

## MyLab Statistics with MyLabsPlus educator study assesses student performance in Elementary Statistics course at University of Texas Arlington

<p><b>School Name</b> University of Texas at Arlington, Arlington, TX</p> <p><b>Course name</b> Elementary Statistics</p> <p><b>Course format</b> Hybrid: One 80-minute class meeting and two 80-minute lab meetings each week; fixed due dates, scheduled meetings with flex lab time allowed plus optional open lab time</p> <p><b>Course materials</b> MyLab Statistics for <i>Fundamentals of Statistics</i> by Sullivan Optional scientific calculator, as specified on syllabus</p>	<p><b>Timeframe</b> Fall 2012–Spring 2016</p> <p><b>Educator</b> Shanna Banda, Learning Resource Director</p> <p><b>Analyst</b> Bobby Childress, Learning Resource Coordinator</p> <p><b>Results reported by</b> Traci Simons, Pearson Customer Outcomes Analytics Manager</p>
---	--

### Key Findings

- After implementing a hybrid course redesign using MyLab™ Statistics, Elementary Statistics ABC rates improved nine percentage points from Spring 2013–2015 and four percentage points from Fall 2012–2015.
- Coordinators report—and student survey respondents agree—that the institution of flex time for required lab hours has helped students come to the lab when they are able, rather than skipping the lab because they are running late.

### Setting

The University of Texas at Arlington (UTA) is a public research university located on a 420-acre campus in Arlington, Texas. The campus is in the Dallas-Fort Worth-Arlington metropolitan area, and is adjacent to downtown Arlington. The university was founded in 1895 and was in the Texas A&M University system for several decades until joining The University of Texas system in 1965.

In Fall 2014, the campus student population of 35,000 was the second-largest in the UT System. The Carnegie Foundation in 2016 classified UT Arlington in the category of “R-1: Doctoral Universities – Highest Research Activity.” Only 115 institutions in the nation are listed in that category which is often referred to as “tier one.” The Chronicle of Higher Education named the university one of the fastest growing public research universities in the nation. UTA offers 81 baccalaureate, 71 masters, and 31 doctoral degrees, and the average gift aid package—grants and scholarships that do not have to be repaid—is about \$5,700 per student. In addition, U.S. News & World Report has ranked UT Arlington fifth among national universities for undergraduate diversity: 22 percent Hispanic, 15 percent African American, 10 percent Asian, and 11 percent International.

The Math Department at UTA serves over 10,000 students annually and in 2013 was the winner of the American Mathematical Society’s AMS Award for an Exemplary Program or Achievement in a Mathematics Department for doubling the size of its doctoral program over five years and bolstering those ranks with historically underrepresented student groups, including women and minorities. [Learn more about UTA’s 2013 AMS award.](#)

## About the Course

The Elementary Statistics course at UTA is offered through the Math Emporium, which is a part of the math department and is an academic and tutoring computer lab available to UT Arlington students currently enrolled in undergraduate and graduate math classes. The lab is open 8:00 a.m.–9:00 p.m. Monday through Thursday and closes at 5:00 p.m. on Friday. It is open 9:00 a.m.–3:00 p.m. on Saturday. There are 154 seats in the lab, four of which are privacy booths, and a smaller lab across the hall houses 41 computers. The average lecture and lab class size is 150 students. The Lab is staffed at all times, always by undergraduate tutors and with graduate workers during peak times, with the goal of a student-to-undergraduate tutor ratio of 25:1. All undergraduate tutors must be STEM majors and are typically engineering or math majors, with some students coming from the school’s UTeach program, which consists of education majors with a strong math background.

Topics in the Statistics course may include collection, analysis, presentation, and interpretation of data. Analysis includes descriptive statistics, probability, relationships between variables and graphs, elementary statistical models, hypothesis testing, inference, estimation, correlation, regression and confidence intervals.

## Challenges and Goals

“We were losing the sense of a cohesive unit. I basically suggested that we reduce the class size to 150 in the lecture sections and then come together in a single lab. Class size makes such a huge difference.”

