

MyLab Math educator study explores student success in Beginning and Intermediate Algebra at Amarillo College

<p>School Name Amarillo College</p> <p>Course name Beginning and Intermediate Algebra</p> <p>Course format Lecture</p> <p>Course materials MyLab Math for <i>Beginning and Intermediate Algebra</i>, 6th Edition by Martin-Gay</p>	<p>Timeframe Fall 2016, Spring 2017</p> <p>Submitted by Edie Carter, Dean of Academic Success Gale Brewer, Instructor Gretta Johnson, Associate Professor Karen White, Associate Professor</p> <p>Results reported by Julianne Labbiento, Customer Outcomes Analytics Manager</p>
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Key Findings

- Students who had higher notebook scores and MyLab homework scores also had higher average final course scores.
- The overall pass rates for students completing the Beginning Algebra and Intermediate Algebra courses were 71 percent and 70 percent, respectively, considered very strong.
- In addition to the traditional course assessments, Amarillo faculty have also incorporated holistic measures to address and support their students' needs.

Setting

[Amarillo College](https://www.actx.edu/cr/facts) is a public community college dedicated to providing educational, cultural and community services and resources to enhance the quality of life for the diverse population in its West Texas service area. Amarillo College is accredited by the Southern Association of Colleges and Schools Commission on Colleges and offers 143 associate degree and certificate programs. During the Fall 2016, the total campus enrollment was approximately 10,000 students, with almost 24,000 additional area residents taking advantage of the college's professional development and personal enrichment courses through Continuing Education. Approximately 62 percent of students were female, and 49 percent of the student body identified as Caucasian, with another 40 percent identifying as Hispanic/Latino. (<https://www.actx.edu/cr/facts>, <http://www.actx.edu/databook/>)

About the Course

Beginning Algebra (MATH0302) at Amarillo College is a three-credit course that meets for five hours of lecture weekly for eight weeks. Topics covered include: operations with real numbers, exponents and polynomials, operations with algebraic expressions, linear equations in one and two variables, absolute value, basic geometry, introductory graphing, factoring polynomials, and applications.

Intermediate Algebra (MATH0303) is also worth three credits and meets for five hours of lecture weekly for eight weeks. The course represents a study of relations and functions, inequalities, algebraic expressions and equations (absolute value, polynomial, radical, rational), with special emphasis on linear and quadratic expressions and equations. The prerequisite for the course is either minimum grade of C in MATH0302 or a [TSI](#) score of 344.

A graphing calculator (TI 83/84 suggested) is required for both courses.

Challenges and Goals

Several years ago, the Developmental Math team had redesigned Amarillo College's Beginning and Intermediate Algebra courses but the results were modest, so a second redesign was planned for 2016. In an effort to keep student textbook costs down, the Developmental Math team now requires the MyLab access code only, which also provides students with the eText. The team designed a guided notes packet for each course in hopes that success rates would improve as students reviewed their notes and homework. In keeping with Amarillo College's [Poverty Initiative](#), for which the college was awarded the prestigious [Bellwether Award](#) in 2017, Carter says that the guided notes are provided online by the course instructors, and students are required to print the 100-page document for around \$5.00. She and her team also wanted to address students' needs on a holistic basis, since so many of the students are first-generation college students coming from low-income backgrounds. They believed that a lack of familiarity with college expectations and challenges could impact their developmental students' chances for success.

Implementation

Classes meet four days per week for 75 minutes each, or two nights per week for 150 minutes each. Carter states that both the curriculum and tests are standardized. She uses a [coordinator course](#) to ensure that all faculty are using the same homework assignments and online test reviews in MyLab. While classes are taught in a standard classroom, a computer cart is usually available if an instructor wishes to use them during class.

Each class period begins with a quick review of the calendar, words of encouragement, and a skill drill. Skill drills are quick, five-minute assessments that address topics previously covered in class and, if missed, cannot be made up. Research shows that any time you can continually cycle the information and remind students of lessons, the knowledge is more likely to be secured in their minds. Students can earn a maximum of four points per skill drill, with the total contributing ten percent of the student's final course average. A maximum of 100 points is allowed. The skill drill score can also replace a student's lowest test score if the skill drill score is higher. Results of the skill drills are immediately shared with the class and any necessary reviews are conducted before an

instructor moves on to new material. Previously assigned homework is also reviewed with time for student questions.

Delivery of the daily topic may take place as a lecture and/or activity. Carter says that a class notebook is required of all students enrolled in the course. This three-ring binder with dividers must be brought to each class period and is checked periodically by the instructor. The faculty have a strong commitment to fostering the development of organizational skills in their students. Student notebooks must contain a title page, dividers, the syllabus, a reflective test journal, the printed guided notes packet, organized homework assignments, and chapter test review work. Homework assignments must be completed in pencil, organized vertically in no more than two columns per page, and answers must be circled.

