Product Name   MyStatLab

Course Name   Business Statistics

Course Format   Fully online

> **Key Results**   After personalizing his online Business Statistics course, adjunct instructor Delbert Spear saw improvement in course pass rates, with As and Bs increasing 245 percent and Fs decreasing by 100 percent. Students who utilized their two attempts on quizzes and tests increased their scores by 22 percentage points and 10 percentage points, respectively.

Submitted by
Delbert Spear, Adjunct Instructor

Course materials
MyStatLab and *Business Statistics: A First Course,* Levine, Krehbiel, Berenson & Stephan

Setting

Ivy Tech Community College is Indiana's largest public postsecondary institution and the nation's largest singly-accredited statewide community college system, serving nearly 200,000 students annually. Ivy Tech has 32 degree-granting campuses throughout Indiana. It serves as the state's engine of workforce development, offering affordable degree programs and training that aligns with the needs of its communities. In addition, its courses and programs transfer to other colleges and universities in Indiana. It is accredited by the Higher Learning Commission and is a member of the North Central Association. The school is an open-access institution with an average class size of about 22 students.

The Business Statistics course at Ivy Tech is designed to build student competence in the areas of descriptive and inferential statistics through an emphasis on the application of these statistical methods. Taught out of the Business department, the course includes an examination of data, probability of occurrence, and basic sampling processes and uses statistical methods to model results and then uses these models for forecasting. The course also introduces tests to examine the appropriateness of these techniques. Prerequisites for the course are Introduction to Business and Intermediate Algebra or higher.

Challenges and Goals

According to instructor Delbert Spear, it is no secret that the online Business Statistics course at Ivy Tech is not a favorite among students. He attributes this to the fact that the topics are difficult and abstract, yet students must pass the course if they are majoring in Business. In fact, Spear maintains that the Business Statistics class at Ivy Tech has the second highest failure rate behind Calculus and typically has around a 20 percent drop rate.

By adopting MyStatLab for his Business Statistics course, Spear hoped to give students an online course that would interest them and provide them the help they need at the time they need it, thus improving the course's student success and drop rate.

Implementation

After having used a competing product, Spear began using MyStatLab in fall 2014. Students who had used MyMathLab in previous courses recommended it and expressed interest in having a similar program in Business Statistics. "It learned with you," according to the students, which was intriguing to Spear. He was aware that at least one Business Statistics course was using MyStatLab at another campus, so he copied that instructor's course, and set out to try it with his classes.

Spear acknowledges, however, that all did not go smoothly that first semester. Grades went down, student surveys were negative, and everyone was frustrated, due, in part, Spear believes, to the lack of personalization and customization of his MyStatLab course. Spear realized that he had taken an out-of-the-box course and handed it to students instead of taking that same course and modifying it to make it completely fit the course he teaches. After figuring out what wasn't fitting, Spear decided to make some changes.

First, Spear changed how assignments are named. He doesn't like to use terms like "test" and "quiz" because he feels they promote anxiety in students, so he now calls MyStatLab quizzes "Chapter Practice," homework is now "Chapter Homework" and tests are "Chapter Review."

"This course, for me, was very much about the application of the information gained from statistical analysis and I feel that I have succeeded in understanding those concepts beyond simply plugging the numbers into formulas for a correct answer." —Student

Chapter Practice assignments (quizzes) are due each Saturday. Students are allowed two attempts and can complete the assignment in more than one sitting. While there is no minimum score required to move on, students must complete the Chapter Practice assignment before moving on to their personalized Chapter Homework assignment. The homework assignment is built algorithmically based on the student's Chapter Practice performance and focuses on the objectives they need to work on further. Students are allowed two attempts on their personalized Chapter Homework. If they cannot complete the entire homework in one sitting, they can "save for later" and come back to it. The better the student performs on their Chapter Practice, the shorter the Chapter Homework assignment is because they will need to work on fewer objectives.

Students must submit their Chapter Homework before moving on to MyStatLab's Adaptive Study Plan, which acts as a personal tutor, updating in real time based on student performance to provide personalized recommendations on what students should work on next. In Spring 2015, Spears began to require that students submit their Chapter Homework assignment before working in the Study Plan because he felt that his Fall 2014 class spent too much time in the Study Plan and not enough time on the Chapter Homework, resulting in low homework grades. If a student does not earn a 70 percent or higher on the homework, the system then directs them to the Study Plan for practice on trouble areas. Once students obtain a 70 percent or better on that chapter's homework, they then take the Chapter Review (test).