In June 2013, Shanna Banda was recruited to UTA’s math department as the Learning Resource Director with the goal of solving “the gateway courses problem.” Because she came from a community college and had experience with the emporium model, UTA hoped she could help improve the courses’ success rates (students earning a C or better). The department had already started an emporium course for their Statistics course in 2012, but it wasn’t working as they’d

hoped: each lecture section had 200 students who were then split into two lab sections of 100 students each. Success rates were still considered low by the administration. Banda and the faculty quickly realized that in “teaching” large lectures but splitting students up in labs, they were losing some collaborative work that could happen between students because they weren’t seeing the same classmates each meeting. “We were losing the sense of a cohesive unit,” Banda states. “I basically suggested that we reduce the class size to 150 in the lecture sections and then come together in a single lab. Class size makes such a huge difference.” Backed by that theory, the department hypothesized that by adjusting their old model, they would encourage collaboration between students and their instructors, and their student success metrics would improve.

## Implementation

If you don’t have an attendance requirement there, they don’t come. Intrinsic motivation isn’t worth anything to students, but points are!

While taking attendance is not required at UTA, each faculty member is free to develop his or her own methods of evaluating students’ academic performance, which includes establishing course-specific policies on attendance. All sections of Statistics have the following attendance policy:

- Upon entry into the lab, students are required to log in to an attendance tracking system using their MavID card. They are also required to sign out when leaving the lab.
- Over the course of the semester, in addition to lecture attendance, students are required to complete 36 hours of study time within the Math Emporium. Lab hours must be completed throughout the course of the semester. Benchmark periods are designated in the table below and must be met in order to fulfill this course requirement. (NOTE: Any time accumulated over the required 12 hours within each benchmark rolls over to the next benchmark.)

Lab Hours Complete upon Completion of Exam 1	12	Worth 25% of Attendance
Lab Hours Complete Between Exam 1 and Completion of Exam 2	12	Worth 25% of Attendance
Lab Hours Complete Between Exam 2 and the Last Lab Day	12	Worth 25% of Attendance
Total Lab Hours Requirement	36	Worth 75% of Attendance
Lecture Attendance (at least 12 lectures)		Worth 25% of Attendance
<b>TOTAL ATTENDANCE REQUIREMENT</b>		<b>Possible 100% for Attendance</b>

- The attendance requirement is five percent of a student’s overall course grade. By semester’s end, a student’s attendance grade is 0, 25, 50, 75 or 100, depending upon the number of benchmarks met and lecture attendance.

- If a student misses a lab time, he or she is allowed to make up time during open lab hours within the associated benchmark period.

Each section of Statistics meets once per week for lecture/discussion for 80 minutes and two times per week for 80 minutes together in the lab. If a section is scheduled for Monday, Wednesday, Friday at 9:00 a.m., then they would meet for lecture/discussion on Monday and then lab on Wednesday and Friday. Banda recommends that the lectures be treated as a flipped classroom, so the lab before lecture (Friday, in this scenario) is spent reviewing online resources on topics that will be covered in class on Monday.

Discussion sessions, as Banda calls them, start with the entry quiz that assesses whether students came to class prepared for the material. Instruction during class usually covers two sections of the book per meeting. Typically, this time is spent working problems on a doc camera or in small groups. While StatCrunch (a statistical analysis software found in MyLab Statistics) is used in three assignments throughout the course, Banda and the faculty stress that students should use formula sheets, create tables, and draw out frequency tables and normal curves on their own. They feel it's important that discussion sessions spend more time on written visualizations and number crunching so that students can tell where the numbers are coming from and what they mean. Once students understand that, they move into technology exercises using StatCrunch or Excel. At the end of the lecture/discussion session, students take an exit quiz.

While students are able to start their homework assignment for the week at any point, they usually finish up the MyLab Statistics homework assignment in lab on Wednesday, and it is due by midnight on Wednesday. In addition, students sometimes take a content quiz while in the lab. Besides learning material and working on homework, quizzes, and tests in the lab, breakout sessions are also held during this time. One lab day per week has 30 minutes reserved as a breakout. The instructor chooses how to spend this time. Typically, challenging content is reviewed, or instructors may dig deeper into a particular topic based on student gradebook data that identify learning gaps and areas of misunderstanding.

The following is a detailed description of each component of the course:

### **Homework and quizzes**

All homework and quizzes are assigned in MyLab Statistics and are available to students on the first day of class.

