SRP Learning Grant Application
Apollo High School

1. Opportunity Statement

Performance objectives in math will be improved by allowing Apollo High School (AHS) math teachers to work with each student individually in a whole class setting. In future years, as we expand this project, we will be more able to fill each student's gaps in comprehension as they occur in the classroom and should see much greater achievement from all of our math students. Students who have completed their first two years of math and have not yet passed the math portion of Arizona's Instrument to Measure Standards (AIMS) will be the initial focus of this project. These students are enrolled in a Math Standards Prep class where they continue to study all of the concepts contained in the Arizona Mathematics Standard, predominantly algebra, geometry, and data analysis. Our ultimate goal is that we will end up with all students successful on the math portion of AIMS and have many more students opting for upper level math classes.

Both opportunity and need exist at AHS. AHS is an urban high school with a student population of approximately 1700 students. The school has a diverse population; with 55% of the school classified as minorities and 74% qualify for federal free or reduced lunch program. About 11% of Apollo's population is classified as either an English Language Learner (ELL) or Limited English Proficiency (LEP) student. No Child Left Behind expectations - as well as Apollo faculty expectations - are that all students, regardless of their background, will be competent in all academic areas. This can be challenging with such a diverse population.

Arizona's Instrument to Measure Standards (AIMS) is taken by all students at the end of their sophomore year. Students have 3 separate tests in the areas of reading, writing and mathematics and must be successful in all three areas to graduate. The math test has had the lowest percentage of successful students, with 48% passing the first time they take the test. This year's juniors are the first class who will be required to meet these expectations to receive their diploma and 37% still have not passed the math portion of AIMS.

As a math department we have been working very hard to increase our numbers of successful students and we are making progress. Our curriculum has gone through major revisions and is now totally aligned to the Arizona Mathematics Standard. Freshmen students entering next year will have 2 full years of aligned curriculum preparing them for their AIMS math test. However, the 37% of the current junior class who have yet to pass the test have not had the same opportunity as we have been adjusting curriculum throughout the last 3 years. This is a crucial group of students for us to work with and each one of them has slightly different needs.

SRP is being asked to fund the purchase of a Texas Instruments Navigator System, a wireless communication system that links students' calculators to the teacher computer, Smart View, a virtual graphing calculator used for presenting to the class on the Smart Board, and training for the teacher who will be using the system. This contribution will allow AHS to complete one full technology classroom, used by 150 students daily. The Smart Board, projector, computer, and 28 graphing calculators are in place, having been purchased through a district-wide technology initiative. AHS Title I program is also planning to purchase a 16-student Navigator system for use in the Math Learning Center which is available to all AHS students before and after school each day.

2. Project Description/timeline/measurement methodology

The components of this project consist of the following:

- Texas Instruments Navigator System – a system of 8 wireless hubs allowing the student calculators to communicate with the teacher via the computer
- Graphing Calculators
    - 32 student calculators
    - 1 teacher calculator (Smart View)
- Smart Board – an interactive whiteboard
- Teacher Computer – connected to the district network and the Navigator network
- Lightbook Projector

Designed to work with TI graphing calculators already in use, the TI-Navigator System provides wireless communication between students' calculators and the teacher's computer. It allows students to experience the benefits of interactive learning and immediate feedback thus more students are actively engaged in the lesson each day. The Navigator System enables real-time, formative assessment with

immediate feedback available for both teachers and students. This allows the student to know right away where their strengths and weaknesses lie. It allows the teacher to send different lessons to different students, which means the instruction is targeted for each individual's needs. The teacher can show the class how all students responded, as a list of all answers, a graphical display or a table. Because of this, rich discussion ensues about what the right answer is and why without singling out any individual response or person attached to that response. Research has shown that this type of environment leads to improved student achievement as well as improved student attitude. (Educational Leadership Feb 2004)

A typical day in a Navigator classroom consists of the following:

- Enter, Log into System.
- Complete a 3-5 question quiz, sent to all calculators by the teacher. Students send answers to teacher's computer. Alternatively, the students send answers to homework problems selected by the teacher.
- Teacher sees results and shows the graphic to all students, discusses correct answers and begins the day's lesson.
- At the end of the day all students send either a question or a summary to the teacher.
- The teacher can better prepare the following day's lesson based upon the needs of the students. Student responses afford the teacher the ability to address specific needs each day in the classroom.