Students are allowed two attempts on the Chapter Review (test) and are allowed to "save for later" on that assignment as well. When choosing questions for the review, Spear uses the diagnostics for each problem that tell him the average amount of time it takes students to complete the problem, and he makes sure he doesn't assign a review (test) that is longer than 45–50 minutes. The Chapter Review is set up as a personalized assignment from the Chapter Homework, meaning students are automatically given credit on the review for objectives that they mastered in the Chapter Homework, and they do not have to attempt those problems.

Spear allows one makeup on a scheduled Chapter Practice (quiz) or Chapter Review (test) during the semester, but it must be taken within one week from the date missed.

In addition to adding the minimum grade requirement for Chapter Homework assignments, Spear also implemented Discussion Board assignments. Students are required to post comments about assigned topics to the Discussion Board for 14 assignments. Each Discussion Board assignment is worth up to 10 points: up to six points for a student's initial posting, and up to four points for their responses to two classmates. Late postings are not accepted and cannot be made up.

Spear found that the time he took personalizing the online course in MyStatLab was well worth the effort. After rebuilding the course, he reported that he only had a handful of the "old" issues, such as student frustration and poor course reviews, during the Spring 2015 semester.

Assessments

24 percent	Discussion Board (14 @ 10 points each = 140 pts)
24 percent	Chapter Practice, MyStatLab (14 @ 10 points each = 140 pts)
24 percent	Chapter Homework, MyStatLab (14 @ 10 points each = 140 pts)
24 percent	Chapter Review, MyStatLab (14 @ 10 points each = 140 pts)
4 percent	Syllabus quiz, MyStatLab (1 @ 20 points each = 20 pts)

