

MyLab Math with MyLabs Plus educator study documents student success in the Math Zone courses at University of New Haven

<p>School Name University of New Haven, West Haven, CT</p> <p>Course names Fundamental Math, College Math, College Algebra, Pre-Calculus</p> <p>Course format Emporium</p> <p>Course materials MyLab Math in MyLabs Plus, <i>Beginning & Intermediate Algebra</i>, 5th Edition by Martin-Gay; <i>Finite Math with Applications</i>, 11th Edition by Lial; <i>College Algebra</i>, 11th Edition by Lial / Hornsby / Schneider / Daniels; <i>Pre-Calculus</i>, 9th Edition by Sullivan</p>	<p>Timeframe Fall 2014–Fall 2016</p> <p>Submitted by Yevgeniya Rivers, Director of the Math Zone</p> <p>Results reported by Julianne Labbiento, Pearson Customer Outcomes Analytics Manager</p>
--	--

Key Findings

- Students who scored higher on the study plan and chapter tests in MyLab Math also earned more total points for the courses.
- Pass rates for the four courses offered in the Math Zone increased an average of 16 percentage points from Fall 2014 to Fall 2016.
- Withdrawal rates decreased an average of 17 percentage points (30 students) from Fall 2014 to Fall 2016.
- Of the 469 students who successfully completed Pre-Calculus in the Math Zone between Fall 2014 and Fall 2016, 95 percent passed on their first attempt in the course.

Setting

The [University of New Haven](#) is a private comprehensive institution recognized as a national leader in experiential education. Founded in 1920 on the campus of Yale University in cooperation with Northeastern University, the University of New Haven moved to its current West Haven campus in 1960 and opened its Orange Campus in January 2014.

The University enrolls approximately 6,800 students, including nearly 1,800 graduate students and more than 5,000 undergraduates – the majority of whom reside in University housing. Roughly 41 percent of students come from Connecticut, with 43 percent coming from other states and 15 percent from other countries. For Fall 2016, the incoming first-year students had an average high school GPA of 3.4 and an average SAT score of 1058 (math + verbal). Approximately 89 percent of full-time undergraduate students receive some form of financial aid. The University awards 55 associate's and bachelor's degrees, 31 master's degrees, and a doctorate degree in Criminal Justice. The University boasts a student-to-faculty ratio of 16:1, with 268 full-time faculty members in addition to part-time and adjunct professors. Of the full-time faculty, 83 percent hold the highest degree in their field.

[The Math Zone](#) at the University provides a student-centered experience in mathematics that is targeted to each student's unique learning style. Each class in the Math Zone is designed to turn out students who have demonstrated proficiency in mathematics. The goal is to level the playing field for students so that they can fully succeed in upper level math courses. Acquiring math competency is recognized as an essential part of student success at the University.

The Math Zone is located in a new, state-of-the-art Math Learning Center and is a part of the [Department of Mathematics and Physics](#). According to Director Yevgeniya Rivers, The Math Zone seeks to create an individualized educational experience wherein students learn with the support of math instructors and tutors, in an emporium environment. In addition to the guidance provided by dedicated faculty, student mastery is supplemented by MyLab™ Math, which was chosen because the department felt it quickly adapts to areas where students demonstrate mastery of objectives and moves on to deliver precise instruction and support in topics where a student is having difficulty. The faculty in the Math Zone provide students with mini-lectures, support them through guided practice, and assist with navigating the software. They also monitor student progress and guide them in the mathematics learning process.

About the Course

Four courses are offered in the Math Zone, where the goal is to allow students to fast-track through developmental and early-college level material. Each course is worth three credits:

- **Fundamental Mathematics (MATH 1103)** – Required at the inception of the program of study of all students who do not show sufficient competency with fundamental arithmetic and algebra, as determined by departmental placement examination. Topics include: arithmetic operations, algebraic expressions, linear equations in two variables, exponents and polynomials, Cartesian coordinates, equation of a straight line, and simultaneous linear equations. Students who take MATH 1103 will have the total number of credits required for graduation increased by 3 credits.

