab an integral part of their new teaching and learning paradigm, and getting results.

What’s really exciting about the results is that they’re about more than startling increases in pass rates, median exam scores, and numbers of As and Bs. The most important improvements seen today have impact beyond an individual grade. Instructors using MyMathLab in redesigned environments experience higher retention rates, higher subsequent success rates, and increased achievement among previously underserved students. These are changes that matter—specifically for students in remedial and prerequisite mathematics courses. These changes ensure that those students who previously constituted the largest percentage of drop/fail/withdrawals not only stay in school but graduate having mastered concepts that mean they, too, have a shot at personal and economic success in a knowledge economy.

At the University of Alabama at Tuscaloosa, for example, a combined effort of NCAT redesign and MyMathLab dramatically improved students’ math scores. In fact, African-American and female students there have moved to the top of their class, outperforming Caucasian males (by as much as 12 percent in some semesters), who have historically scored higher in math.

As of 2006, more than 1.7 million students at 1,600 community and four-year colleges nationwide are using MyMathLab. Most would agree that this is not a trend toward technology per se as much as an intuitive movement toward more-efficient, more-effective ways to increase student learning. According to the EDUCAUSE Center for Applied Research (ECAR), students want professors to use technology, but only if it is used well, meaning, it is used to increase opportunities for classroom engagement, increase teacher/student communication, and maximize student control of course activities, including planning and apportionment of time—all key components of the MyMathLab program.13

The ECAR study brings to light another emerging aspect of MyMathLab research: standardized usage and integrated assessment. According to the study, students are “overwhelmingly positive about course management systems but want greater consistency in their use and availability.” Students are catching on. The most recent studies from MyMathLab institutions reveal that the greatest benefit—both statistically and in terms of student satisfaction—emerges with regular, integrated use of the program. Through the use of MML’s automated assessment features, students know immediately if they’re on track and if not, how to get back on; instructors can quickly intervene at the first sign of trouble; and there’s no risk of sudden surprises at the end of the semester.

For most instructors, decisions boil down to a matter of whether or not a product can help provide the highest-quality education possible for students. MyMathLab unequivocally does. For more information, visit MML online at www.mymathlab.com.


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The Story behind Making the Grade, Version 2.0

Making the Grade, Version 2.0, was written by Michelle D. Speckler, an independent writer commissioned by Pearson Education in fall 2006 to showcase statistical data, case-study information, and testimonials from users of MyMathLab (MML). The report illustrates the consistently positive impact MML has on the quality of learning and cost reduction in higher education math instruction. It examines how MML can be successfully implemented in both distance- and on-site-learning environments and demonstrates the quantifiable difference that regular usage of MML has on student retention, subsequent success, and underserved populations. The report also explores the beneficial relationships between MML and course redesign and between MML and integrated assessment.

What Is the National Center for Academic Transformation?

Two of the six case-study contributors to Making the Grade, Version 2.0, participated in the Program in Course Redesign launched by the National Center for Academic Transformation (NCAT). NCAT (www.thencat.org) is an independent, nonprofit organization that provides leadership in the use of information technology for the redesign of learning environments to improve learning outcomes for students at a reduced cost to the institution. NCAT is headed by Dr. Carol Twigg, an internationally recognized expert in information technology. NCAT staff have extensive experience in higher education as faculty members, administrators, and researchers in both traditional and nontraditional higher education environments.

Who Is Dr. Carol A. Twigg?

Dr. Carol A. Twigg is president and CEO of the NCAT and an expert in using information technology to transform teaching and learning in higher education. Winner of the McGraw Prize in Education, she is former vice president of Educom (now EDUCAUSE), where she advanced the need for new models of student-centered online teaching and learning, now commonly accepted in higher education. She also initiated the IMS Global Learning Consortium, which is establishing interoperable technical standards for online education and training. Before joining Educom, she was associate vice chancellor for learning technologies at the State University of New York and held a number of senior academic administrative positions at Empire State College.

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