Results and Data

When analysis was completed on data from Spear's Spring 2015 class, he was curious to learn how students performed from the first attempt to the second attempt on the Chapter Practice (quiz) assignments and the Chapter Review (test) assignments. Spear also wanted to look at whether students were getting faster as they worked through the material, demonstrating what he calls a "progressive learning element"—meaning, the learning is getting better and easier for the students as they progress through the topic.
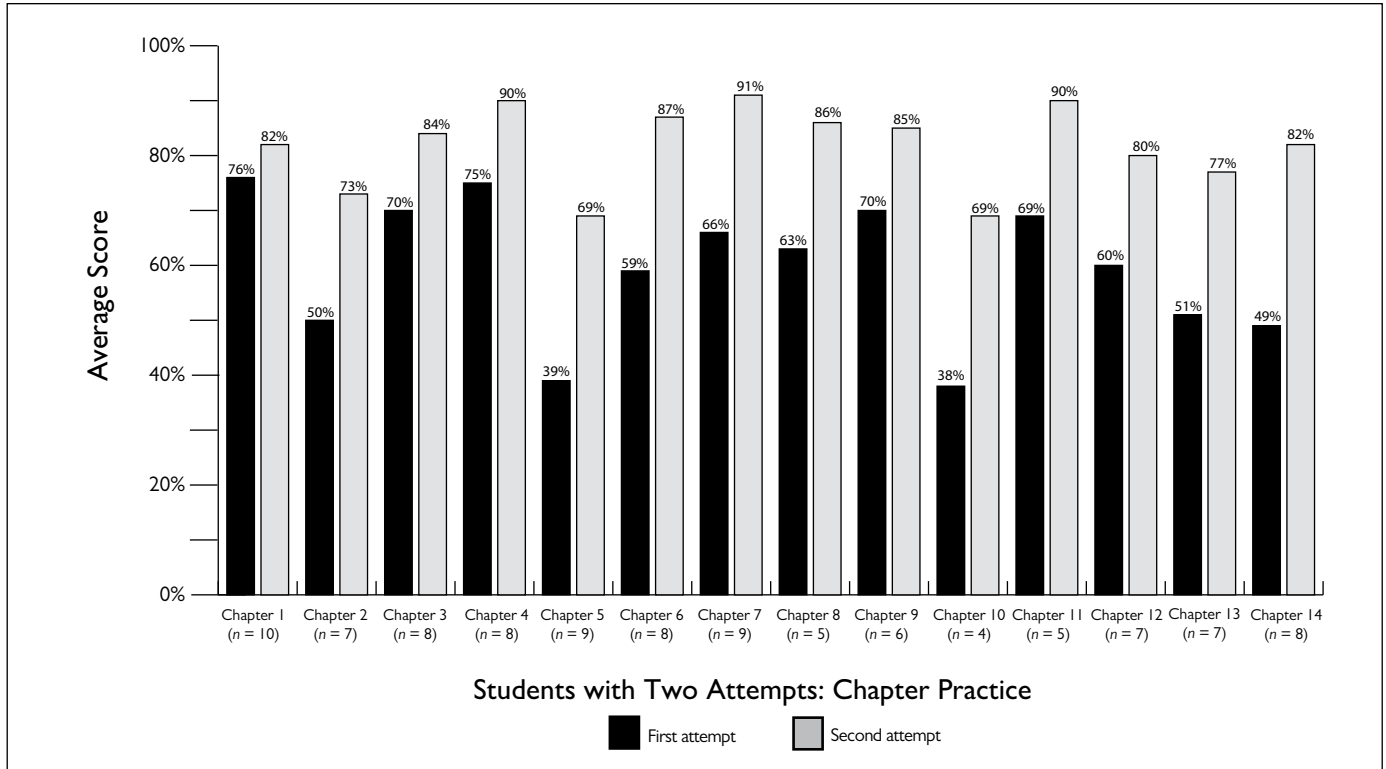
Figure 1. Students Using Two Attempts on Chapter Practice Increased Their Average Score 22 Percentage Points, Spring 2015
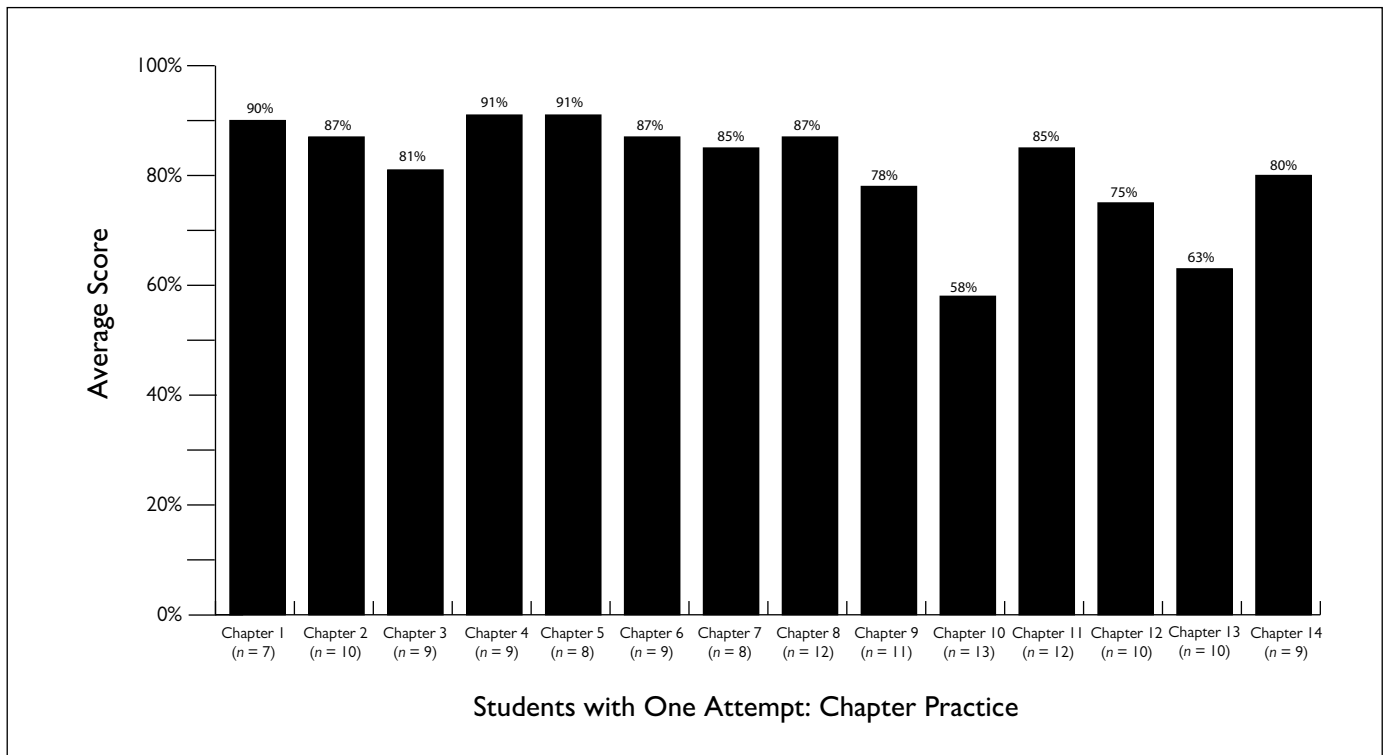

