Product Name	MyStatLab
Course Name	Introduction to Statistics
Course Format	Combination of hybrid and fully online

Key Results   After Professor Hollister began to require MyStatLab's Companion Study Plan in her Introduction to Statistics course, students scored on average four percentage points, or five percent, higher on exams than students in the previous semester when the Study Plan was not assigned.

Submitted by
Diane Hollister, Professor

Course Materials
MyStatLab, Learning Catalytics, and *Essentials of Statistics*, Triola

Setting

Reading Area Community College (RACC) is an accredited, comprehensive, open-enrollment education institution. According to its website, 78 percent of RACC's students are enrolled part-time, with 53 percent identifying as white, 28 percent as Latino/Hispanic, and 13 percent as Black or African-American.

The Statistics course at RACC is a three-credit introduction to statistical concepts where students will gain an understanding of and ability to use graphs, frequency distributions, measures of central tendency and dispersion, probability, various distributions and their properties, testing hypotheses, approximation and Chi-square tests, regression, and correlation.

Challenges and Goals

RACC started using MyStatLab in 2007 and saw overall improvements in student achievement, but, Professor Diane Hollister recognized that many students continued to struggle. She found that students often lack some of the necessary prerequisite knowledge and many times exhibit poor study skills, so she started requiring students to use the Companion Study Plan in MyStatLab in January 2014, believing that doing so would increase student success.

Implementation

The statistics course at RACC is taught in a variety of ways. During the traditional semesters (fall and spring), Hollister's MyStatLab students are a blend of hybrid (face-to-face time with the instructor plus a MyStatLab online component) and fully online (no face-to-face time; all online via MyStatLab).

RACC also offers a three-week, intensive statistics boot camp in January and Hollister's summer sections are typically fully online. All students, no matter the course delivery method, receive the same resources via MyStatLab.

Hollister focuses her attention on providing as much support for her Statistics students as possible. She has created YouTube videos that show her students how to use StatCrunch and that review key course concepts. Also, in fall 2014, she began to provide students with a Learning Guide that outlines the course and allows space for students to write notes, explanations in their own words, etc. Finally, Hollister introduced Learning Catalytics into her classroom in fall 2014, which, she reports, has increased student activity in the classroom. "All of this is an attempt to provide them structure," says Hollister. "Believe it or not, even though this is a 200-level course, students still come to class sometimes without paper or anything to write with. These tools help to improve their study and learning skills."

Students start each chapter by working inside the homework assignment. Hollister only assigns one homework assignment per chapter, but she embeds media into it, and students can go in and out of the homework as often as they need throughout the time they spend covering the unit. Homework is due a couple days before the exam, all learning aids are always available to students, and they have four attempts on each problem.

Hollister reports that embedding the media into the assignments has cut down on the overall email from students and questions about concepts because she can track which topics tend to confuse students and insert media at that juncture to head off misconceptions and add further clarification. Discussion posts and course links also aim to address trouble areas and "help" documents are posted for each chapter.

After students complete the homework, or even during the time they are completing the homework assignment, they work in the Companion Study Plan (CSP). Students must achieve 80

"Student scores either improved significantly or stayed the same, and standard deviation of scores dropped in many cases significantly after implementing the Companion Study Plan."— Professor Hollister

percent mastery on the concepts in the CSP before they can unlock the test for that unit.

Hollister has added mini assignments to the course recently as well. These assignments focus on a YouTube video with two or three problems assigned that are associated with that video. "That's just a quick way to help students know what video from YouTube they should be focused on at that point of the chapter," notes Hollister. "The students actually requested it."

Tests are chunked by unit, and students can either take them on campus in the computer lab or remotely. Each test is timed at 90 minutes and must be taken in one sitting. The final exam is delivered via MyStatLab and is proctored on campus, timed, and password protected.

Some of the additional features in MyStatLab that Hollister utilizes, in an attempt to help provide structure for her students, are "Search/Email by Criteria," the course calendar, the gradebook reporting dashboard, and StatCrunch.

"The new gradebook reporting dashboard has great visuals for things like item analysis, mastery information, and time on task with resulting score. I sometimes take a snapshot of the time on task visual and show it to my students during class. That's when the light bulb goes on—they see the connection between working hard and getting a good grade."

Assessments

65 percent	Tests (MyStatLab, nine unit tests timed at 90 minutes each, and the final exam, which is 25 percent of the category, delivered in MyStatLab and proctored)
20 percent	Homework (MyStatLab, one per unit/chapter)
15 percent	Projects (completed in MyStatLab using and analyzing data via StatCrunch)

Results and Data

When Hollister compared students' scores on exams from fall 2013 when the Companion Study Plan was not assigned to fall 2014 when she did assign the Companion Study Plan, she saw a definite improvement in the fall 2014 scores. She reports, "Student scores either improved significantly or stayed the same, and standard deviation of scores dropped in many cases significantly."

