

MyStatLab educator study measures correlations between assignments at Richland College

School Name Richland College, Dallas, TX	Timeframe Fall 2015
Course name Elementary Statistical Methods	Submitted by Yolanda Manzano, Professor of Mathematics
Course format Fully online	Results reported by Traci Simons, Pearson Customer Outcomes Analytics Manager
Course materials MyStatLab; Essentials of Statistics by Triola	

Key Findings

- Data for this course show a strong positive correlation between students' MyStatLab homework averages and test averages.
- Data indicate that students who earned higher MyStatLab homework averages and study plan scores, showing mastery of course material by earning an overall A/B/C course grade, had average MyStatLab homework scores 42 percent higher and average study plan scores 83 percent higher than students who earned a D/F in the course.
- The instructor feels that MyStatLab's quality, instantaneous feedback is its greatest advantage for student learning.

Setting

Part of the Dallas County Community College District, Richland College (RLC) has focused on teaching, learning, and community building for more than 40 years. In recognition of these efforts, the White House and the Department of Commerce named RLC a 2005 recipient of the [Malcolm Baldrige National Quality Award](#), the only community college to have received this award. Each semester, Richland serves approximately 20,000 credit and 4,800 non-credit students who come from more than 130 countries and speak 79 different first languages. Other demographics include:

- Female: 55 percent
- Male: 45 percent
- Anglo: 28 percent

- Hispanic: 30 percent
- African-American: 21 percent
- Asian/Pacific Islander: 14 percent
- Unknown: 5 percent
- International: 1 percent
- Native American: 0 percent
- Average age: 26

About the Course

The Elementary Statistical Methods course at Richland College is a core curriculum course covering collection, analysis, presentation and interpretation of data, and probability. Analysis includes descriptive statistics, correlation and regression, confidence intervals and hypothesis testing. Use of appropriate technology is recommended. Elementary Statistical Methods is an entry-level course and is open to any student meeting Texas Success Initiative standards of college readiness (student must have appropriate assessment test score or have successfully completed Intermediate Algebra).

Challenges and Goals

Teaching gateway courses, such as statistics, presents a number of challenges. Some of the challenges instructors face include transparency in grades and grading, providing students personalized and immediate feedback and help, and allowing for diverse learning experiences. By adopting MyStatLab for her Elementary Statistics course, Yolanda Manzano, Professor of Mathematics, hoped to provide students with a resource that would:

1. Allow them to know their grades at all times;
2. Provide assistance finding errors in problems while working them, thus promoting “productive struggle;”
3. Provide access to a variety of help aids that are tailored to different learning styles; and
4. Help students become more motivated to complete statistics because of the software’s clear content support in a non-threatening, user-friendly manner.

Manzano was also interested in understanding if there were specific resources or tools in MyStatLab that correlated with student success so that she and her colleagues could build on that information.

Implementation

This fully online course is set up by units. Students click on the corresponding unit button, and then select “Videos and Homework” from the drop-down menu. For each section, students must view the section video. These videos are set up in MyStatLab as prerequisites to the homework, so students cannot access the homework assignment until they have watched the video. Students are encouraged to take notes on all explanations and examples to help clear up anything they may miss during the video. Once they have watched the video, students then move on to the homework problem set. It is suggested that they work the homework problems in a notebook, showing written work for all problems so that if there is a question, the instructor can see what the problem was asking and what steps the student took to arrive at the answer. Students must score a minimum of 85 percent on each exercise set before moving on to the next. While students can work ahead in each unit, deadlines are firm, so they are strongly discouraged from falling behind. Homework problems submitted late are penalized 10 percent. Manzano drops the three lowest homework

grades, though she does not broadcast this in the syllabus because she wants students to put full effort into all homework assignments.

Since this class is fully online, students take their tests in MyStatLab. Students do not receive credit for correct answers without providing supporting work. Any test submitted without corresponding documentation within one hour of test completion earns a grade of zero. Tests cannot be retaken; however, the final exam grade can replace a test grade.