- **College Mathematics (MATH 1108)** – Prerequisite: Placement into College Math or completion of MATH 1103 or equivalent with a grade of C or higher. Topics include: algebraic expressions and equations, functions and graphs, linear inequalities, polynomials and rational functions, an introduction to exponential and logarithmic functions, systems of two linear equations, and basic elements of probability.
- **College Algebra (MATH 1110)** – Prerequisite: A grade of C (not C-) or higher in MATH 1108 or placement by the department. A review of the fundamental operations and an extensive study of functions, exponents, radicals, linear and quadratic equations. Additional topics include ratio, proportion, variation, progression and the binomial theorem. This course is intended primarily for students whose program of study requires calculus or business math.
- **Pre-Calculus (MATH 1115)** – Prerequisite: placement into MATH 1115, or completion of MATH 1110 with a grade of C or higher. Topics include: polynomials and algebraic functions; plane analytic trigonometry; and properties of exponential, logarithmic, and trigonometric functions. This course offers the foundation needed for the study of calculus.

Challenges and Goals

Director Rivers highlights several challenges that faculty faced prior to the redesign. First, faculty wanted to improve the success rates in the courses held in the Math Zone, traditionally viewed as pre-college-level courses at the University. Secondly, there was a concern that students were not fulfilling their weekly lab hour requirement for the courses, but faculty had no efficient way to track or measure that belief. Finally, there was a desire to fast-track students in the Pre-Calculus course to allow them to reach Calculus or their next required course more quickly. The hope was that with the MyLab digital product, tracking would be easier and student success would improve, and that when used in the emporium format, acceleration would give students the advantage of moving through the course material more quickly and efficiently.

Implementation

The Math Zone uses a mentored and adaptive learning environment for teaching MATH 1103 Fundamental Mathematics, MATH 1108 College Math, MATH 1110 College Algebra, and MATH 1115 Pre-Calculus. According to the [Math Zone website](#), students are informed as follows:

“Mentored means that you have tutors assisting you with learning, that you can ask questions, and get help. Adaptive means that the curriculum is customized to each of your learning needs. You can advance at your own pace, as long as you advance. You also have opportunities to regain mastery and attempt higher scores through re-testing.”

While the Math Zone course only meets together for 3 hours of seat time, the department tells students that it is crucial that they spend another 6 hours independently completing practice problems either in the Math Zone during tutoring hours or remotely from home or elsewhere. “The most important part in all of this,” according to the website, “is learning personal responsibility. Indeed, this is part of what we teach. Unlike high school, the Math Zone requires that each student become directly engaged in their own learning. Students learn to take charge of the time they spend studying. We are here to help. Your instructors and Math Zone Staff will follow up with you if you are not meeting your obligation. This is a united effort.”

Students who are assigned to the Math Zone are enrolled in one of the aforementioned courses. They are provided detailed instructions on how to access Math Zone courses and how to attend classes each week. Testing and some of a student's weekly studying must be done in the Math Zone. Even though this is not an online class, students can access their course to study on their own anywhere they have an Internet connection. Rivers notes that a [coordinator course](#) is maintained for each course, ensuring consistency in assignments, chapter tests, and final exams across all sections of the courses.

Students who are scheduled for a class in the Math Zone receive once-weekly lectures delivered by faculty members and then practice in the MyLab [study plan](#) in their once-weekly lab. Depending on time constraints, faculty may also use the lab time to conduct a mini-lecture and check in with their students' progress. During these weekly check-ins, instructors will apprise students of where they may find their student gradebook and how to interpret the results they find there. The study plan is segmented by learning objectives, and students are told to complete as many practice problems as they think they need before then completing a short Quiz Me to assess their learning and earn mastery for that objective. Mastery levels on Quiz Me assessments are set at 66.6 percent, containing two "easy" questions and two "medium" questions for the Fundamental Math course and one "easy" and two "medium" for the other three courses (College Math, College Algebra, and Pre-Calculus). All [learning aids](#) are turned off during Quiz Me's and students can attempt Quiz Me's as many times as they wish. The last attempt is used for grade calculation, which may or may not be the highest score.

