

MyLab educator study examines the impact of the Companion Study Plan in Developmental Math at J.F. Drake State Community and Technical College

Key Findings

- Students improved their module pre-test to post-test scores an average of 34 percentage points in Basic Mathematics and 44 percentage points in Elementary Algebra.
- The percentage of students earning the required minimum score on tests increased an average of 83 percentage points between module pre-test and post-test.
- Faculty created courses intended to promote a growth mindset and independent learning, while providing students with personalized assignments and multiple opportunities for remediation.

Study Specifics

School name: J.F. Drake State Community and Technical College, Huntsville, AL

Course names: Basic Mathematics and Elementary Algebra

Course format: Emporium

Course materials: MyLab Math for *Developmental Mathematics: Basic Mathematics and Algebra*, with

workbook by Lial, Hornsby, McGinnis, Salzmann, and Hestwood

Timeframe: Fall 2017

Educator: Brandi Winchester

Results reported by: Julie Rebert, Pearson Results Manager

Setting

[J. F. Drake State Community and Technical College](#) (Drake State) is a two-year comprehensive community and technical college training students for current and future employment in career technical programs or university transfer. Most of the programs offer options for an associate in applied science degree or a certificate allowing for immediate entry into the workforce.

- Enrollment: approximately 1,000 credit students (Fall 2015)
- Part-time students: 51%
- Female students: 57%
- Job placement rate: 76% (2013–2014)

About the Course

This study profiles two developmental math courses at Drake State: Basic Mathematics and Elementary Algebra. Each course is three credits and meets for 80 minutes twice per week. The courses are designed to help students gain mathematical proficiency by reviewing arithmetic principles and computations.

Basic Mathematics topics include performing operations with whole numbers, integers, and positive and negative fractions and decimals; converting between fraction and decimal; and working with ratio, proportion, simple percent, and word problems. Calculators are not allowed.

Elementary Algebra topics include reviewing the operations of positive and negative numbers, working with linear equations and inequalities, performing operations with exponents and polynomials, and factoring.

No specific prerequisites exist for either course. Students are enrolled based on their performance on the institution's placement test.

Challenges and Goals

[Drake State's Quality Enhancement Plan](#) (QEP) is a required component of their [South Association of Colleges and Schools Commission on Colleges](#) (SACSCOC) accreditation that focuses on enhancing student learning. The goals of the QEP are to improve basic numerical skills and to change the way math is perceived by employing strategies that include using the math emporium model, promoting a growth mindset among students, utilizing success coaches and math tutors, and providing 24/7 mobile access for students.

In line with the QEP's requirements, Professor Brandi Winchester sought to create courses that would address student deficiencies, while fostering independence and teaching students to take responsibility for their learning. Using MyLab™ Math in an emporium format, the QEP Math Emporium courses, including Basic Mathematics and Elementary Algebra, provide a personalized curriculum to address each student's learning gaps, while aligning course objectives to the Student Learning Objectives in Drake State's Quality Enhancement Plan.

Implementation

“MyLab Math allows students to work at their own pace and continue to work on a particular section until they have learned the concepts and are able to confidently pass the quizzes and tests.”

—Student, J.F. Drake State Community and Technical College

All coursework for the QEP Math Emporium courses is completed on the computer in MyLab Math. The digital program has been customized to deliver individualized work for each student, linked through [Canvas](#), Drake State's learning management system. Students are able to complete their homework in class, or anywhere they have access to the internet, and at their own pace. They are required to complete module quizzes and module tests in the computer lab, proctored by either their instructor, the math lab coordinator, or the math lab tutor. In a voluntary, anonymous survey, one student shared, “MyLab Math allows students to work at their own pace and continue to work on a particular section until they have learned the concepts and are able to confidently pass the quizzes and tests.”

The Basic Mathematics and Elementary Algebra courses are delivered in modules, with Basic Mathematics containing five modules and Elementary Algebra containing four. Each module in each course is set up in the same manner. Students take a module pre-test to determine their initial mastery level within the module content, then follow the learning path below to module completion:

Module Pre-test → Companion Study Plan → Module Quiz → Companion Study Plan → Module Post-test

Winchester uses [prerequisites](#) in MyLab to guide the students through the path, opening the appropriate remediation tool or assessment when the required mastery benchmark is met. Winchester uses [coordinator course](#) shells in MyLab for each of the courses to maintain consistency among the many sections.