The final exam is also taken in MyStatLab, and students may complete the course before the final exam date if able. Like their face-to-face counterparts, the fully online students are encouraged to use the final exam review in MyStatLab to prepare for the final. As with all other fully online tests, students do not receive credit for correct answers without providing supporting work, and any test submitted without corresponding documentation within one hour of final exam completion will earn a grade of zero. Manzano's rationale for this is two-fold: 1) The one-hour time limit helps to curb the possibility of using others' work, and 2) she wants to ensure students know how to arrive at the correct answer. Manzano has detailed guidelines for submitting written work in her syllabus. If all listed criteria are not met, students do not receive credit and earn a zero on their test. Generally, students must submit a single Word or PDF document containing pictures of the worked problems to Manzano via email.

In addition to exams being delivered via MyStatLab, Manzano also requires use of the Discussion Board in the fully online course. Discussion Board assignments allow students to share their thoughts with Manzano and their classmates throughout the course. Postings must be complete, concise, and considerate. There are three Discussion Board assignments throughout the semester: Introduction, Self Evaluation, and Course Evaluation. In addition, if Manzano receives a question from a student that she feels may help other students in the course, she asks the student to post it on the Discussion Board, thus encouraging interaction among the class, which Manzano believes creates an environment where students feel comfortable with and can potentially help each other. In addition to the features noted above, Manzano also utilizes the MyStatLab gradebook's Search/Email by Criteria function frequently to give more personalized feedback after tests, major assignments, or just generally to provide encouragement.

Assessments

- 40% Tests (4)
- 30% Final exam
- 20% MyStatLab homework
- 10% Discussion board posts

Results and Data

Fall 2015 grades were analyzed with the exception of 14 students who did not take the final exam but did not officially withdraw from the course. Figures 1, 2, and 3 are correlation graphs; correlations do not imply causation but instead measure the strength of a relationship between two variables, where r is the correlation coefficient. The closer the r value is to 1 or -1, the stronger the correlation. The corresponding p -value measures the statistical significance/strength of this evidence (the correlation, or r), where a p -value $<.05$ shows the existence of a correlation between these two variables. For Manzano's course, the following correlations were found:

- A strong positive correlation exists between students' MyStatLab homework averages and their test averages, where $r=.54$ and $p<.001$ (figure 1).
- A strong positive correlation exists between students' final exam scores and their average MyStatLab homework scores, where $r=.51$ and $p<.001$ (figure 2).
- A very strong positive correlation exists between students' study plan scores and their overall course scores, where $r=.72$ and $p<.001$ (figure 3). This is interesting because the study plan does not count towards the students' final grade. The data suggest that effort and extra practice in the study plan may help to increase student performance overall. In fact, very strong positive correlations exist between students' study plan and homework performances ($r=.77$, $p<.001$), test performances ($r=.65$, $p<.001$), and final exam performances ($r=.52$, $p<.001$). Although these results seem to support a hypothesis around study plan usage, more research is needed in this area.