- No late homework or quizzes are accepted, so students are encouraged to monitor due dates on the MyLab Statistics calendar. Students receive a zero for any assignments not submitted.
- There is a homework assignment covering each section of material and there are six, ten-question quizzes. Homework assignments are set for unlimited access up until the due date, and students have three attempts per question before it is scored as incorrect. They have two attempts to request a similar exercise. Students are allowed just two attempts on quizzes, which also have a 45-minute time limit and must be completed once opened. The highest score is recorded for grading purposes.
- All homework assignments contain learning aids to help students through the material. Quizzes do not contain the learning aids except in review mode once the quiz has been submitted.

- The Lockdown Browser feature in MyLab Statistics is used for all quizzes, so students are encouraged to either complete their quizzes in the Math Emporium Computer Lab or make sure they have administrative rights to the computer they are using in order to install the program. The program is a free download and easily installed through the Browser Check in MyLab Statistics.

### **Extra credit: technology assignments**

The Statistics course contains three related concept assignments which are completed using StatCrunch or Excel with MyLab Statistics. These assignments reinforce work done by hand using technology and count as bonus points on a chapter exam based on the percentage score earned on each assignment. No more than five points can be earned on any given test. Extra credit is applied at the end of the semester and cannot apply to the final exam.

Extra credit may also be earned by correctly answering entry and exit quizzes given during lecture meetings. The entry quiz is based on a topic over which students are expected to prepare before lecture, and the exit quiz is based on the lecture itself. The quizzes are answered on the required 3×5 index cards that students bring to class. Points accumulated for correct responses could add up to five points on the final exam.

### **Tests**

There are three online, proctored chapter tests throughout the course of the semester.

- All chapter tests are administered in MyLab Statistics and are comprised of questions that must be completed within 75 consecutive minutes. Tests cannot be opened, saved, and returned to at a later time.
- Students may use one 3×5 index card with notes on the front and back, an approved calculator, approved formula sheets, and blank scratch paper, which is provided.
- The approved formula sheets are supplied by the instructor and lab tutors for all tests. These sheets are identical to the foldout chart located in the back of the textbook.
- All exams are taken in the Math Emporium computer lab during the students' regularly scheduled lab time. Students must have their student ID with them on exam day and are required to sign in upon entering and exiting the lab.
- Prior to taking each content quiz, students must also take an Acknowledgement Quiz, which is designed to stress the importance of reading instructions in MyLab Statistics. Banda learned this practice after having too many students request credit for problems when they got the answer correct but didn't enter it in the terms expressed in the problem's instructions. The Acknowledgement Quiz consists of three questions: the first question is an orientation question, written by Pearson, the second question asks what model calculator the student is using, and the third question is, "I understand how important it is to read blue verbiage next to MyLab Statistics problems," and students must type in, "I acknowledge" or "I agree." Since implementing the Acknowledgement Quiz, Banda reports that she receives little to no student complaints about quiz grades because they know she can point to the Acknowledgement Quiz as proof that they were supposed to read instructions.
- Partial credit forms are available for the chapter tests, however. Upon completion of each exam, students are allowed to review their answers. At that time, they may fill out a partial credit form and request partial credit on up to three questions by turning the form into their instructor or a lab assistant in the Math Emporium. Students cannot earn credit for any problems not originally attempted and answered during the exam, and partial credit is not available on any retake of a chapter exam.

- Questions for tests are pulled from homework assignments and quizzes; the test is approximately 14 questions plus an essay question where students must write 3–5 sentences discussing a topic. The essay question is worth ten points on the test.

### Final exam

The final exam is a comprehensive, proctored exam containing material from all 30 sections covered over the course of the semester.

- The final is administered in MyLab Statistics and is comprised of questions that must be completed within 140 consecutive minutes. The final cannot be opened, saved, and returned to at a later time.
- Students are allowed to use two 3×5 index cards with notes front and back, an approved calculator, approved formula sheets, and blank scratch paper, which is provided.
- The final exam is taken in the Math Emporium computer lab.
- There is no partial credit for the final exam; however, up to five bonus points can be earned by accumulating points throughout the semester from correctly answering entry and exit quizzes.

In addition to the MyLab Statistics features noted above that students use, instructors also take advantage of various MyLab Statistics gradebook features, including Search/Email by Criteria and Item Analysis. Banda says she may use Search/Email by Criteria to find anyone who scored lower than a 30 on the exam to remind them that they have the option of retaking it. “It’s nice because students think you’re emailing them individually, but you really aren’t. It’s a huge time saver.” Banda believes that students who receive these emails realize they are not just another number in a sea of students, but rather their instructor is paying attention and cares about their success in the course. Exporting grades is also easily done in MyLab Math, according to Banda, and she does it all the time, as well as looking at the Item Analysis report from the gradebook to tell where students are struggling on each assignment. With this information, instructors go over difficult concepts during the class meeting, and Banda uses it to determine if a question is not valid or if the whole department should modify their instruction on the topic.

