Graphing Calculators for Algebra II

Grant Source: http://www.nctm.org/Grants-and-Awards/Grants/Enhancing-Student-Mathematics-Learning-through-the-Use-of-Tools-and-Technology-Grants-(Pre-K-12)/

I. Project Description

In a 21st Century classroom, it is critical that students have access to project-based and contextualized activities. For Algebra students, the math they learn needs to be applicable. One way to increase students' ability to engage in collaborative, technology-based projects is to ensure all students have access to the same resources. By providing universal access to graphing calculators, students will be able to analyze characteristics of functions, compare and contrast functions, and create coherent representations of mathematical models for real world situations. Students will also have opportunities to investigate the insights gained from and limitations of using a graphing calculator as a tool to assist in mathematical problem solving. This will improve their mathematical proficiency among Algebra II students based on the Common Core Standards for Mathematical Practice.

II. Proposal

A. Plan:

This grant proposal requests funds for 24 TI-84 graphing calculators for Algebra II students. The students will be able use the calculators to better understand algebraic concepts and real world applications. High school students today are constantly interacting with technology, so it makes sense that they use it when learning math as well.

Their lives revolve around social media, the internet and connecting through technology. They are accustomed to immediate feedback and instant gratification. Graphing calculators allow students to visually see their math problems, and helps them understand real-world applications. Problem-solving is a critical skill that must be developed in all students because it applies to every aspect of life—from buying groceries to manipulating graphic representations of equations. It is critical that the math concepts they learn are relevant to real life. Using real world examples from data that they have themselves collected engages students to learn problem-solving techniques in a way that no other tool can. The calculator connects an abstract thought into something concrete.

Objectives include:

1. The graphing calculators will be regularly incorporated into the Algebra II instruction, allowing students to make connections between algebraic manipulations and graphical representations of concepts.

2. Students will utilize graphing calculators to make visual representations of their word problems.

3. For each type of function, students will be posed a real world situation, which requires them to use regression and their knowledge of the graphing calculator to create a mathematical model to represent the data.

4. Students will engage in activities incorporating the graphing calculators to compare and contrast the impact of transformations on different quadratic functions.

5. Students will collaborate together using the calculators and other available technologies (e.g. computers, iPads, tablets) to develop technology-based presentations to demonstrate content knowledge

Demographics

This project will primarily impact two classes of college preparatory Algebra II. Approximately 45% of the students in each class receive free or reduced price lunches. Santa Monica High School (SAMOHI) cannot legally require students to supply their own materials for the classroom and due to the price of these calculators, it is not feasible for all the families of SAMOHI students to purchase these devices by themselves.

Research

There is overwhelming evidence of the benefits of graphing calculators in the algebra classroom. For instance, Kastberg and Leatham report that several studies have shown that access to graphing calculators is associated with greater student achievement in mathematics. They also found that previous studies have suggested that student achievement is further improved when teachers utilize curricula with graphing calculators as a central focus. (Kastberg and Leatham, 2005). Indeed, graphing calculator technology is recommended by national standards in mathematics (National Council of Teachers of Mathematics, 2000).

B. Budget:

Item Description: TI-84 Plus Calculators (www.schoolmart.com)

Calculator Cost per Unit:	$122.49
Number of Calculators:	24
Total Amount:	$2940.00

C. Outcomes:

The efficacy of the calculators will be assessed via pre-tests and post-tests. These assessments will examine students' abilities to compare and contrast concepts, and construct arguments demonstrating their ability to reason mathematically given a real world situation.

I will also be able to compare test scores from Smarter Balanced Assessment Consortium (SBAC) scores from 2015-16 (instruction without benefit of graphing calculator grant) to 2016-17(with graphing calculators).