Remediation with the Companion Study Plan

Any assessment in MyLab can be used to intentionally inform and update the study plan, providing a personalized assignment tailored to a specific student's performance on a single assessment. Winchester uses the [Companion Study Plan](#) (CSP) in MyLab as the primary means of remediation between assessments in the

courses. Within the CSP, students are provided with practice problems similar to those missed on the associated assessment. As they work through the practice problems, MyLab guides them with [learning aids](#) such as View an Example, Help Me Solve This, and Ask My Instructor. Once students complete the practice problems, they take short Quiz Me quizzes within the CSP to earn mastery on the objectives. The CSP is simply used to deliver a review plan for the student, personalized after each assessment. Mastery points in the CSP do not count towards a student's final grade.

Whether students choose to purchase a paper copy of the textbook package or use only the eText, MyLab provides them with links to the workbook and video lectures for the sections within the module. Winchester's syllabus notes that, as students watch the videos, they need to be sure to use their workbooks to help reinforce the concepts. She also recommends that they keep notes in a math notebook for quick reference. Students are encouraged to bring their own headphones to class to listen to the video tutorials, though earbuds are available in class. She warns that students who do not watch the videos, go through the workbook, or keep a good math notebook for each topic, have a tendency to struggle in the course. Students are also strongly encouraged to ask the instructor or math lab tutor for assistance only after they have first gone through the video tutorials and workbook, again promoting the growth mindset strategy of the QEP. One student shared, "[MyLab] taught me patience...and to keep trying until I get the problems completed."

Periodic assessment with module quizzes and tests

Module assessments allow students to test themselves on their knowledge without the availability of learning aids. Each pre-test and module quiz is taken only once, with each updating the CSP based on the student's performance. Winchester felt it was important to teach students to become independent with their learning, so there is no prerequisite on module quizzes. Students are strongly urged to complete the CSP between the pre-test and the quiz, to ensure that they fully understand the content, but she imposes no minimum mastery level as a prerequisite to attempting the quiz. Instead, she hopes that students will learn the value of preparation and time spent in the CSP prior to taking a quiz for themselves, reminding them that a poor score on a prematurely taken quiz will simply result in more questions on the next CSP. Only one attempt is allowed on module quizzes and quiz scores do not count towards the final grade.

After taking the module quiz, students again complete their CSP, but since the next benchmark is the module post-test, Winchester does impose a minimum mastery level before allowing students to proceed. Students in Basic Mathematics must earn at least 80% on the CSP in order to access the module post-test, while the mastery level for students in Elementary Algebra is 75%.

The module post-tests may be taken up to three times, and similarly, each attempt updates the CSP, which must be completed to the required mastery before an additional attempt may be tried. Students must earn a minimum score on the post-tests in order to move on to the next module, set at 80% for Basic Mathematics and 75% for Elementary Algebra. Those unable to earn the minimum score after three attempts must meet with their instructor or a tutor to discuss their particular barriers to success and devise an action strategy prior to a fourth, or further, attempt. On average, less than four percent of students taking exams required four or more attempts to reach mastery, representing no more than three students for each module. The highest score earned on post-tests counts towards a student's final grade calculation and, following successful completion of all of the modules, students complete the course with a comprehensive final exam.

All module quizzes and tests are taken in the computer classroom and are [password-protected](#) within MyLab. Instructors, lab coordinators, or math tutors are able to allow access to these assessments once the required minimum score is reached on the CSP. The nature of the emporium model allows student to work at their own pace, so any number of students could be testing on any given day. Winchester shares that while the classrooms do have designated desks that they use for testing, blue plastic cups are also placed on those

computers to easily distinguish students who are testing from those who are just working. The use of notes or textbooks is prohibited when taking tests or quizzes and in the Basic Mathematics course, students may not use calculators until they reach the second module. Students are required to show all work on quizzes and tests on scratch paper provided to them when they take the assessments and turn it in when the assessment is complete. Work on the scratch paper helps instructors better understand where mistakes are being made within problems and how to best assist each individual student when reviewing for a quiz, test, or the final exam.

Best study practices shared with students

On her syllabus, Winchester shares study tips and encouragement with her students, in line with the QEP's growth mindset strategy. Included are the following suggestions:

- **Do not waste time.** While it's exciting for students to find themselves ahead of the pacing, it's best to continue to work ahead in case extra time is needed at the end of the semester.
- **Keep a neat, organized notebook.** Number each problem and show all work, with all steps. The results will make it easier to analyze your work and correct mistakes.
- **Focus time and effort toward learning math,** rather than memorizing problems and retaking tests.
- **Remember your goals.** Winchester appreciates that students may already know some of the math concepts presented in the course, but assures them that they do not know them all. She reminds her students that the main purpose of these math courses is to prepare them for their next math course and that if they do not learn all the math concepts now, they will not be prepared to learn the new concepts in the next course.