Correlation between homework and test averages

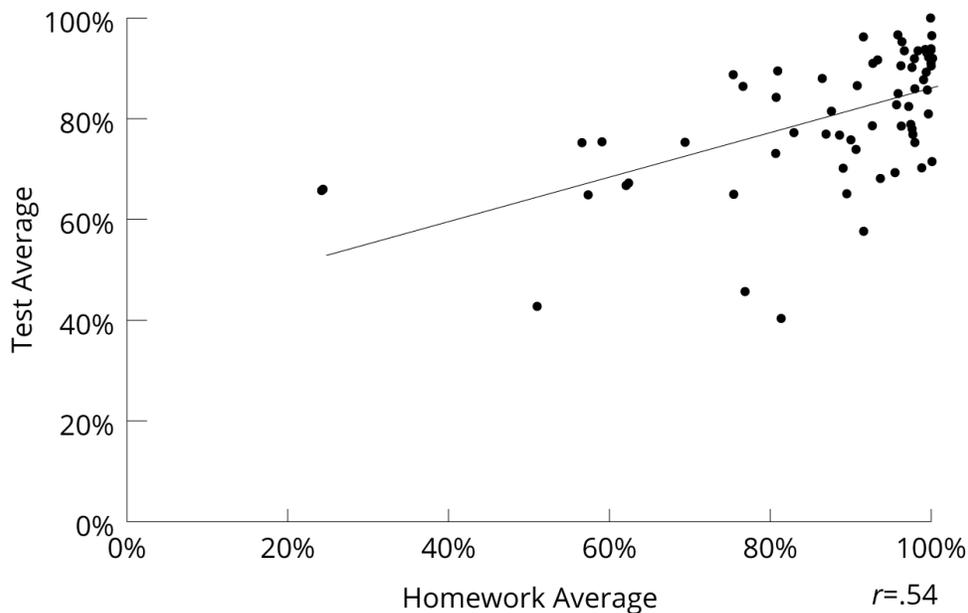


Figure 1. Correlation Between MyStatLab Homework Averages and Test Averages, Fall 2015 ($n=67$)

Correlation between homework and final exam averages

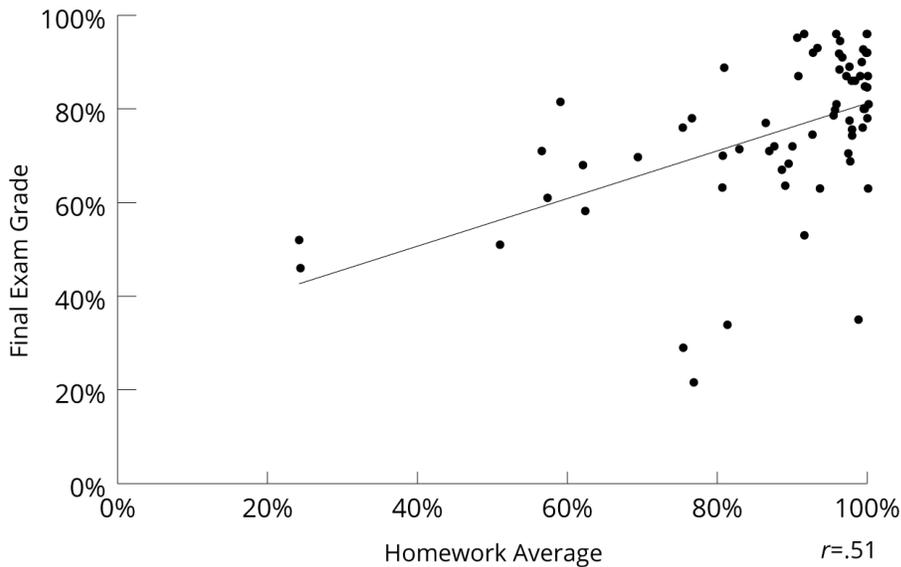


Figure 2. Correlation Between MyStatLab Homework Average and Final Exam Grades, Fall 2015 ($n=67$)