Faculty for these courses have also grown a learner-centered activity bank, and Carter believes that it has provided huge dividends for their students. At least once or twice per week, students learn a lesson and then engage in one of the bank's activities to further solidify the concepts. She says that the inclusion of these activities also drove a change in the classroom design. Classrooms are now organized into learning pods of four-to-five students each, and students are encouraged to collaborate as they work. Faculty try to keep students interested and active while in the classroom as well, limiting each chunk of information or activity to 8–10 minutes before moving on to the next.

Following the presentation of materials in class, an online homework assignment is given in MyLab for each section of the book covered. All [learning aids](#) are turned on for these homework assignments, and they are due by the deadline set by the instructor and not accessible after that date. Students work problems in their class notebooks or on graph paper and have unlimited attempts to earn full credit prior to the due date. As one student noted, *"The benefit is that you can always make a 100% if you are willing to work for it."*

Tests are not taken during normal class time, nor are they taken in the classroom; they are taken in the [Math Testing Center](#). Carter states that this allows for more flexibility as to when a student chooses to test during a specified window of time. By not testing in the classroom, student anxiety over being rushed to finish is also reduced. Tests are given after each module. Prior to testing, students are required to complete an online test review in MyLab with all learning aids turned off. Students must earn a score of at least 70 percent to be eligible to take a test. Reviews may be taken an unlimited number of times. Instructors encourage continued practice of the reviews until students attain mastery. After achieving the required score and printing verification of the test review, students take their tests to the Math Testing Center. These paper-and-pencil tests are graded by the students' instructor and stored in the Math Testing Center during the semester, and are available for review by the student at any time. Chapter tests may only be taken one time and, for students who score below 70 percent, a minimum of 30 minutes of mandatory tutoring is required at the [Outreach Center](#), the Math Tutoring Center. Students not completing mandatory tutoring are not allowed to take their next chapter test. Chapter tests taken after their due dates incur a five-point penalty per day, excluding Sundays.

A paper-and-pencil comprehensive final exam is given after all chapter tests are completed and may be taken only once. Instead of an online review for the final exam, there is a paper-and-pencil review that must be submitted to the Math Testing Center when requesting the final exam. Students not taking the final exam by the deadline earn zero points for the exam.

Carter explains that, in addition to the traditional course assessments described above, Amarillo College's developmental math faculty are particularly proud of the holistic measures they have incorporated into the courses to promote a growth mindset and provide additional support for students. Some initiatives include:

- Instructors meet one-on-one with students for a minimum of ten minutes each during their office hours to form a more personal bond and to break down barriers to each student's success;
- Students review their tests and write reflective test journals to identify their mistakes and chronicle their progress throughout the semester;
- Skill drills incorporate a unique motivational quote each day;
- Accountability partners provide support, encouragement, and build community within the classroom, with each student asked to partner with three other students in the classroom to work with and serve as a go-to person to contact if they are running late, sick, confused on a deadline, etc.; and
- Students receive encouragement bracelets at the beginning of each course with the motivational reminder that, "Success is the Only Option."

According to Carter, many of the students in these classes are first-generation college students who may have a supportive network of family or friends, but may not have the understanding of the pathway that a student needs to travel through college. These measures are designed to address and support those needs. For example, she says that many students will look down at the bracelet's inspirational message when they are struggling and remember that they need to push through to success. As evidence of the bracelets' impact in particular, Carter relates that faculty initially intended to collect the bracelets at the end of each term to distribute to future students, but the students wanted to keep them! Students describe their appreciation for all of the faculty's efforts, commenting: *"The class was fast paced, but (my teacher) was thorough and allowed us the option to ask her to slow down and made us feel comfortable when we thought our questions were silly. She provided a wonderful environment for learning,"* and *"Best format/regiment for a math course I have ever taken."*

Assessments

Each student's final score is calculated based on the following:

- 50% Chapter/module tests (5 @10% each)
- 20% Comprehensive final exam
- 10% MyLab homework
- 10% Notebook
- 10% Skill drills*
- Attendance**

*The skill drill score counts once on its own and can also count as a replacement chapter test score if it is higher than the lowest chapter test score.

**Attendance influences the final course score. Up to two points can be added to the final average and up to three points can be subtracted from the final average, depending on the number of absences incurred.

Final letter grades are assigned using the following scale:

- A** 90–100%
- B** 80–89%
- C** 70–79%
- D** 60–69%
- F** Below 60%

Other than attendance, no additional opportunities for extra credit are available. MyLab assignments count for 10 percent of a student's final course score.