Assessments

Basic Mathematics and Elementary Algebra grades are determined by averaging the module post-test scores with the final exam score and their grading scales varying slightly, as shown below. Students must earn a B or higher in Basic Mathematics and a C or higher in Elementary Algebra in order to move to the next higher course. In addition, students in the Basic Mathematics course are required to earn 80% or higher on the final exam itself in order to earn credit for the course.

Basic Mathematics: **A** 90–100% | **B** 80–89% | **C** 70–79% | **D** 60–69% | **F** 0–59%
Elementary Algebra: **A** 90–100% | **B** 80–89% | **C** 70–75% | **D** 60–74% | **F** 0–59%

In both courses, a rollover option is given to students who show commitment to their math course but cannot finish the material, and allows students to continue where they are in the course the following semester. In order to receive the rollover, students must complete all required paperwork with their instructor before the last day of instruction, receive a failing grade for the current semester, and register and pay for the same course the following semester.

Results and Data

Winchester's course design utilized MyLab's Companion Study Plan as the primary means of remediation as students identified their knowledge gaps and proceeded through their course. The CSP was provided following the module pre-tests and required between the module quizzes and post-tests. Students not achieving mastery on the post-tests were also required to complete their CSP before additional attempts of the post-test. The data analysis of Winchester's courses centered on score improvement and changes in success rates on the module pre-tests and post-tests.

Scores on each module pre-test in each course were analyzed, as well as students' subsequent scores on their initial attempts on the post-tests and final attempts on the post-tests. After taking the pre-test, using the

Companion Study Plan to remediate before and after the module quiz, then taking the post-test for the first time, students in Basic Mathematics were able to raise their pre-test average scores by 34 percentage points (figure 1) and Elementary Algebra students raised their scores by an average of 44 percentage points (figure 2). Results were statistically significant, using a paired sample *t*-test:

- Basic Mathematics pre-test (M=52%, SD=25%, N=132), post-test (M=82%, SD=9%, N=132), $t(131)=-13.87$, $p<0.05$.
- Elementary Algebra pre-test (M=39%, SD=25%, N=128), post-test (M=83%, SD=9%, N=128), $t(127)=-20.30$, $p<0.05$.

Average scores on module pre-tests and post-tests, Basic Mathematics

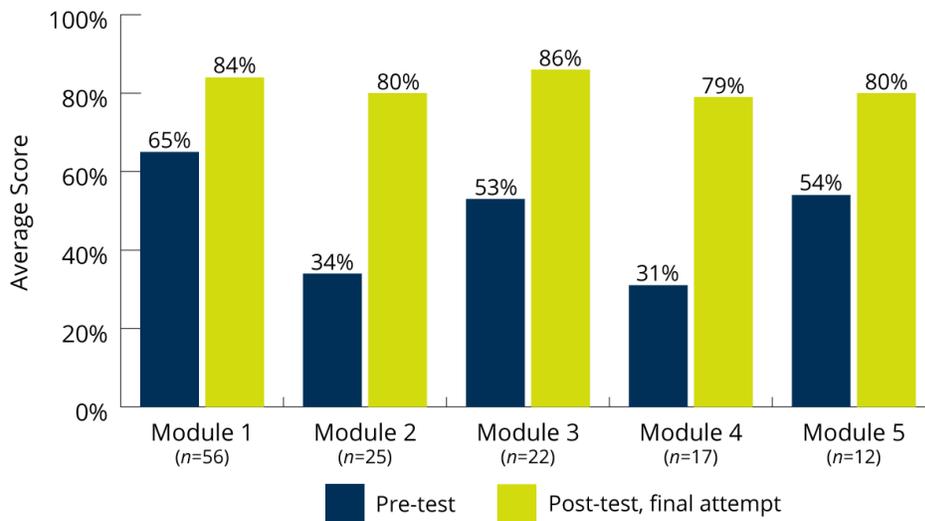


Figure 1. Average Scores on Module Pre-tests and Post-tests in Basic Mathematics, Fall 2017