Figure 2. Students Using One Attempts on Chapter Practice Had an Average Score of 81 Percent, Spring 2015

The data from Spear's Spring 2015 class show that, for those students using two attempts, average scores went from 60 percent on the first attempt of Chapter Practice assignments to 82 percent on the second attempt, a 22 percentage points, or 36 percent, increase (Figure 1). Students with one Chapter Practice attempt averaged an 81 percent on these assignments (Figure 2). It should be noted that enrollment in the fully online course is 17. Given this low sample size, the average number of students who had two attempts on Chapter Practice assignments was only seven per assignment, and the average number of students had two attempts on Chapter Review assignments was only three per assignment.

Average scores on Chapter Review assignments for those students using two attempts went from 73 percent on the first attempt to 83 percent, a 10 percentage point, or 14 percent, increase (Figure 3). Students with one Chapter Review attempt earned an average score of 86 percent (Figure 4).

Data also showed that students spent less time on their second attempt than on their first attempt for each type of assignment (more than one hour less on Chapter Practice from attempt one to attempt two), and, further, their time-spent went down from Practice assignments to Review assignments, as depicted in Figure 5. Again, it should be noted that, on average, only

seven of the 17 learners attempted the Chapter Practice a second time and, on average, only three of the 17 attempted the Chapter Review a second time. Moreover, these results coincide with the structure and plan of Spear's course because Chapter Homework is a personalized assignment based on Chapter Practice performance, and Chapter Review is a personalized assignment based on Chapter Homework performance. "These results show that the MyStatLab course is doing what I structured it to do," says Spear. "If students master an objective, they don't have to cover it again, so they spend less time doing things they already know how to do and more time learning what they don't."

Analysis of time spent on Chapter Homework was not conducted because data was only available for each students' best attempt. However, that data showed that, on average, students spent 45 minutes on their Chapter Homework assignments.