While studying and completing the practice problems, students are encouraged to utilize the Math Zone instructors and tutors for assistance whenever they have questions. Students in the Fundamental Math, College Math, and College Algebra courses are also required to keep a homework notebook as part of their grade. This notebook is checked for completion bi-weekly by either the instructor or classroom assistant and is graded based on a departmental rubric.

During the semester, there are four to five chapter tests and one final exam for each course. Two attempts to earn a passing grade of 60 percent are permitted on the chapter tests, with the score of the higher attempt used in the calculation of a student's final grade. Chapter tests have a prerequisite set of study plan mastery points that must be earned prior to taking a test. It is also recommended that a student take and earn at least 50 percent on a self-assessment prior to sitting for a chapter test. Rivers explains that, for students who do not pass a chapter test on the first attempt, a prescribed process occurs to offer students time to review their mistakes, continue to study any objectives they struggle with, and ensure that they are fully prepared to retest. Prior to retaking any chapter test, a student must debrief and remediate with a tutor, take the self-assessment, and earn all study plan master points for the second attempt. Only one attempt is allowed for the two-hour final exam. All exams and self-assessments must be taken in the Math Zone in a proctored setting and are password-protected. Students must let the Math Zone faculty know they are ready to take an exam so that the faculty can begin the testing session.

Because of the self-paced nature of the course, University of New Haven mathematics faculty make sure students know where they stand in the course by providing a pacing guide. The pacing guide allows students to track their own progress in their Math Zone class. It includes dates based on the the University academic calendar, with the mastery points needed to stay on track. The pacing guide is found in the MyLab course documents and students have instructors initial it each week to confirm mastery. As an additional intervention, Rivers notes that instructors utilize the [Search/Email](#)

[by criteria](#) feature in the MyLab gradebook in order to see who has not logged into the course recently and then reach out to those students to encourage them through the course.

Rivers relates that, while experience in classroom varies by instructor, active engagement in classwork and class discussion are important in each of the classes. Attendance is recorded on Starfish after each class meeting. After three absences, a student's MyLab account is inactivated and the student must then speak with an instructor or the Math Zone director to have it reactivated. After four absences, the instructor has the right to drop the student from the course.

Assessments

Each student is assessed on a computer point score from 0 to 100. This total point score is based on exams and mastery points as follows:

- 55% Chapter tests in MyLab
- 20% Final exam in MyLab (cumulative)
- 15%* Study plan in MyLab (60 percent or higher on Quiz Me's)
- 10%* Homework Lab/Log

*The Homework Lab/Log is not required in the Pre-Calculus course, making the study plan worth 25 percent of a student's final grade in that course.

Students can also earn up to ten bonus points for the terms based on their performance on their first attempts at chapter tests. For a point score of 75–87.5 on a chapter test, a student earns one bonus point towards the total overall point score. For a point score of 87.5–100 on a chapter test, two points are earned.

Final letter grades are based on a student's total point score for the semester. The class letter grade is assigned using the following scale:

A+	97.5–100 points	C+	77.5–80.0 points
A	92.5–97.5 points	C	72.5–77.5 points
A-	90.0–92.5 points	C-	70.0–72.5 points
B+	87.5–90.0 points	D+	67.5–70.0 points
B	82.5–87.5 points	D	60.0–67.5 points
B-	80.0–82.5 points	F	0–60.0 points

A grade of INC(omplete) or W(ithdraw) may be assigned based on Department, College, and University expectations and policies.

Results and Data

Since Rivers assumed the role of Director of the Math Zone in Fall 2014, pass rates for each of the four courses have increased an average of 16 percentage points. Meanwhile, withdrawal rates have fallen an average of 17 percentage points, or 30 students per course, from Fall 2014 to Fall 2016. Figure 1 displays the pass rates and figure 2 illustrates the drop in the percentage of students withdrawing from Math Zone courses during that period.