### Assessments

- 50% MyLab Statistics chapter tests
- 25% MyLab Statistics comprehensive final exam
- 20% MyLab Statistics homework/quizzes
- 5% Attendance

The two lowest homework grades and lowest quiz grade are dropped at the end of the semester for grade calculation purposes.

In the event a student is not satisfied with one of his three chapter exam scores, he may ask his instructor for a retake. Only one retake on a chapter exam of the student’s choosing is allowed, and it must be taken on a specific retake date as well as completed prior to the final exam.

### Results and Data

A summary of student success rates for the redesigned Elementary Statistics course since its inception in Fall 2012 (UTA’s baseline semester) was provided. Results are compared to similar semester types, Fall to Fall and Spring to Spring. Figure 1 depicts the course’s ABC rate. The ABC rate

in Fall 2012 was 64 percent. ABC rates have increased slightly since the redesign, rising to 68 percent in Fall 2015, a four percentage point increase. For Spring semesters, the ABC rate has increased from 60 percent in Spring 2013 to 69 percent in Spring 2015, a nine percentage point increase. Childress explains, "To me, the data demonstrates that our efforts are working and substantiates all the long hours and difficult projects our office has endured to effect the necessary changes and bring our programs to their current level." He continues, "Above all, as long as data are trending in the positive direction, we feel positive about our efforts. I do not think we ever feel complacent about our success rates either, and we are always trying to find areas upon which we can improve in each course and respective modality."

### Elementary Statistics ABC rate

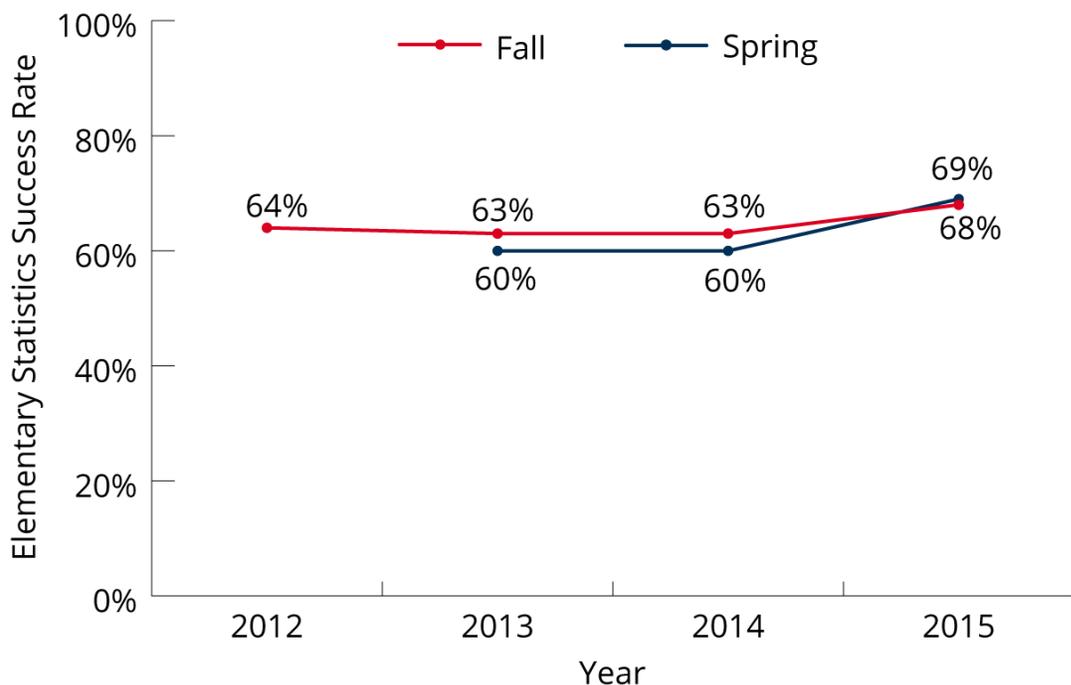


Figure 1. Elementary Statistics ABC Rate, Fall 2012–Fall 2015 (n=4,647)

