

100% of At-Risk Students Master Algebra 2 with TI-Nspire

Case Study 39

Teacher/Researcher – Marie Knox
Western Technology Center, Burns Flat, OK



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"All our students pass the state test, even the IEP students... We are known as the people who teach math. We were asked to do the summer remediation."

Teacher/Researcher	Marie Knox
Location	Western Technology Center, Burns Flat, Oklahoma
Course	Algebra 2
Grade	11-12 Pull out
Student Profile	Class of 15 students: 98% at risk, 75% have failed math before. Entire grade 10-12 profile: 14% Hispanic, 10% Native American, 2% African-American, 73% White 74% economically disadvantaged 3% Limited English
Technology	TI-Nspire handhelds and Teacher Edition, with interactive white board. A+ Learning System

Setting: Western Technology Center is a regional service center providing technology education for adults and high school students, expert assistance and training facilities for business and industry services, from four campuses. It has 14 partner schools in Western Oklahoma.

Ms. Knox teaches Algebra 2, Geometry and Math of Finance at WTC. Her 15 Algebra II students are drawn from 12 schools. Nearly all of the students are at risk, and three quarters have failed math before. Minorities comprise about one fourth of her class, and about three quarters are economically disadvantaged.

Ms. Knox began teaching 11 years ago, after a mid-career change from systems engineering for a large software company. She was new to the uses of graphing calculators in teaching math, and she introduced herself to the technology by learning TI-Nspire.

Curriculum & Teaching:

Ms. Knox knew that conventional teaching had failed her students, so she had to do something different. "Math is a head game," she says, "You have to get them over their phobia of math. You have to change their expectations about their ability to learn math – and those of their parents."

To meet the needs of her students, Ms. Knox has placed the entire curriculum online. There is no textbook, and very little paper. The curriculum includes all the state PASS objectives. Students work at their own pace: they can test out of a topic with a pretest. If study is needed, the students read the lesson and they take a practice test. Since the best way to learn something is to teach it, peer tutoring in a work group comes next. The students decide if they need Ms. Knox to drop by and explain something.

All students have access to computers, and all students are issued their own TI-Nspire handheld for the year. This structure allows the students to work continuously.

Ms. Knox says that she never lectures – she does “...everything the Nspire way. You can do more problems – instead of doing just one graph, you can do 50....teaching by exploration. When the students ask how do you do something, I say, ‘I don’t know...let’s figure it out...’ The students from Elk City can’t believe it’s not cheating...it’s not, because they understand it and we can move on quickly...consequently, we can cover everything in the book now.”

Ms. Knox believes understanding the math is what’s important: “You need a tool to see the mathematics: TI-Nspire is that tool. My students remember [conceptually] what a logarithm is – learning [just the procedure of how to] to calculate it is something you forget.”

She also believes it’s important “to be a good cheerleader for math,” and TI-Nspire helps. She reports that her students view TI-Nspire as a status symbol. Using the technology fits with the image of the Tech Center, so the students embrace it. Using TI-Nspire is permitted on the state test, and she believes using it improves their confidence level.

Assessment Method:

Assessment within the course uses the A+ Learning System, supplemented by paper tests for security. This allows each student to have a unique test. The course uses a self-paced mastery model: students must pass each lesson’s test before going on to the next one.

Results:

For the 2008-9 school year, a full **100% of the students in Ms. Knox’s class demonstrated proficiency** on the state’s EOI test for Algebra 2, if their home school allowed use of TI-Nspire on the test (one school did not, and experienced a 75% pass rate). Compared to other similar classes in schools which allowed calculators on the state test, this represents nearly a doubling of the proficiency rate. For the 2009-10 school year, 33 of her 36 students passed; exceptional circumstances account for two of the three students who were not proficient. For the 2010-11 school year, 12 of her 13 students passed, while the state average in 2010 was 65%.

“It’s amazing how this is all working,” Ms. Knox comments. “Everyone loves to come to class. The second they walk through the door they’re engaged.”

The success in teaching math has enhanced the reputation of the Tech Center, Ms. Knox reports. The Tech Center had a bad reputation for watering down Algebra II. Not only is that no longer the case, but even their IEP students are passing the state test. Administrators from the sending districts now say the Tech Center’s state test results are no problem – it’s a new reputation. Now, they are known as the people who teach the math. They were recently asked to teach the summer two week Algebra II remediation for the area schools.

Ms. Knox is also gaining converts among her colleagues. She reports that two of the sending school’s Algebra 2 teachers are getting a class set of TI-Nspire handhelds. She’s eager to show her system to her colleagues in all math subjects. “It also works with Geometry and Calculus,” she says.