Correlation between study plan and overall course score

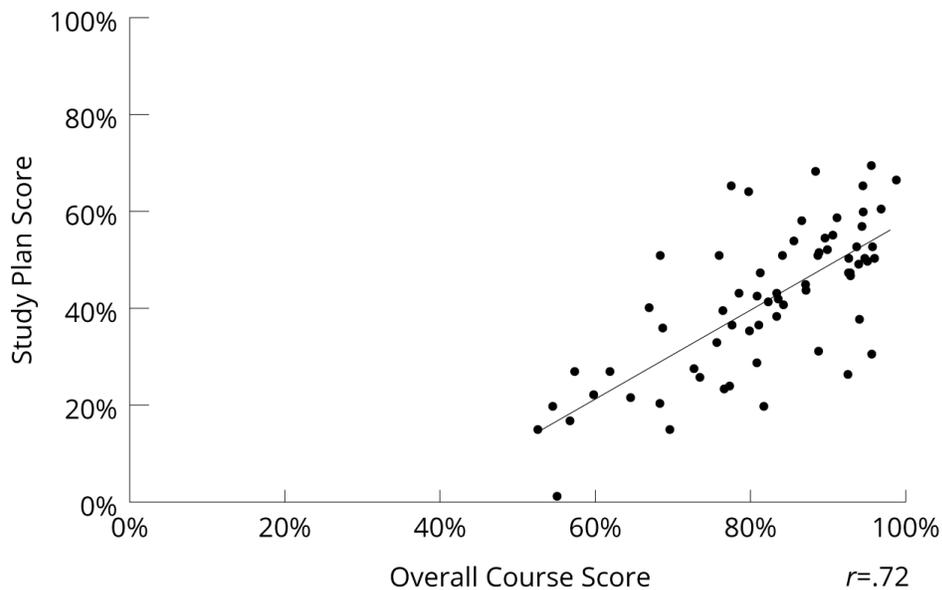


Figure 3. Correlation Between Students' MyStatLab Study Plan Score and Overall Course Score, Fall 2015 ($n=67$)

In addition, a strong linear relationship of the final course letter grade distribution per average MyStatLab homework assignment grade exists (figure 4). It should be noted that homework scores comprise 20 percent of the final course grade, thus influencing this relationship.

- Students earning a final course grade of A, B, or C scored 27 percentage points higher on homework in MyStatLab than those students earning a final course grade of D or F; A, B, or C students averaged 91 percent on homework, while D or F students averaged 64 percent.
- Students earning a final course grade of A, B, or C scored 20 percentage points higher on the study plan in MyStatLab than those students earning a final course grade of D or F; A, B, or C students averaged 44 percent on the study plan in MyStatLab compared to students earning a final course grade of D or F, who scored an average of 24 percent. Because activity in the study plan does not count towards the students' final grades, performance in this space may be considered an indication of effort. One could argue that A students typically put forth more effort than the rest of the group. With that in mind, students earning a B or C in the course were compared to students earning a D or F. Students earning a B or C in the course averaged 40 percent in the study plan, 16 percentage points higher than students who earned a D or F in the course.