In addition, data from Spear's Fall 2014 (first-time use of MyStatLab) and Spring 2015 (redesigned implementation of MyStatLab) courses were analyzed using a t-Test assuming unequal variances. Students in Spring 2015 (M = 86%, SD = 6%, N = 17) achieved overall grades that were a 47 percent, or 28 percentage point, increase from the previous semester in 2014 (M = 58%, SD = 29%, N = 18), $t(19) = -3.92$, $p<0.05$.
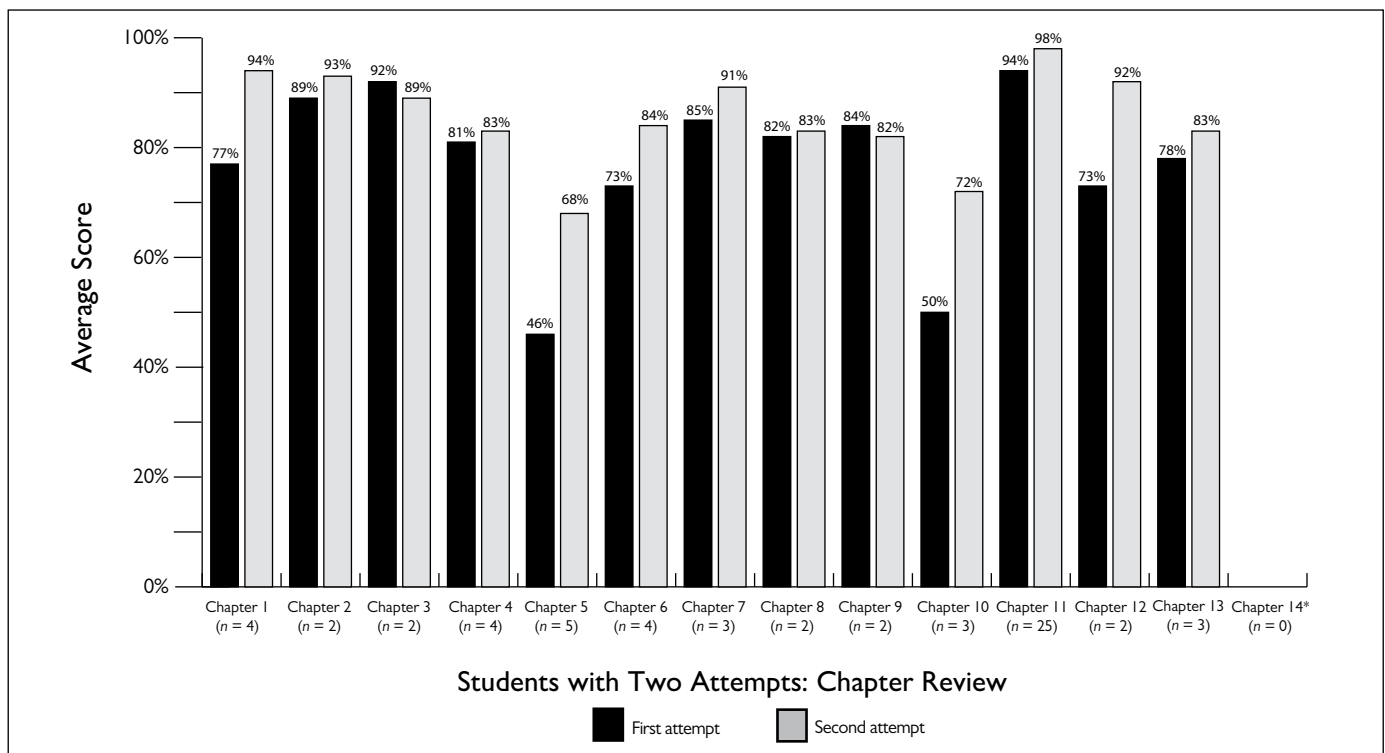