In addition, each semester, the department assigns each student a 0–5 score based on their course grade (A=5, B=4, C=3, D=2, F=1, W=0), and those scores are averaged to arrive at each section's score. Childress explains, "We have found that modelling the data in this way gives us a greater idea of the success of each course or semester. A flat ABC/DFW rate can at times be too broad to identify incremental success in a course." The difference, he says, is accounting for the withdrawals. "A student who works the whole semester but fails the course is different than a student who doesn't show up after the first exam but never actually withdraws. That student fails the course, too, but shouldn't receive the same score as the one who worked all semester. Therefore, we consider those students as withdrawals and assign them a zero."

Figure 2 depicts the average course rating of all Elementary Statistics sections from Fall 2012–Spring 2015. In Fall 2012, Elementary Statistics sections averaged a score of 2.8. Fall semester ratings have risen to 3.1 as of Fall 2015, a 10 percent increase from where they started. Spring semester course

ratings have also risen, improving from 2.6 in Spring 2013 to 3.1 in Spring 2015, a 19 percent increase from the start of the redesign.

### Elementary Statistics course rating

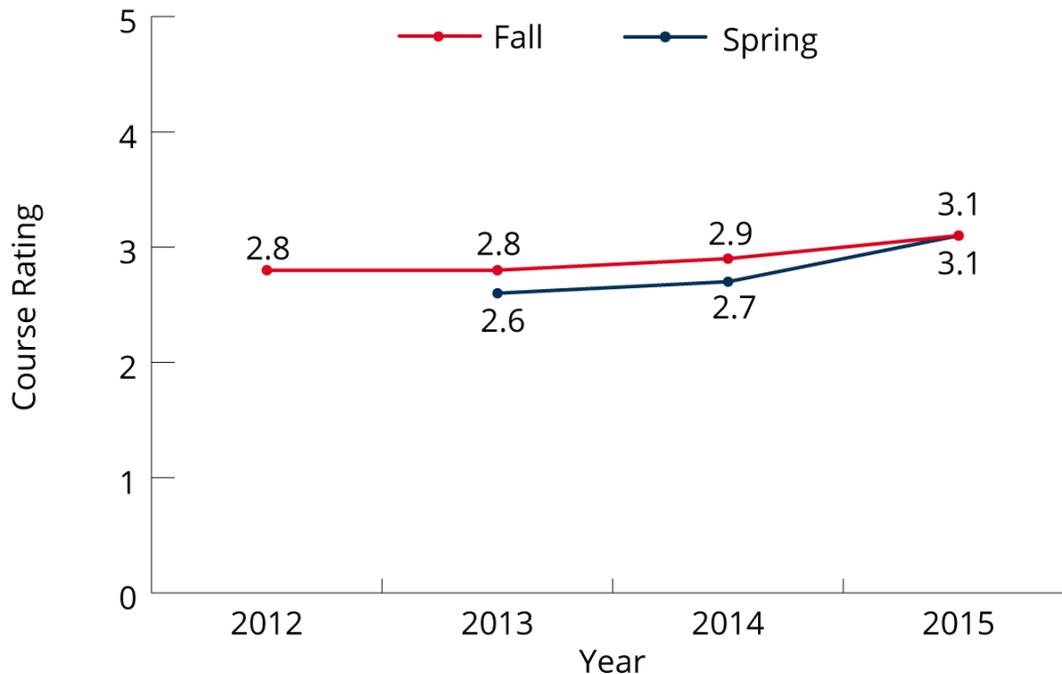


Figure 2. Five-point Scale Elementary Statistics Course Rating, Fall 2012–Fall 2015 (n=4,647)

## The Student Experience

“Flex time has really helped....If students have a class across campus and can’t stay in the lab the whole time, we’d rather them come for a little bit than not at all. Flex time allows them to get credit for the time they are there.”