Final letter grade compared to MyStatLab performance

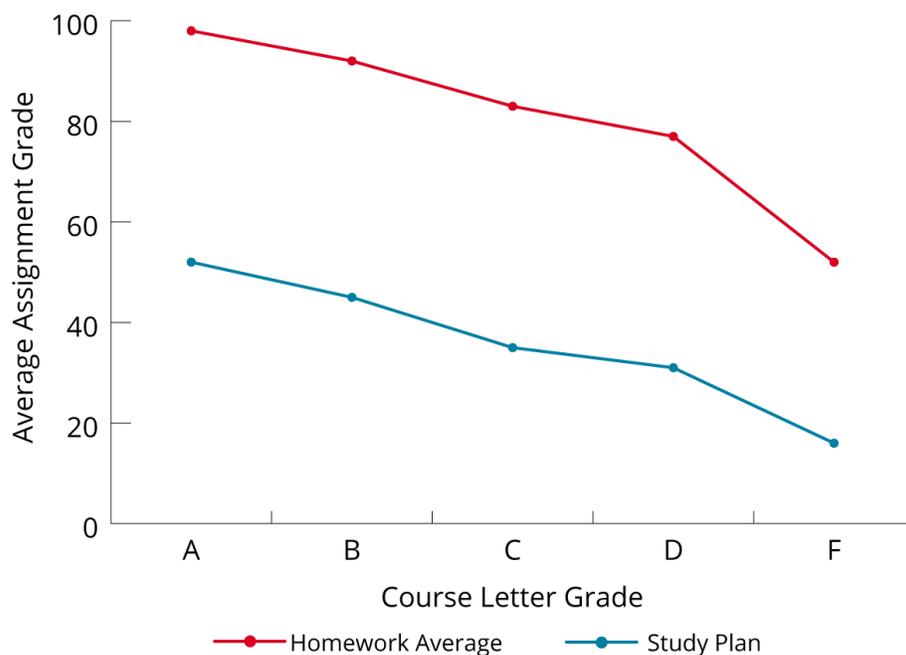


Figure 4. Students' Final Letter Grades Compared to Performance on MyStatLab Assignments, Fall 2015 ($n=81$)

The Student Experience

A voluntary, end-of-semester survey was distributed to students enrolled in Manzano's Elementary Statistical Methods course in Fall 2015 (75 percent response rate).

The Elementary Statistical Methods course contains core objectives that are addressed and assessed through the content covered:

- Critical thinking skills: to include creative thinking, innovation, inquiry, and analysis, evaluation, and syntheses of information
- Communication skills: to include effective development, interpretation and expression of ideas through written, oral, and visual communication
- Empirical and quantitative skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions

At the end of the course, students who responded to the post-course survey revealed that they felt fairly confident they were prepared to do several of the course’s core objectives in their next course (figure 5). On a scale of 1–10, students were asked, “After taking this class, how prepared are you to do the following in your next courses?”

Student survey response to preparation level for next course

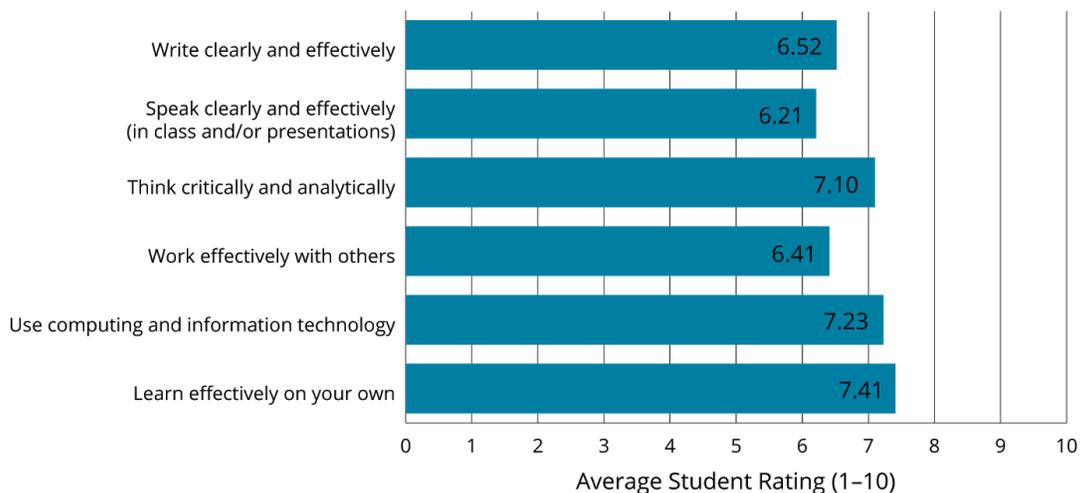


Figure 5. Student Responses to a Voluntary Survey Question, “After taking this class, how prepared are you to do the following in your next course?” Fall 2015 ($n=61$)

In addition, the majority of students who responded to the post-course survey felt that MyStatLab was either helpful or very helpful in a number of areas, including providing adequate practice, improving their confidence in their ability to understand the concept, providing a positive learning experience, and motivating them to learn (figure 6).