Figure 3. Students Using Two Attempts on Chapter Review Increased Their Average Score 10 Percentage Points, Spring 2015
(* Note: No students attempted the Chapter 14 Review a second time, so there were no students with two attempts for this analysis.)
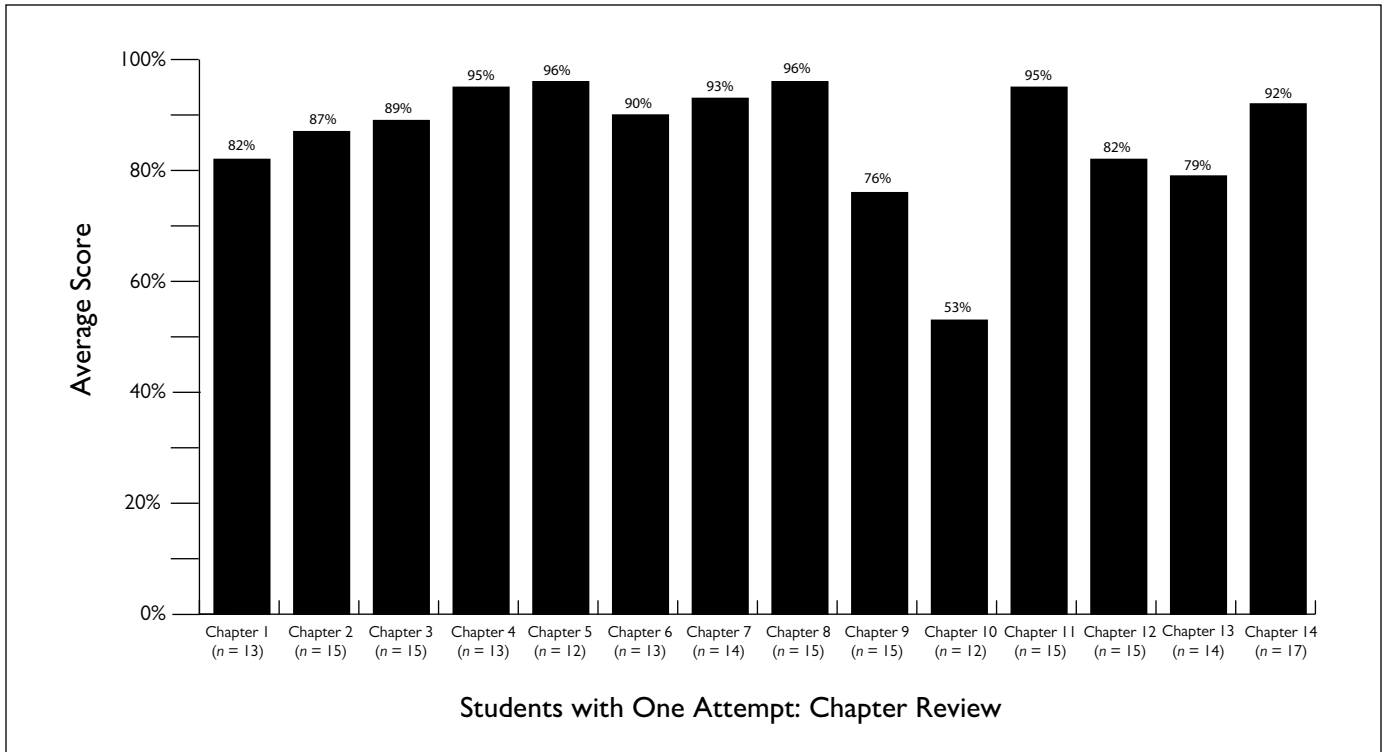
Figure 4. Students Using One Attempt on Chapter Review Had an Average Score of 86 Percent, Spring 2015

Spear attributes this overall performance improvement to the fact that his Fall 2014 MyStatLab course was a "generic" course that he copied from a previous instructor while his Spring 2015 MyStatLab course was completely personalized and customized for the way he wanted to teach his course (see "Implementation"). Figure 6 shows the percentage of students who received each letter grade. Spear is proud of the fact that nobody failed in Spring 2015. "Of course," he says, "It's impossible to fail the course unless you just don't do the work, but look at the increase in the number of A's and B's! That, for me, is something to get excited about."

Finally, data from the Spring 2015 course found positive correlations between students' scores on Chapter Practice (quizzes) ($r = .90$, $p<.001$), Chapter Homework ($r = .53$, $p<.001$), and Chapter Review (tests) ($r = .82$, p<.001) and students' final course grade. Chapter Practice, Chapter Homework, and Chapter Review each comprised an equal portion (24 percent) of a student's total grade, influencing this relationship. These positive correlations show a relationship in this course where students' scores on Practice, Homework, and Review are reflected in their overall performance.
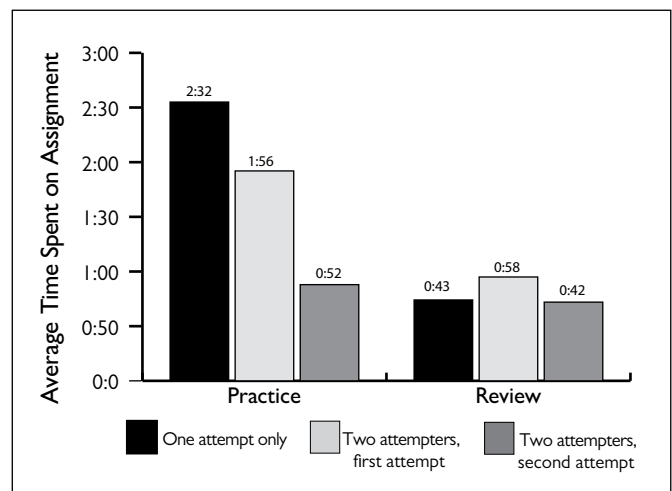