Pass rates for Math Zone courses

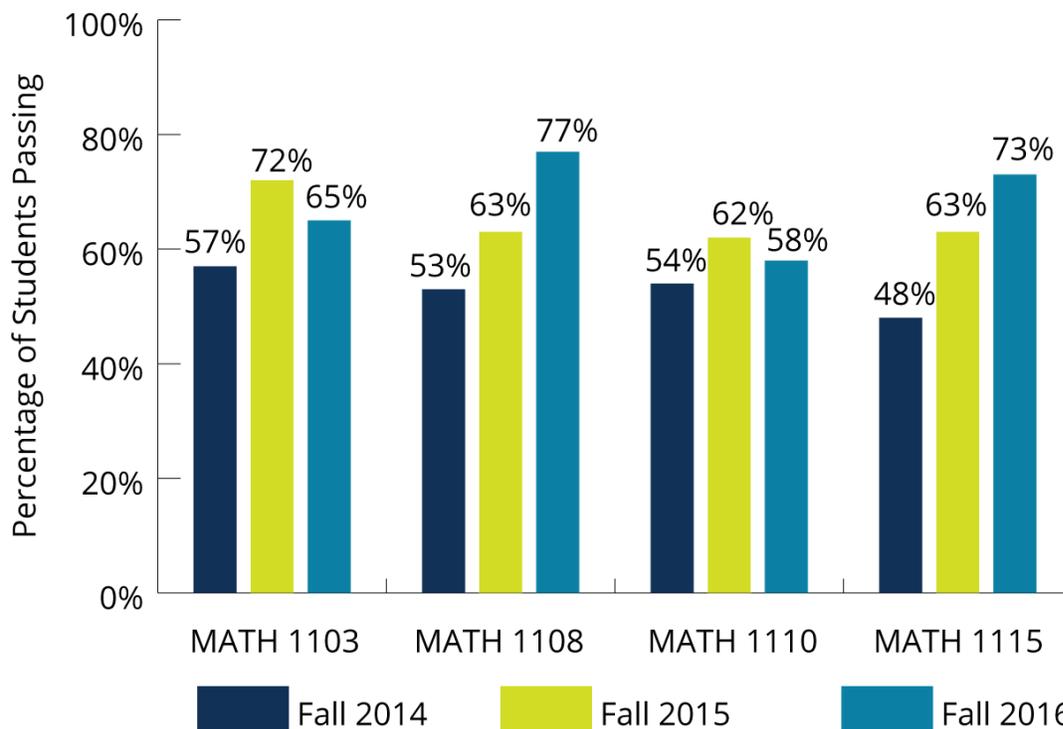


Figure 1. Pass Rates for Math Zone Courses. Fall 2014 enrollments: MATH 1103 ($n=117$); MATH 1108 ($n=289$); MATH 1110 ($n=178$); MATH 1115 ($n=151$); Fall 2015 enrollments: MATH 1103 ($n=137$); MATH 1108 ($n=228$); MATH 1110 ($n=213$); MATH 1115 ($n=127$); Fall 2016 enrollments: MATH 1103 ($n=127$); MATH 1108, ($n=236$); MATH 1110 ($n=199$); MATH 1115 ($n=123$)