Average scores on module pre-tests and post-tests, Elementary Algebra

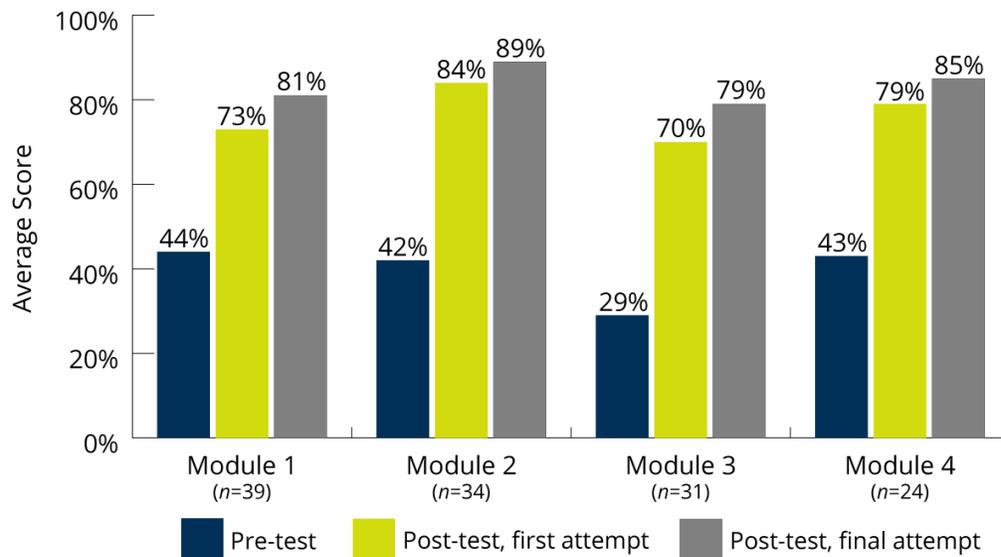


Figure 2. Average Scores on Module Pre-tests, First Attempts on Post-tests, and Final Attempts on Post-tests in Elementary Algebra, Fall 2017

Further investigation into module tests in both courses also suggests the impact that the Companion Study Plan had on the success rates on each of the tests. In the Basic Mathematics course, just 16% of students earned 80% or higher on the module 1 pre-test, but after completing the subsequent Companion Study Plan, taking the module quiz, and remediating again with the Companion Study Plan, the percentage of students ultimately earning 80% or higher on the post-test rose to 91%, a 75 percentage point jump. Figure 3 illustrates similar results for the other module pre-test to post-test success rates for Basic Mathematics.

MyLab Companion Study Plan impact on success rates, Basic Mathematics

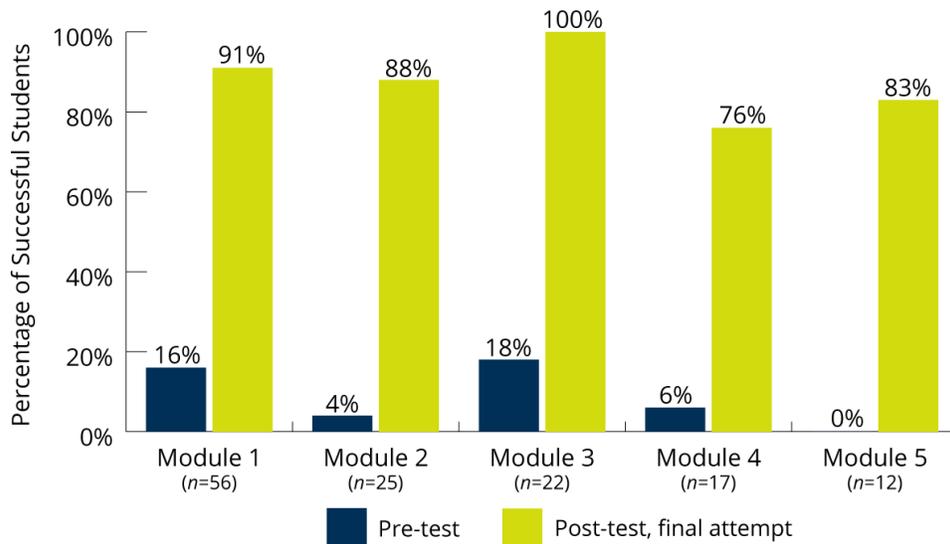


Figure 3. Percentage of Basic Mathematics Students Earning at Least 80% on Module Pre-tests and Module Post-tests After Completing Required Companion Study Plan Remediation, Fall 2017

In addition to pre-test and final post-test scores, first-attempt post-test scores were also available for the Elementary Algebra course and all three scores were analyzed to determine the impact of Winchester’s model on student success within those assessments (figure 4). Data show that success rates increased from an average of 9% on pre-tests to 60% on the first attempt of the post-tests, a 51 percentage point leap. Students not achieving the required 75% on their first attempt of the post-test were required to remediate in the Companion Study Plan and were then allowed to retake the post-test up to three more times, with additional remediation in between attempts. Students needing additional attempts were required to meet with either their instructor or a tutor for additional review before continuing. Across the four modules, students spent an average of 1.57 attempts on the post-test to earn the required minimum score. Data show that average success rates on post-tests, from first to final attempt, rose from 60% to 97%, a 37 percentage point increase.