Figure 5. Average Time Spent on Assignments Based on Attempt, Practice and Review Assignments (Spring 2015, $N = 17$; Average n for One Attempt Only, Practice $n = 10$; Average n for Two-Attempters, Practice $n = 7$; Average n for One Attempt Only, Review $n = 14$; Average n for Two-Attempters, Review $n = 3$)
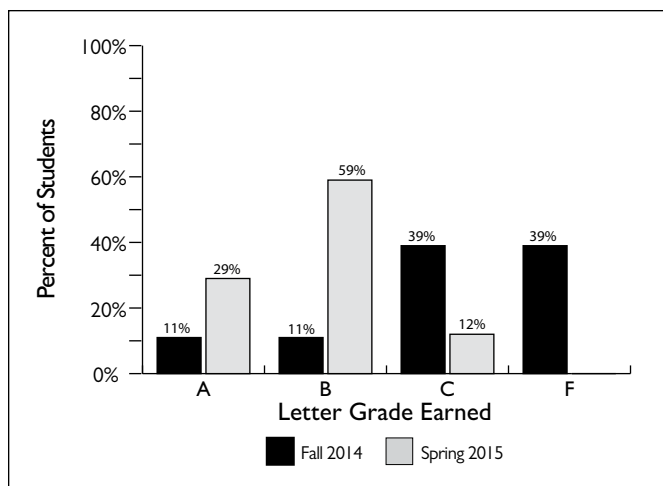
Figure 6. Comparison of Final Letter Grade Earned, Fall 2014 (N = 18: A = 2, B = 2, C = 7, D = 0, F = 7); Spring 2015,(N = 17: A = 2, B = 10, C = 2, D = 0, F = 0)

The Student Experience

In a 10-question survey distributed to students in spring 2015 (13 of 17 responded, 76 percent), 100 percent of responders in both sections said they would recommend the instructor to other students. Their comments reflect an appreciation for the materials used in the course:

* *"I appreciate the multiple learning styles of the class in that there was videos, articles, and work that made the content of the material much easier to understand."*

* *"I especially enjoyed the discussion boards. They were always on point and a great way to apply the lessons learned from the text and homework. I always felt like I learned something from one of the student's postings. The use of discussions made for a better understanding of course material than just cramming formulas for an exam."*

In addition, Spear believes that students' responses to the question, "What aspects, if any, do you appreciate about the instructor's teaching?" reaffirmed that renaming the assignments from the conventional "quiz" and "test" to his "Chapter Practice" and "Chapter Review" did what he intended it to do—take unneeded stress away from students. He also reports that he did change the number of problems he assigned in the later chapters to maintain a more consistent workload expected of students. Students commented:

* *"I loved not having tests. I am sure all students would say that, but it took away so much stress and because of that, I felt that I learned more because I was relaxed when doing my assignments. The only thing I would correct would be the number of questions in MyStatLab for some of the later chapters. The material was harder, and there were a lot of questions that really took me a great deal of time to do, like an uncomfortable amount of hours."*

* *"I appreciate not having midterms or finals because there is a lot of information to learn and tossing it all into one test would be hellish."*

One student noted that, having taken three online math courses, he believes he learns more in online math classes than in a traditional classroom setting. He also stated that, "This course, for me, was very much about the application of the information gained from statistical analysis and I feel that I have succeeded in understanding those concepts beyond simply plugging the numbers into formulas for a correct answer."

Conclusion

Spear reports that early fall 2015 student results are holding steady with the previous semester. "I'll be really excited to see how this fall goes, but I think it's going to be just as good," he says, noting that of the 38 students currently enrolled in his two online sections at two campuses, only one student has such poor performance that he or she may not be able to pass the course. "This is about the same as what I saw last semester when I first personalized my course."

Spear hopes to work with his institution's administrators to use the foundation of this course as a model for other online courses at the college. "Most instructors here are adjuncts and have full-time jobs," he states. "It would be nice for everyone to have something that's ready to go so that all we have to manage are the questions we may get. I think this course, since it's already personalized, would give them a great starting point." The number of students impacted so far is small, but Spear is committed to continuing tracking, analyzing, and interpreting student data moving forward.

Spear recalls a particularly inspirational comment from a student: "I was dreading this class because of all the horror stories I have heard about statistics. However, the professor made it a really interesting and more easily understood class than I could have hoped for." That was my goal, right there," says Spear, "and without MyStatLab, it wouldn't have been possible."