Withdrawal rates for Math Zone courses

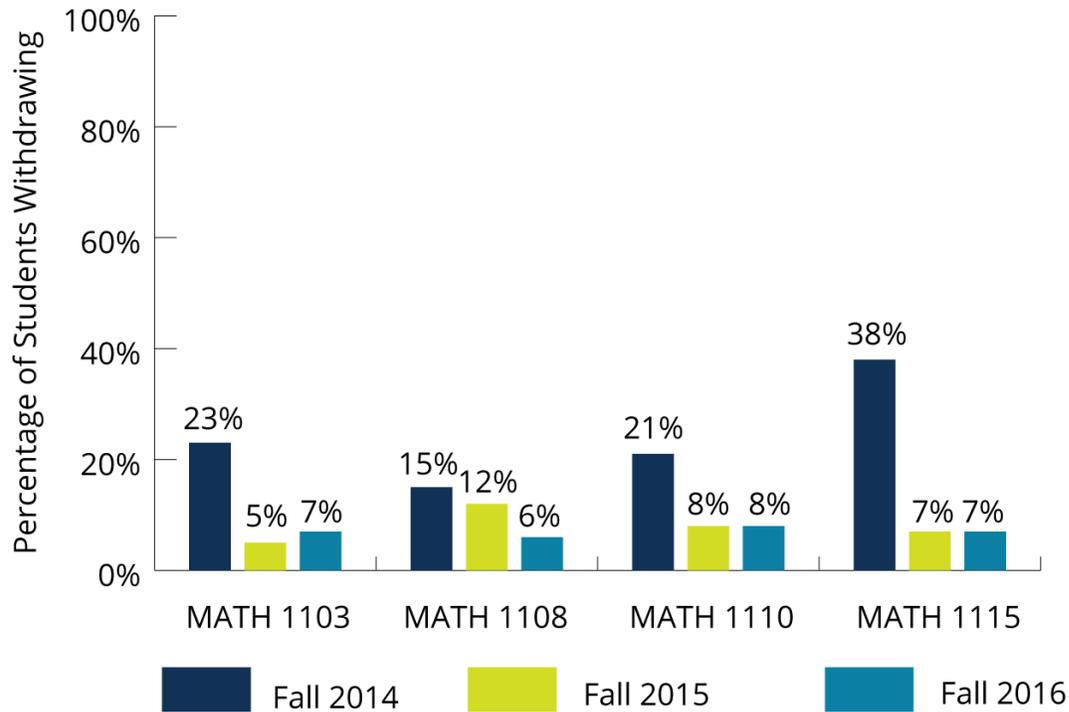


Figure 2. Withdrawal Rates for Math Zone Courses. Fall 2014 enrollments: MATH 1103 ($n=117$); MATH 1108 ($n=289$); MATH 1110 ($n=178$); MATH 1115 ($n=151$); Fall 2015 enrollments: MATH 1103 ($n=137$); MATH 1108 ($n=228$); MATH 1110 ($n=213$); MATH 1115 ($n=127$); Fall 2016 enrollments: MATH 1103 ($n=127$); MATH 1108 ($n=236$); MATH 1110 ($n=199$); MATH 1115, ($n=123$)

A correlation measures the strength of a relationship between two variables, where r is the correlation coefficient. The closer a positive r value is to 1.0, the stronger the correlation. The corresponding p -value measures the statistical significance or strength of the correlation, where a p -value < 0.01 shows the existence of a positive correlation between these two variables. Note that correlation does not imply causation; it is simply a measure of the strength of the relationship. Chapter tests given in each course accounted for 55 percent of the total points scored for the course. Data show a very strong correlation between the chapter tests in MyLab and a student's total point score in Fall 2016. Figure 3 displays the correlation between chapter tests and total point scores in Fall 2016 for all Math Zone courses combined, $r=0.98$, $p<0.001$.