MyLab Companion Study Plan impact on success rates, Elementary Algebra

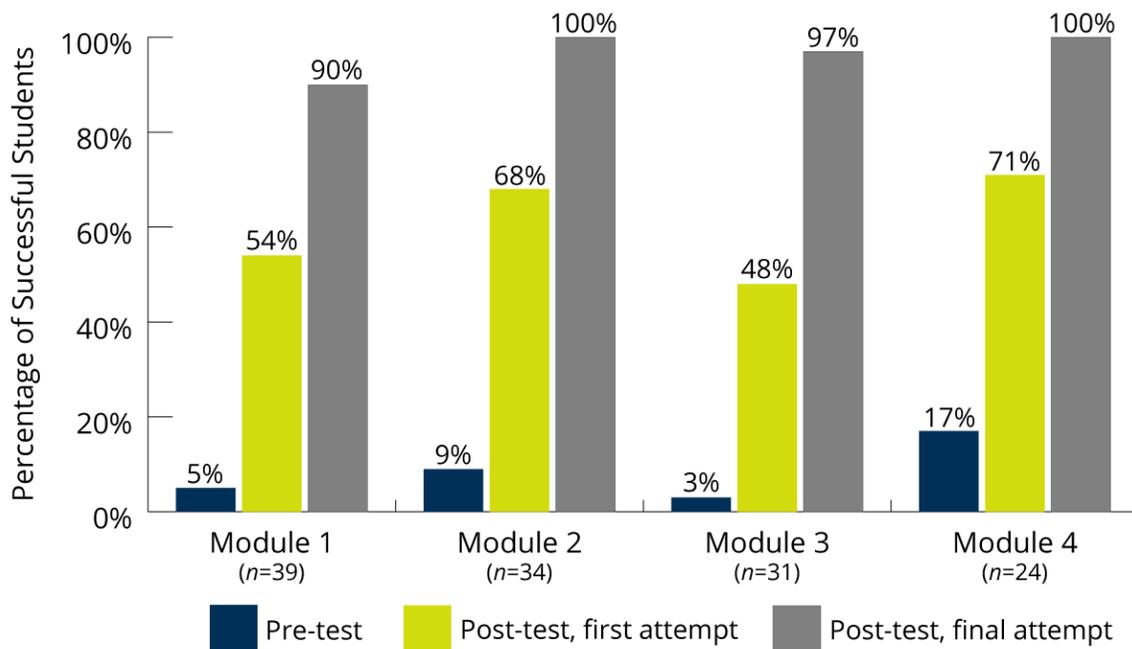


Figure 4. Percentage of Elementary Algebra Students Earning at Least 75% on Module Pre-tests and Module Post-tests, After Completing Required Companion Study Plan Remediation, Fall 2017

The Student Experience

In an anonymous, voluntary survey (28% response rate), students shared their views on how MyLab Math impacted their learning in the course:

- *"I improved more because it teaches me step by step. Easy to catch on."*
- *"MyLab Math was very helpful because of the ability to work out examples to get a better understanding of how to work a problem."*
- *"It took some getting used to because I do prefer an instructor-type class, but it is effective when I do have time to do work away from the classroom setting."*
- *"The benefits are you can use the view examples, view the videos, and practice exercises multiply times until you understand the problems."*
- *"When you need help, it helps you step by step and you improve more."*

Results from the survey also showed:

- 92% of student respondents were able to access MyLab during the first week
- 84% of student respondents accessed MyLab on their own personal laptop or desktop computer
- 56% of student respondents also purchased either the hardback or loose-leaf textbook
- 44% of student respondents purchased and used only the eText
- 32% of student respondents accessed MyLab in a computer lab
- 12% of student respondents reported having no internet at home
- 4% of student respondents reported having no computer at home

Conclusion

Brandi Winchester wanted her students to take ownership of their learning, so in line with her institution's QEP, she designed her Basic Mathematics and Elementary Algebra courses following an modular emporium model. The prerequisite feature in MyLab guides each student through the course at an individualized pace. Performance on module pre-tests and quizzes identifies student weaknesses and updates the Companion Study Plan, which is used for remediation between assessments and attempts on assessments. Results show strong improvements in both average scores and success rates between module pre-tests and post-tests in both courses.