Results and Data

Carter reports that she observed a slight increase in pass rates during a previous redesign, but believed that more could be done. The guided notes packet was designed to serve as a tool for students to complete and reference throughout the entire course sequence. She and her team feel that the incorporation of the notebook as a requirement in the course has had great impact. In a survey given by Amarillo faculty in Fall 2016 ($n=431$), 42 percent of students self-reported "Guided Notebook" as what they liked best about the course.

Data shows very strong correlations between notebook scores and final course scores, as well as MyLab homework scores and final course scores. 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 <0.001 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. Figure 1 displays the correlation between notebook scores and final course scores for Beginning and Intermediate Algebra, $r=0.82$, $p<0.001$, while Figure 2 illustrates the correlation between MyLab homework assignments and final course scores for the two courses, $r=0.82$, $p<0.001$. Both results are statistically significant. The notebook and MyLab homework assignments each contribute ten percent towards students' final scores in the course, influencing these relationships.

Correlation between notebook scores and final course scores

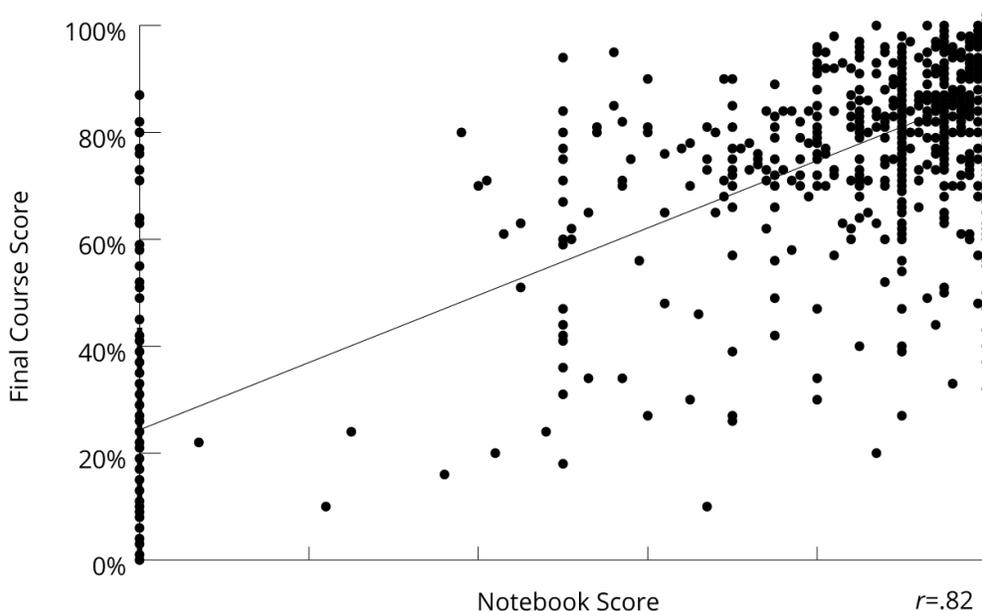


Figure 1. Correlation between Notebook Scores and Final Course Scores in Beginning and Intermediate Algebra ($n=1,251$)

