

## MyLab Math in MyLabsPlus educator study looks at effect of regulated multiple attempts on quizzes in fully online College Algebra course at Mississippi State University

### Key Findings

- Fully online sections that had staggered minimum prerequisite homework scores in order to earn multiple quiz attempts saw increased scores in all course metrics, notably five percentage points in overall course grade and six percentage points on test averages.
- The instructor believes that the prerequisite requirements enforced more practice, thus aiding their performance on the higher stakes assessments.

### Study Specifics

**School name:** Mississippi State University, Starkville, MS

**Course name:** College Algebra

**Course format:** Fully online

**Course materials:** MyLab Math in MyLabsPlus with *College Algebra, MSU Custom Edition* by Trigsted

**Timeframe:** Fall 2015–Spring 2017

**Educator:** Kim Walters, Instructor

**Results reported by:** Traci Simons, Pearson Customer Outcomes Analytics Manager

### Setting

Mississippi State University is a comprehensive, doctoral degree-granting institution with a nationally and internationally diverse student body and holds the Carnegie Foundation for the Advancement of Teaching's designation as a Doctoral/Extensive institution. The University's [common data set](#) for 2017–2018 notes the following facts regarding its student body:

- Total undergraduate enrollment: 18,312
- Undergraduate race/ethnicity breakdown: 72% Caucasian, 20% African American, 3% Hispanic, 5% Other (two or more races, Asian, Non-resident Alien, American Indian or Alaskan Native, Native Hawaiian or other Pacific Islander, Unknown)
- Total graduation rate for 2010 cohort: 60%
- Retention rate for entering Fall 2016 freshmen to Fall 2017: 79%
- Average high school GPA of all degree-seeking, first-time, first-year students: 3.79
- Student to faculty ratio: 20 to 1

Mississippi State University's [Office of Institutional Research and Effectiveness](#) provides reports on its website.

### About the Course

Mississippi State University offers its College Algebra course as a hybrid, two lecture hour/two lab hour option or as a fully online course. The fully online course will be examined for the purposes of this study. Course topics include: review of fundamentals; linear and quadratic equations; inequalities; functions; simultaneous

equations; and topics in the theory of equations. Prerequisites for the course are an ACT Math subscore of 19 or better or a C or better in the school's Intermediate Algebra course.

## Challenges and Goals

Instructor Kim Walters, who teaches multiple sections of College Algebra both online and face to face, wanted to be sure her online students — whom she rarely, if ever, got to see in person — were practicing course concepts and completing their homework. Online students only took five quizzes each semester, compared to 17 quizzes in the face-to-face sections. To ensure her online students had plenty of opportunity to practice, she decided to implement multiple attempts on the quizzes with prerequisite requirements for the retakes. Walters also increased minimum homework scores for each subsequent quiz attempt because she believed that actually practicing math helps students be more successful.

## Implementation

*“My thought was that if I dangled a carrot in front of them [second attempt on quiz], they might complete the homework assignments, therefore practicing the math!”*  
—Kim Walters, Mississippi State University

The College Algebra course requires students to use MyLab™ Math in MyLabsPlus™. Students complete all graded work in MyLab.

### Homework

Students typically complete 14 untimed homework assignments which consist of one, two, or three sections. Homework assignments are pulled from MyLab course content and contain media assignments, or problems, where students must watch media and answer associated questions. Students have unlimited attempts on homework assignments up until the due date. Due dates are hard due dates, but students with medical or university excuses sometimes get extensions on homework assignments.

### Quizzes and tests

Students complete five 60-minute quizzes, two 90-minute tests, and a three-hour final exam. Quizzes and tests are multiple choice and either come from the corresponding test bank questions or custom questions that Walters has either created from scratch or modified from MyLab content. Due to the volume of students that take the course, the department has always given multiple choice tests and a final exam.

Utilizing the prerequisite function in MyLab, Walters allows students to earn a second and third attempt for each quiz by completing their homework assignments. If they score at least 70% on the homework, they receive a second attempt on the quiz. If they wish to have a third attempt, students can go back to their homework and must achieve at least a 90%.

Each test covers material on two quizzes. Tests are password-protected and must be taken in a proctored environment, preferably the Mississippi State math lab. Students can use homework and notes when taking a quiz but no materials are allowed for tests.

Test dates are available in the course syllabus and also on the MyLabsPlus calendar. There is a window of one week during which each test is available to allow some flexibility for taking each test. The final exam must be taken during the university final exam period. There are no makeup tests. The final exam can replace one missed test. Students may make arrangements to take a test early if they know ahead of time that they have a conflict with a test week.