According to Banda, students had mixed reviews about the course set-up at first: some appreciated it because it offered them free tutoring, while others didn’t understand why they had to come to the lab when they could do the same thing on their couch at home. Now that faculty are focusing on coaching and mentoring, Childress reports that the students are seeing more of a benefit of being in the lab. Student quotes from feedback surveys written and deployed by UTA in Fall 2015 and Spring 2016 confirm Childress’s beliefs. In particular, survey respondents understand the benefits of required time in the lab:

- *“I really enjoyed the mandatory lab hours. It made it easier to make sure my homework and quizzes were taken care of before the deadline.”*
- *“Required lab time gave me the setting I needed in order to work and absorb information.”*

- *"Having a certain amount of lab hours really pushed me to go to the lab and do my homework instead of just putting it off."*
- *"It was really nice having the lab available for us to get help, and lab time being part of our grade really helped me sit down and get stuff done."*

Quotes from the survey also reveal that respondents realized the importance of the instructors and teaching aids available in the lab to help them:

- *"I liked all the time and assistance that was available to me while working in the lab."*
- *"I really liked how many people were there to help me and how organized the lab was."*
- *"The people working in the lab and my professor were helpful. They were always available when I had questions on problems."*
- *"Having the student helpers in lab helped a lot because they all understood the problem and worked with us so we could better understand."*
- *"Having tutors/assistants/helpers available in the lab all day was a life saver. Please never let those people go."*

Additionally, the institution of flex time, where students can come to the lab at any time has met the department's goal of making the lab available to students when they are able to come, as evidenced by student quotes from the survey:

- *"Having the lab open whenever possible and with the professor being available during lab hours really helped get the information across."*
- *"I loved that we could go to lab at any time and not just during our scheduled time besides tests."*
- *"I appreciated the fact that the lab was almost always open so that I could do my homework/quizzes at my own convenience."*
- *"The flexible hours to complete lab work and also the help that was available in lab was excellent and very helpful."*

Finally, selected quotes from the survey regarding students' thoughts on MyLab Statistics are:

- *"The Study Plan in MyLab Statistics helped me learn the material easier."*
- *"I enjoyed the fact that we had multiple tries for each problem. MyLab Statistics does a fantastic job of letting me know what mistakes I made, and letting me learn from my mistakes."*
- *"What helped me learn the material was the homework, and the Study Plan in MyLab Statistics. Really great program!"*
- *"MyLab Statistics was a good and efficient program with many tools to help myself learn statistics with additional videos, e-textbook, PowerPoints, practice tests, etc."*

## Conclusion

We work together as a team more now than before. Before, people worked alone as islands, for the most part. Now we talk and work through course issues together.

While Banda, Childress, and the department feel they have met their goal of increasing student success and are very pleased with the improvements thus far to the course, they continue to evaluate and modify their course. One example of a recent change they've instituted is allowing the option of flex time. "Flex time really helped," says Childress, "We want to be able to work with them if

need be. If they have a class across campus and can't stay in the lab the whole time, we'd rather them come for a little bit than not at all. Flex time allows them to get credit for the time they are there." In fact, Childress says requiring attendance in some way is his best recommendation for anyone considering an emporium or hybrid model, "If you don't have an attendance requirement there, they don't come. Intrinsic motivation isn't worth anything to students, but points are!"

Banda says one change they are contemplating making in the near future is using Learning Catalytics for the entry and exit quizzes instead of pencil and paper. "That would give us instant information and we could use it throughout the discussion session to increase the active learning in the classroom." In addition, the department is looking to implement a project in the Elementary Statistics course. Childress also plans to research and analyze students' academic history in order to plot out what kind of student will have the most success in the program. By doing this, Childress hopes the department will be able to see which students are struggling and what they can do or change about the implementation to help them succeed.

In conclusion, Banda believes they still haven't realized the true impact of the new format, though she thinks they're on the right path. "It was a tough transition for our faculty—three new faculty were hired the year after I came on board, and I was one of those new people coming in, telling them we needed to change things. Those faculty who were willing to do whatever it takes to help students were the ones who really made a difference. They had open minds and saw the benefit of fixing what was broken." To encourage instructor support for the format, Banda instituted team meetings where instructors teaching the course meet together on a bi-weekly basis and plan how to tackle topics and discuss what's working and what isn't. "We work together as a team more now than before. Before, people worked alone as islands, for the most part. Now we talk and work through course issues together." She continues, "The new course structure has had an impact on our faculty for sure. Some took a year or more to buy in, but those who stuck around—the other course coordinators, especially—see the benefits."

[Learn more about UTA's instructors and listen to them talk about their experiences with MyLab Statistics at www.pearsoned.com/efficacy-whitepaper-online.](http://www.pearsoned.com/efficacy-whitepaper-online)