Correlation between MyLab homework scores and final course scores

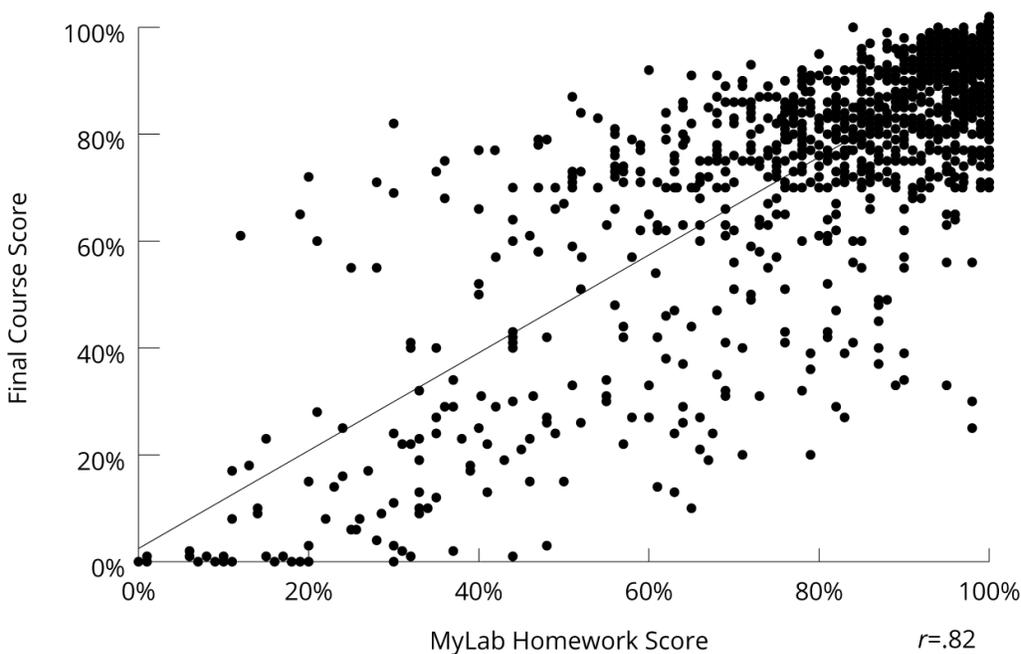


Figure 2. Correlation between MyLab Homework Scores and Final Course Scores in Beginning and Intermediate Algebra ($n=1,251$)

Analysis of the data shows that the overall pass rates for students completing the Beginning Algebra and Intermediate Algebra courses were 71 percent and 70 percent, respectively. Figure 3 illustrates the breakdown of the pass rates by course and by semester.

Pass rates for Beginning Algebra

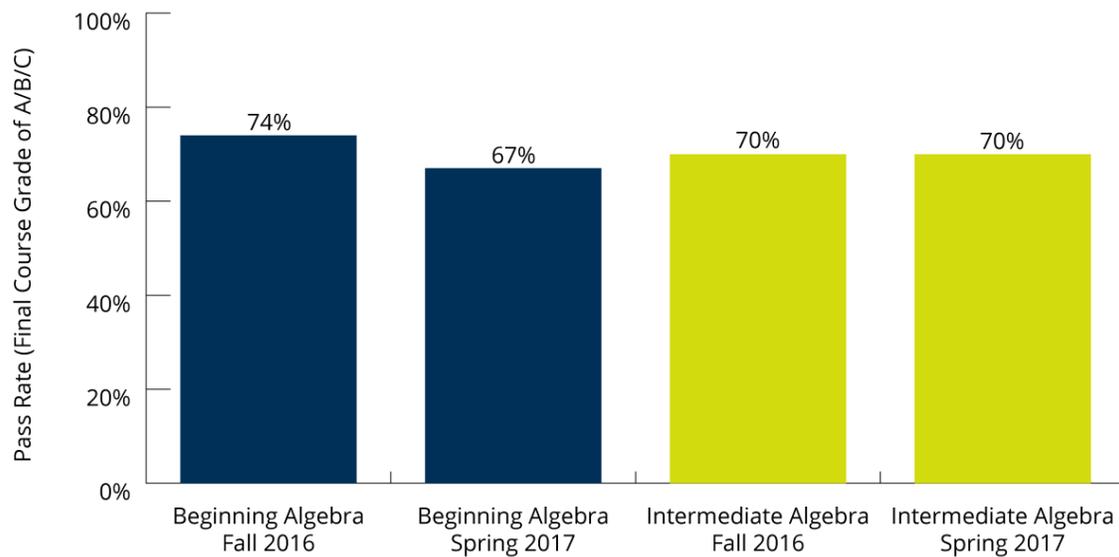


Figure 3. Pass Rates for Beginning Algebra (Fall: $n=479$, Spring: $n=375$) and Intermediate Algebra (Fall: $n=538$, Spring: $n=489$)

The Student Experience

Students taking a voluntary end-of-semester student survey in Spring 2017 (39 percent response rate) were asked about their impressions of using MyLab Math. Some responses given to questions about impact and benefits were:

What do you think are the benefits of using MyLab Math?

- *"When doing homework, if you get an answer wrong, it tells you that it is wrong and gives you the correct answer so you can practice. You get all the chances you want on the homework and reviews."*
- *"The instructions are detailed step-by-step and the program offers similar problems."*
- *"Going over it and over it again helps it stick that much better."*

What impact has MyLab Math had on the way you study?

- *"It has made it feel like someone is there all the time if you need help."*
- *"Allows me to see examples and problems so when I don't understand I can work similar questions so that I actually learn what I am doing. I really think it helps me a lot more in Algebra."*
- *"It has helped me find a good pace on which to do my work and not just math, but all my classes."*

Conclusion

Edie Carter and her team of faculty at Amarillo College wanted to improve the success of developmental students who faced both academic and socio-economic challenges. Through the guided notes packet and holistic measures Carter and team incorporated, students have embraced the growth mindset and learned valuable organizational skills. While Carter agrees that the regiment of the course sequence is now very prescriptive, she maintains that students benefit from each aspect of the course, and the data illustrate their success.