## Assessments

- 300 points (~33%) MyLab Math Final exam
- 300 points (~33%) MyLab Math Tests (2)
- 200 points (~22%) MyLab Math Quizzes (5)
- 100 points (~11%) MyLab Math Homework (14)

Final course grades are assigned as follows:

**A** 810–900 points | **B** 720–809 points | **C** 630–719 points | **D** 540–629 points | **F** 0–540 points

## Results and Data

In order to see if there was an improvement in student performance, data from Fall 2015–Spring 2017 were analyzed. The semesters where no prerequisites were set up were compared to those where minimum requirements on homework were required to earn multiple attempts on quizzes. It was found that no harm was done with the face-to-face sections. In fact, in the face-to-face sections, overall course scores increased one percentage point, as did homework averages, which is to be expected since students had to increase their homework score in order to earn multiple quiz attempts.

In the fully online sections, increases were more substantial. As depicted in figure 1, homework averages increased two percentage points, as did quizzes. Even more encouraging, though, are the results for test averages and overall course scores. Comparing semesters when prerequisites were not in effect (Fall 2015 and Spring 2016) to those when they were (Fall 2016 and Spring 2017), test scores increased six percentage points, from 66% to 72%, and overall course grades increased five percentage points, from 68% to 73%.

### Pre and post prerequisite averages in online courses

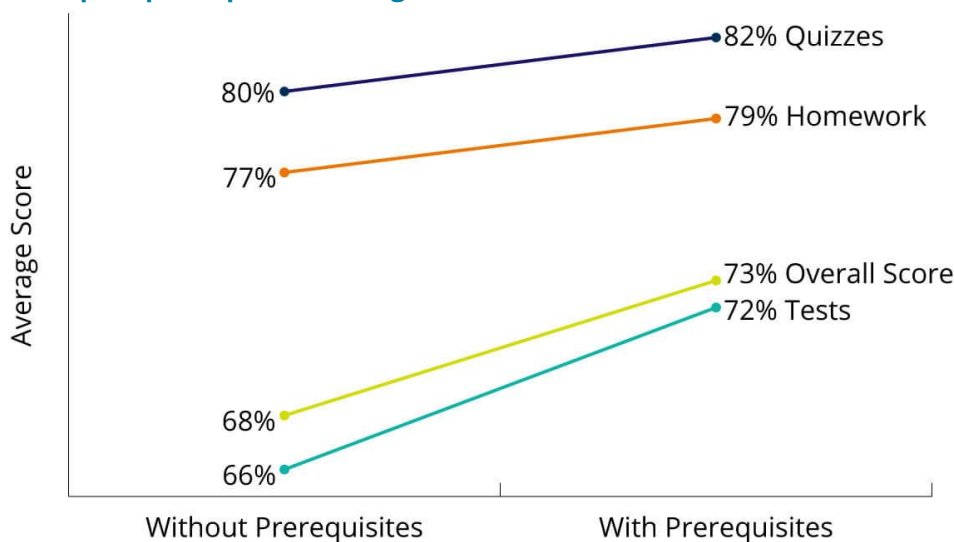


Figure 1. Course Metrics Comparison between Semesters without Prerequisites, Fall 2015–Spring 2016 ( $n=1,512$ ), and with Prerequisites, Fall 2016–Spring 2017 ( $n=2,164$ )

Overall, enforced prerequisites before quiz attempts seems to have helped the online students, which is where Walters started the initiative in order to enforce effort, since she couldn't see or meet with the students. "I'm

very happy with these results," Walters states. "Of course, I'd love the face-to-face results to be as obvious as the online sections, but I think it's great that we didn't harm the face-to-face students, and I could argue that it's harder to impact online students, because you don't see them, so this is a success."

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## The Student Experience

Walters has collected students' thoughts about MyLab Math/MyLabsPlus. Selected quotes are below.

- *"The Help Me Solve This button helped me a lot because I got to actually do the work, and the computer told me if it was correct or not. I think MyMathLab is a useful tool that should be continued!"*
- *"If I couldn't find an answer to a question in the homework while looking through my notes the Help Me Solve This aid was really helpful and sometimes taught me a different way to work the problem, and I found to like that better sometimes."*
- *"The website we used to do homework, tests, and quizzes was the most user friendly out of any other site or online classes I had to use this semester."*
- *"MyLab Math has helped me a lot to understand the problems, and it even showed me examples which helped me understand even more."*
- *"It was a good experience, and the example problems were extremely helpful to me in the homework. I really like the structure of the MyLabsPlus."*

## Conclusion

Before implementing multiple attempts in the face-to-face sections, Walters implemented prerequisites on quizzes that required students achieve at least 70% on their homework before attempting the quiz the first time. However, she found that students stopped at 70% since that was the bar she had set, and it frustrated Walters. "My thought was that if I dangled a carrot in front of them (second attempt on the quiz), they might complete the homework assignments, therefore practicing the math!" Thus, she changed the prerequisites and offered multiple quiz attempts: students must earn 70% on homework to earn a first attempt on a quiz and 90% in order to earn a second attempt. While course metrics remained steady for face-to-face sections, gains were observed in fully online sections. Thus, Walters achieved her goal of increasing student success by enforcing more practice on her students.

Moving forward, Mississippi State's College Algebra course is working to implement a corequisite solution for students coming into the course without the prerequisite understanding needed to be successful in the course.