Correlation between chapter test scores and total points scored

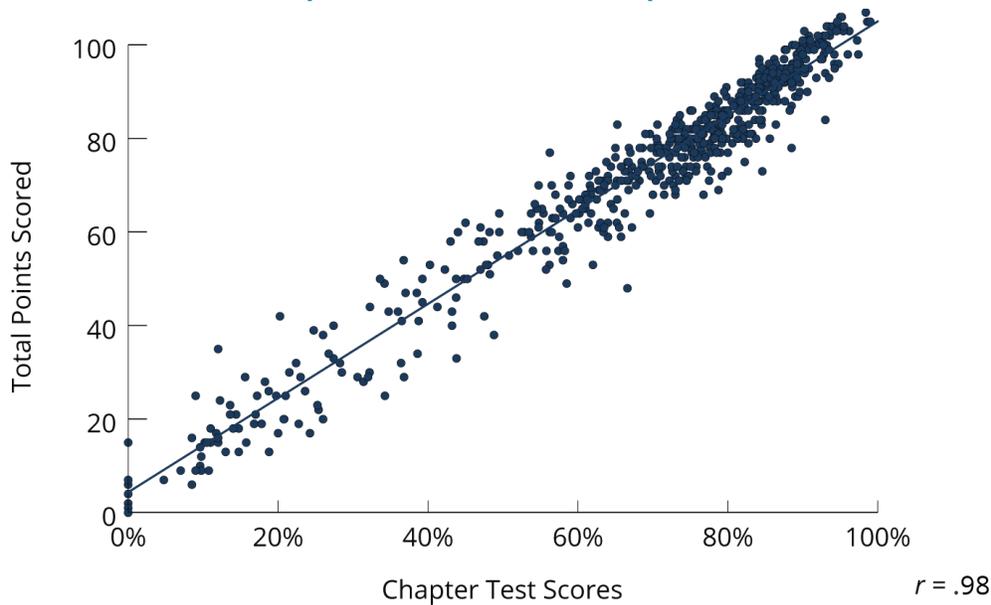


Figure 3. Correlation between Chapter Test Scores and Total Points Scored for Math Zone Students in Fall 2016 ($n=644$)

The study plan in the MyLab counted for 15-25 percent of a student's total point score, depending on the course. An analysis of study plan mastery and total points scored for all students enrolled in Math Zone courses in Fall 2016 shows a strong correlation ($r=0.70$, $p<0.001$) between the two assessments. (figure 4)

Correlation between study plan mastery and total points scored

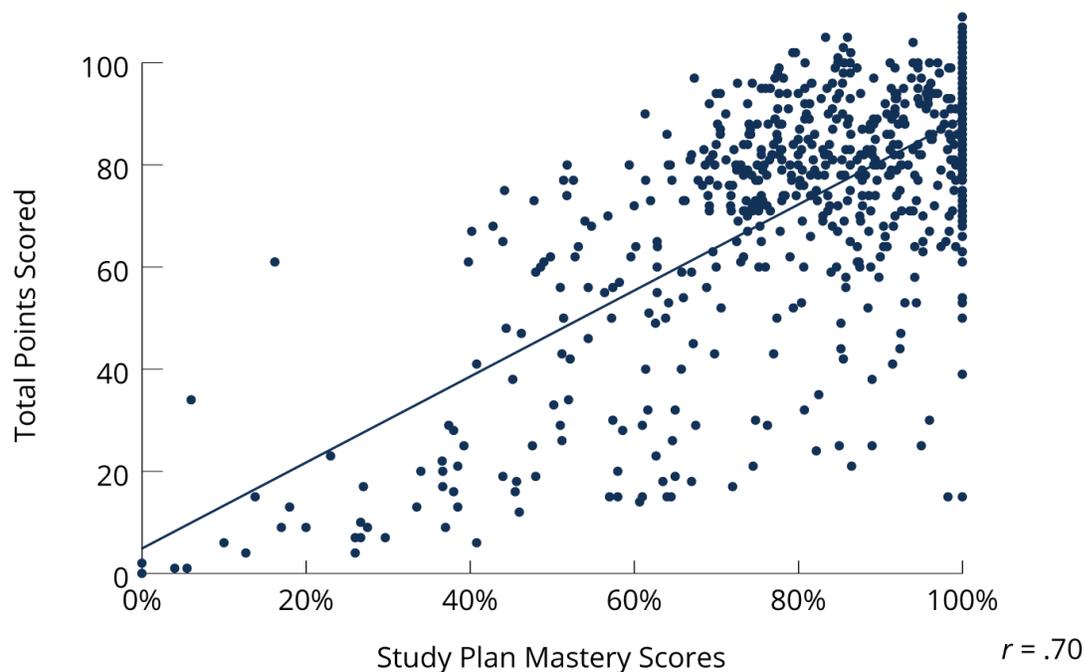


Figure 4. Correlation between Study Plan Mastery and Total Points Scored for Math Zone Students in Fall 2016 ($n=644$)

Finally, Rivers relates that Pre-Calculus was included as a course in the Math Zone so that it could also be delivered in the emporium format, thereby offering students the ability to fast-track through the course and into the Calculus sequence. Data show that 95 percent of students successfully completing Pre-Calculus passed the course on their first attempt. Figure 5 displays these results, by semester.

