

Algebra I Teacher Helps Underachievers with TI-Nspire

Case Study 18

Teacher/Researchers – Marti Hoyt & Stacey Fuentes, Kern High School District, Bakersfield, CA



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Algebra I Teacher Helps Students Gain with TI-Nspire

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| Teacher/Researchers | Marti Hoyt & Stacey Fuentes |
| Location | Independence High School, Kern HS District, CA |
| Course | Algebra I |
| Grade | 9 |
| Student Profile | 65 students in a college prep program |
| Technology | TI-Nspire and overhead projector with wireless slate |

Using TI-Nspire, at midyear Ms. Hoyt had 2 to 4 times as many students in the "Basic" or "Proficient" level, compared to other teachers' classes not using TI-Nspire

Setting: Independence High School opened its doors in 2008. Its largest ethnic group is Hispanic, with over 56% enrollment. Next is White, with about 31%. African-American is about 8%. It is part of the Kern High School District, California's largest 9-12 high school district with more than 35,000 students and 3,500 employees on 22 comprehensive, continuation, special education or vocational campuses. The district enrollment is almost half free/reduced lunch, and about 1/3 native or fluent English speakers.

Marti Hoyt is now in her third year of teaching, and just her second year of teaching Algebra I. She has provisional certification in math teaching. Her math classes meet in room 1010. Her Algebra I classes meet for 5 periods of 55 minutes weekly. The desks are in rows, and students are assigned to them for 5-6 weeks at a time. They work entirely in large group format. On the walls are posters from previous students in Statistics, as well as maps and as a few Einstein pictures and quotes, impossible shapes, and different types of energy (solar, wind etc). Grades also are posted.

Curriculum & Teaching:

The textbook used is Chapters 1-12 of, Larson Boswell Kanold & Stiff (2007) Algebra 1, published by McDougal/Littell. She supplements the textbook with TI-Nspire activities, mostly downloaded from the TI Activities Exchange web site.

Ms. Hoyt observes that her students' use of TI-Nspire changed its characters over the term. Early in the term, and through the middle of the term, students used the handheld weekly to compute and check answers. That declined by the end of the term. Similarly, comparing answers with other students was observed weekly at the beginning of the term, but that behavior declined by midway. Throughout the term, students weekly generated examples of new concepts, made predictions, and discussed problem solving strategy. Most commonly, student use of TI-Nspire involved equations and tables in multiple representations at the beginning of the term, and by the end of the term use of graphs became more common. TI-Nspire documents were distributed by Ms. Hoyt.

Ms Hoyt reports that early in the semester, she was asking daily about how students were operating the handheld, and what answers they were getting. By the end of the term, however, this kind of interaction declined. Questions exploring reasons for conflicting answers also declined as the semester progressed. Throughout the term, by contrast, daily

lessons routinely included questions about problem solving strategy and reasoning or justification for conclusions.

Assessment Method:

The course began with a pretest, and includes three benchmark tests during the year. In addition, Ms. Hoyt writes chapter tests of 25-30 multiple-choice questions and 2-3 free response questions. She also writes semester final exams for each semester, with 50-80 multiple choice questions. Her grading system is 40% Quarter 1 + 40% Quarter 2 + 20% Semester Final Quarter. Each quarter is based on 20% homework + 15% Quizzes and Projects + 65% Chapter assessments.

Results:

Ms. Hoyt felt comfortable with TI-Nspire after 2 weeks of use, and she now says, "I feel very comfortable with the calculator and have been creating my own documents, but I am still learning "all" the functions and capabilities." She says that within 6 weeks, most students were able to use all representation modes on the handheld: "Some are still afraid, but others have seen enough of the calculator to maneuver around quite well, " she reports. She cautions that the keyboard can be daunting at first, and students must be careful not to save documents which overwrite the previous period's work.

Ms. Hoyt sees great benefit in the multiple representations capabilities of TI-Nspire: "Manipulating graphs and functions is AMAZING! Students can watch the equation change with regards to the graph in real time. Also the split screen action is quite handy, they can watch the table of values change as the function changes. This ability has created the foundation of understanding which the algebraic techniques are placed upon, my students no longer are wondering "why" in most cases."

She also has found the document-based capabilities of TI-Nspire to be the key to changing her role in the classroom: "I downloaded many of my activities from the online website by TI, then uploaded it and saved it to each calculator. This allowed students to work individually or in groups at their own pace while I walked around the classroom troubleshooting problems. I was really just monitoring the students as they learned on their own. It was a great feeling! Occasionally I would state a big idea to the class to make sure they all came to the same conclusion."

The effectiveness of this new way of teaching is evident in the third-quarter benchmark scores. In the table below, Ms. Hoyt's class is labeled as "Teacher A." The chart shows 2 to 4 times as many students in the "Basic" or "Proficient" level, compared to other teachers' classes not using TI-Nspire.

| Total Row(s): 4 Generated on Mar-18-2009 by Stacey Fuentes | Algebra I Benchmark #3 2008-2009 2008-2009 | | | | | | |
|---------------------------------------------------------------|--------------------------------------------|----------------------|-----------------------|-------------|-----------|------------|----------|
| | Total # students | Overall (30 pts max) | | | | | |
| | | Avg % Correct | # in Performance Band | | | | |
| Teacher | | | Far Below Basic | Below Basic | Basic | Proficient | Advanced |
| Teacher A | 65 | 63% | 13 | 7 | 17 | 24 | 4 |
| Teacher B | 38 | 50% | 15 | 8 | 8 | 6 | 1 |
| Teacher C | 15 | 34% | 14 | | 1 | | |
| Teacher D | 56 | 46% | 37 | 8 | 4 | 5 | 2 |

While this is not a controlled comparison, Ms. Hoyt feels that TI-Nspire made an important difference in her teaching. Her supervisor, Stacey Fuentes, reports that “the average achievement levels of 3 of the 4 teachers’ students was about the same; one of the other teachers selected a group of strong pre-algebra students to form his Algebra 1 section. While they’ve made great progress, they are still somewhat below the true college-prep level students.”

Her recommendation to her colleagues is, “Try it! Have someone show you what it can do, it’s not just any ordinary graphing calculator, it was created for students to explore math and discover patterns and limits to graphs, equations and tables.”