Further analysis of the data shows that students in the fall 2014 section scored, on average, four percentage points, or five percent, higher on exams (M=86%, SD=9%, N=53) than students in fall of 2013 (M=82%, SD=13%, N=65), t(-1.94)=0.03, p<0.05 (Figure 1). In this analysis, students without a final exam grade were removed (fall 2013 n=11, fall 2014 n=4).

There was also a strong positive correlation found between the average exam score and a student's overall grade in fall of 2014, r(53)=.86, p<.05 (Figure 2). The data indicate a relationship between average exam score and a student's overall grade—it should be noted that exam scores made up 65 percent of the final course grade when calculated, influencing this relationship.
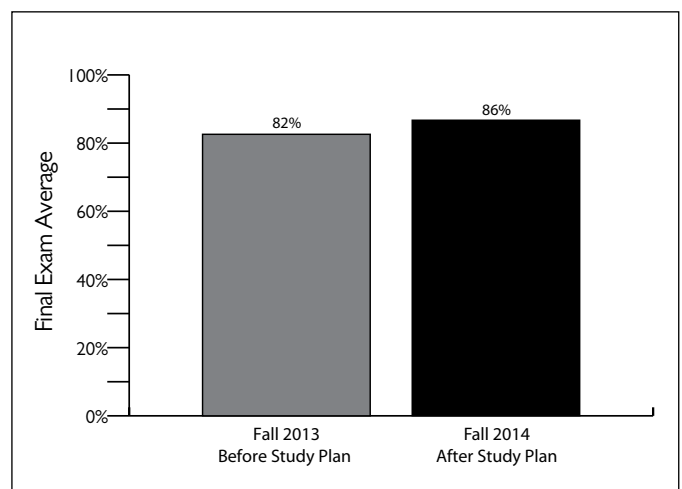

Figure 1. Comparison of Final Exam Average before Required Companion Study Plan (Fall 2013, n=65) and after (Fall 2014, n=53)
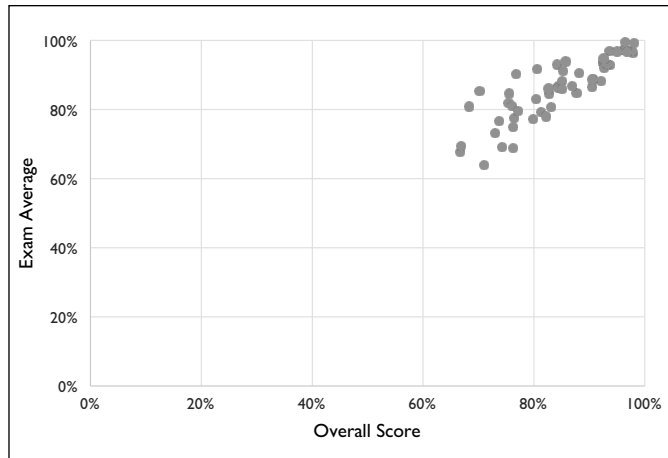
Figure 2. Overall Course Score and Exam Average, Fall 2014 ($n = 53$)

The Student Experience

According to Hollister, students seem to find the videos extremely helpful. She believes this is because they are very visual and specific to her students' needs. Hollister's students have told her that they like that she is the teacher in the video going over how to use StatCrunch or reminding them of what they talked about in class.

Hollister also reports that her students appear to enjoy Learning Catalytics. When Hollister decided to implement it, she told her students that she wanted to try out something new in class, and she wanted their feedback. She gave them the choice of rating the program "highly beneficial," "somewhat beneficial," or "I don't care to use it." When surveyed, every student who was present in class that day responded to the question, and the majority of responders found it "highly beneficial" and wanted to continue using it.

In an informal poll of her fall 2014 class, Hollister asked what resource they found most helpful in learning the material. Of those in attendance when the question was asked, all students responded and most responders initially replied that StatCrunch was the most helpful. She then asked the same question but gave answer options (study plan, videos, learning guide, etc.); 80 percent of the responders chose the YouTube videos, and 60 percent of the students found the Companion Study Plan helpful.

Hollister has noted that students get frustrated with the prerequisite requirement to master the objectives in the Companion Study Plan before being able to take the test, but she has found that explaining the rationale to her students helps ease their frustration. "I just tell them that they don't know what they don't know, and working to mastery in the CSP will get them a better grade on the exam."

Conclusion

Hollister is pleased with the way the Statistics course has performed, especially given all the changes and additions to the course. She plans to work on polishing the Learning Guide, trying to figure out how to best balance providing students with more support tools without overwhelming them. Specifically, she plans to include more guidance when it comes to StatCrunch, pointing students directly to certain applets within the program and leaving room for their observations.