Student survey response to helpfulness of MyStatLab

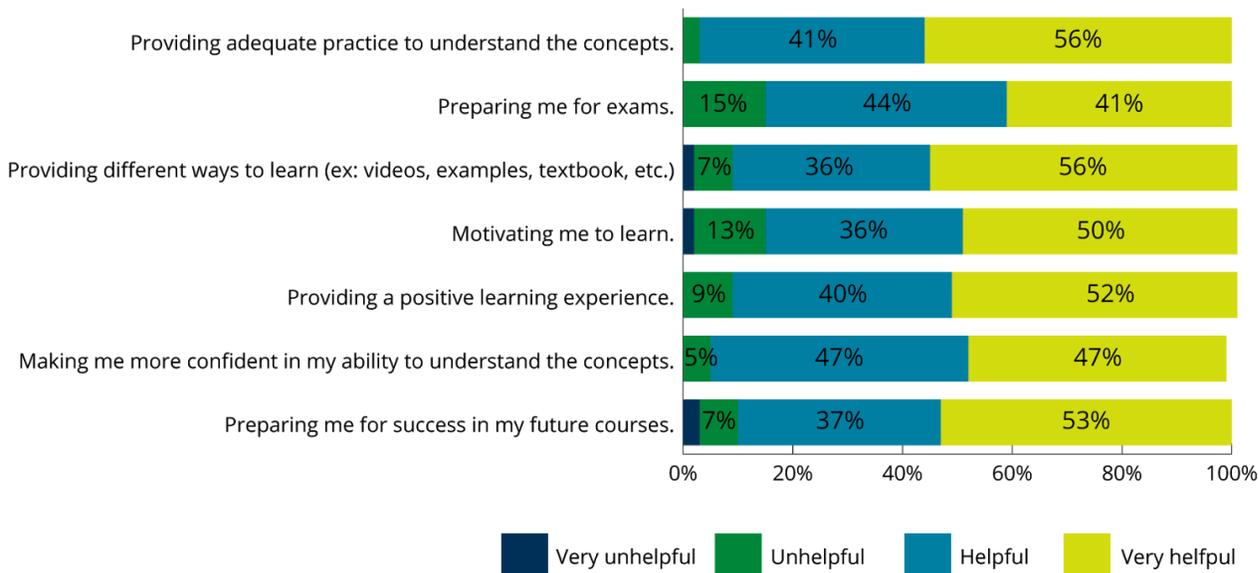


Figure 6. Student Responses to the Question, “How helpful was MyStatLab in the following areas?” Fall 2015 ($n=59$)

Selected student written responses to the open-ended question, “How has MyStatLab impacted your learning in this course?” include:

- *“The way MyStatLab was designed, I feel extremely impacted my learning. It was very organized, tells you how long until your next assignment is due and has my results and my progress all in the ‘course home’ tab, which helps you feel less stressed and more organized and confident.”*
- *“I have discovered the love for online videos for learning!!”*
- *“I now love statistics.”*
- *“It has challenged me to work certain problems that are out of my comfort zone.”*
- *“It has improved my ability to self study outside a classroom setting.”*

Additional student comments about MyStatLab are below:

- *“I think MyStatLab provides you with all the materials and resources you need in order to succeed in whatever course you take through MyMathLab/MyStatLab. You do have to devote a lot of time to it, being that the assignments do take quite some time, but since you have everything you need, it makes it less stressful. If you have the devotion and the time for an online course, I think MyMathLab/MyStatLab is the way to go.”*
- *“MyStatLab is like your own personal tutor that really helps you get more comfortable and confident with math.”*

Conclusion

Currently, Manzano does not offer extra credit for the study plan, but, in previous courses, she has required that students complete the study plan to gain access to the retest. “This was very helpful,” states Manzano, “and I may look into trying that again.”

By adopting MyStatLab for her Statistics course, Manzano hoped to provide students with a resource that would allow them to know their grades at all times, have help finding errors in

problems while working them, and provide access to a variety of help aids that are tailored to different learning styles. Manzano is pleased with the results thus far and feels that the students' responses to the survey especially reflect that MyStatLab is doing what she'd hoped it would. "The greatest advantage of MyStatLab is that it provides quality feedback to students instantaneously. I appreciate that the students feel they are getting so much help from the program."