

Students Achieve More in Algebra 3-4 with TI Graphing Calculators

Case Study 2

Teacher/Researcher – Brandon Leach, Spanish Springs High School, Sparks, NV



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Teacher/Researcher	Brandon Leach
Location	Spanish Springs High School, Sparks, NV
Course	Algebra 3-4
Grade	10-12
Student Profile	12 Males, 18 Females, 85% White, non-ELL, non-FRL
Technology	TI-83 Graphing Calculators with Projector. Activities downloaded from TI Web site.

“...a 5% increase in learning occurred directly due to the addition of technology in the classroom....The class that used technology was able to have a maximum score of 100% on the assessment, whereas the non-technology group only scored a maximum of 95%...”

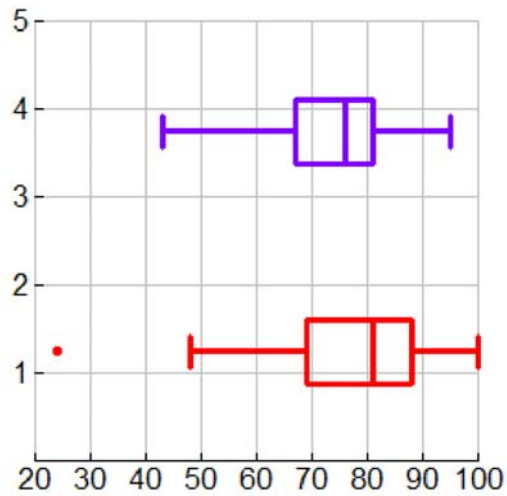
Setting: Mr. Leach’s Algebra 3-4 class in Room 201 looks like a conventional classroom: 30 students sit attentively in rows. Student work and projects are displayed on the walls. But Mr. Leach wanted to know if adding TI graphing calculators would improve learning. So he compared two of his classes, one using the technology, and one not using it, from March to May, 2006. Spanish Springs High School is in the Washoe County, NV school district. The class is 85% White, all native English speakers, with no free/reduced lunch students. All but two of his 30 students began the year on grade level.

Curriculum & Teaching: Mr. Leach was experienced with TI graphing calculators and the students had been using TI graphing calculators for a full 18 weeks. He felt that both he and his students were comfortable with the technology in all representation modes, and ready for a learning trial. The topic for the trial was Chapter 10 in the Holt, Rinehart and Winston Algebra 2 text, on statistical concepts. In addition to the text, Mr. Leach downloaded correlated activities from the TI Web site. When the activities required small group work, the students self-assigned their groups. The students used their calculators to compute and check their own answers, and to compare their answers with other students. They used representations with graphs on a daily basis, and representations with equations weekly during the unit. Daily discussion centered on reasons for different examples, answers or predictions, and procedures for problem solving, as well as answer checking and calculator operation. At least once a week, Mr. Leach asked students to give reasons or justification for their conclusions. Mr. Leach created all the problems the class used.

Assessment Method: Mr. Leach created mid-chapter quizzes and end of chapter tests using the test generator that accompanied the textbook. His grading system allocates credit this way: Homework 20%, Tests 45%, Quizzes 15%, Final 15%, Participation 5%.

Results: List 1 contains the scores from students who did not use handheld technology. List 2 contains the scores from students who did use the technology. The graphs show the two sets of scores. The top graph is without technology and the bottom graph is with technology.

L1	L2
71	90
81	90
81	71
67	57
71	81
81	76
76	86
57	95
81	81
76	81
86	76
67	62



Statistics without Technology

One-Variable Statistics

$\bar{x} = 72.6452$
 $\Sigma x = 2252.$
 $\Sigma x^2 = 168974.$
 $S_x = 13.3879$
 $\sigma_x = 13.1702$
 $n = 31.$
 $\text{min}X = 43.$
 $Q1 = 67.$
 $\text{Median} = 76.$
 $Q3 = 81.$
 $\text{max}X = 95.$

Statistics with Technology

One-Variable Statistics

$\bar{x} = 77.3103$
 $\Sigma x = 2242.$
 $\Sigma x^2 = 180720.$
 $S_x = 16.2461$
 $\sigma_x = 15.9635$
 $n = 29.$
 $\text{min}X = 24.$
 $Q1 = 69.$
 $\text{Median} = 81.$
 $Q3 = 88.$
 $\text{max}X = 100.$

Mr. Leach observed:

The students seemed to like using the real dice and coins for the probability activities when there was a small number of trials. Students preferred the technology when the number of trials exceeded 50. Students recognized the advantage of technology when the sample size became extremely large.

He concluded:

“After completing this technology research with my classes, I feel that technology helped my students better understand the concepts related to probability. There was a 5% increase in test scores and I believe that is due to the use of handheld technology.”

The researcher feels when teaching probability, first there must be a basic understanding of dice, playing cards or coins using manipulatives, then a movement into handheld technology for large samples. Students had a deeper understanding of the whole experimental probability idea when the manipulatives were used first.

“The addition of technology in my class didn’t necessarily benefit the A or B students, but it did help the C and D students understand the topics much better. With the use of technology more students are interested in mathematics, and anything that gets students interested in mathematics is good for education.”