Percentage of students successfully completing Pre-Calculus on their first attempt

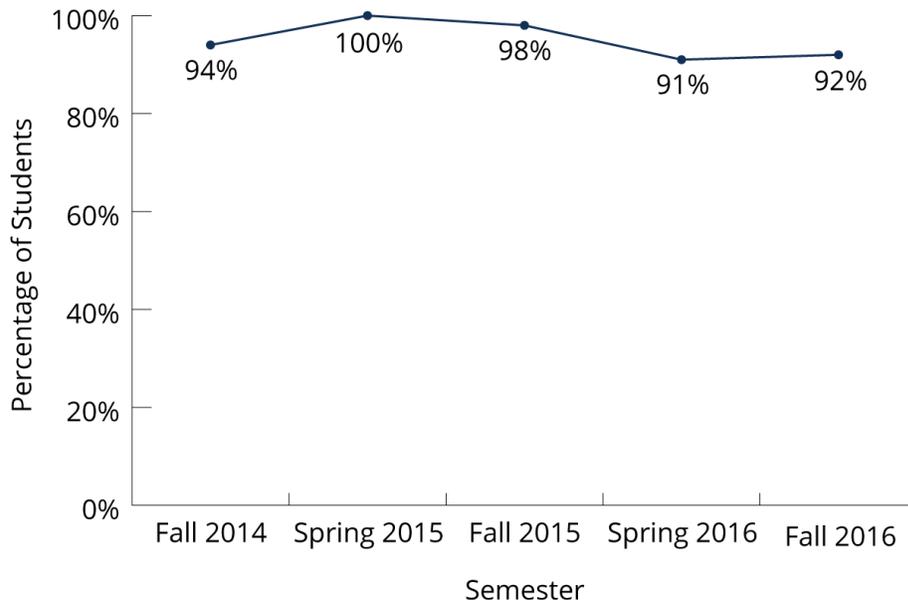


Figure 5. Percentage of Students Successfully Completing Pre-Calculus on their First Attempt. ($n=469$)

The Student Experience

In a student survey administered by the University of New Haven in the middle of the Fall 2016 semester (19 percent response rate), students were asked their opinions on the course format and the exam retake policy. 84 percent preferred a course that contained a lab over a traditional lecture format. Student comments included:

- *"When I do my lab class I feel comfortable working at my own pace and I can get more work done."*
- *"I'm a more visual and hands-on learner."*
- *"I feel I get more accomplished in lab, and if I need help there are people to help me 1 on 1. I have a really hard time paying attention to the lectures and fully understanding."*
- *"I learn more by doing, so I prefer the lab classes where you can do the work and get one on one help."*

84 percent of students responding appreciated the policy of retaking chapter tests. Student comments included:

- *"The policy of retaking exams is great because it gives students another chance to improve their grade."*

- *"I like it! I really like the fact that there is support and if we don't understand something we have the chance to give it a second shot."*
- *"That's a good policy, because allowing students to fix their mistakes allows them to boost their confidence and learn from their mistakes."*

Conclusion

Rivers notes that one goal of the emporium implementation with MyLab was to be able to track a student's lab attendance and activity. Prior to redesign, it was felt that students weren't spending the time necessary to master the content in the courses. Now, depending on the course, 90 to 100 percent of assignments and assessments contributing directly to a student's total point score are written in MyLab and the time spent is trackable. With password-protected chapter tests and prescribed remediation with tutors or faculty between attempts, lab attendance and usage is assured. Students are also now able to fast-track through the Pre-Calculus course, using MyLab in the Math Zone. Finally, Rivers mentions that, though students are not currently required to take self-assessments, faculty can see who does. Future plans are to track outcomes for students who do take the self-assessments vs. those who do not, to determine whether adding this activity as a requirement would be an effective student success strategy in the Math Zone courses.