Through the use of the projected technology the goals are to improve the students' depth of understanding of mathematics, increase AIMS math scores and increase student enrollment in upper level math classes.

Timeline

Action	Date
Order equipment	By June 30
Take Online Course	By August 1
Install equipment	By August 15
Conduct student activities/lessons	Ongoing 2005/2006
Conduct First Semester Family Math Sessions	September, October 2005
AIMS Retake	October 2005
Receive Oct AIMS data	January 2006
Conduct Second Semester Family Math Sessions	January, February 2006
Write and submit final report	April/May 2006

Math achievement will be measured using AIMS scores. Spring 2005 scores will be used as the baseline data. October 2005 and April 2006 scores will be compared to the baseline.

Student attitudes will be measured using a pre and post survey. The district research director will help adapt an existing survey concerning the students' attitude toward learning math. The district data-processing department will compile the results and AHS will analyze the results with the help of the research director.

3. Student Impact

This project has the potential to affect every math student on our campus in future years. The first year of the project, approximately 90 students, mostly juniors, in standards prep classes will benefit from using the technology on a daily basis. Title I will be purchasing a 16-student set-up for use in our Math Learning Center, available to all AHS students before and after school. This is the first year of the Math Learning Center. Approximately 20 students per week regularly use the Math Learning Center. Usage is predicted to increase as students see the benefits of learning with the new technology.

4. Creativity

AHS students will be on the cutting edge of learning. This project is different from others in that it allows for greater communication and interaction during the entire course of the learning process. Real time observation is possible with the projected technology. The students' calculators become an interactive communication link, allowing the teacher to catch and correct mistakes as or before they happen. By redirecting learning earlier in the problem solving process students gain a deeper understanding of mathematical concepts. Empirical evidence shows that classroom networks have much promise in K-12 classrooms. Hegedus and Kaput (2003) reported strong gains from using classroom networks in teaching algebra. (Educational Leadership, Feb 2004)

Instruction includes real world applications of mathematical concepts taught in the classroom. Examples include geometric art, Fibonacci numbers in nature, finding the average person in class, navigational problems and architectural applications. Students are continually shown that math exists everywhere, and, indeed, their lives are impacted greatly by math. Such an understanding lends itself to improved achievement on standardized tests.

5. Promotion Opportunities

Apollo High School publishes a quarterly newsletter for our school community. This project will be described in the first newsletter, giving credit to SRP for this wonderful opportunity to increase student achievement at Apollo. Subsequent issues will keep the community updated about the project and our results. The faculty bulletin will be used to notify faculty of SRP's commitment to AHS.

Glendale Union High School District also sends a newsletter to the district community describing various events at all nine of our high schools. This provides an opportunity to let the entire district community know about SRP's commitment to the education of our youth in Arizona.

The Arizona Republic has an "Around our Schools" feature, published each week in the various Community sections of the newspaper. If this project is funded, we will mention it as one of our highlights at Apollo as we begin the school year and again in the spring semester as the AIMS testing cycle approaches.

6. Sustainability

Future students will benefit by virtue of having the technology in place their entire career at AHS. A deeper understanding of the fundamentals of mathematics will provide a generation of students with the opportunity to study and understand complex mathematical concepts, both at AHS and at any post-secondary institution they may attend.

Currently there are three "technology" classrooms in the math department and there will be 4 more this fall. Each of these classrooms is equipped with a Smart Board, a projector, and a state-of-the-art computer. This is all part of a district-wide math technology initiative. Future funding will allow AHS to continue to add to the strong technological infrastructure that the district has provided.

7. Evaluation Process

The success of the project will be measured objectively by student achievement. Baseline test scores of the April, 2005 AIMS math test will be compared to the October, 2005 and April, 2006 AIMS math tests. Student scores on standardized homework and in-class assignments will be compared for the same period.

Student attitudes will be measured through the use of a pre and post survey. Attendance rates for the spring semester 2005 will be compared to attendance rates for the spring 2006 semester. Research has shown that attendance increases with increased student satisfaction.

8. Community and Parent Involvement

Guest speakers from several area businesses will come in and speak to students several times each semester. The speakers will talk to the students about how math is used in their job, what opportunities are available in their field, and what education is necessary for an entry-level position. A local credit union will also come and speak with students about checking and savings accounts and responsible use of credit.

Four "Family Math" sessions, two each semester, will also be a part of this project. The first "Family Math" session will be offered to families on an evening during the week. If it is found that many

families are unable to attend a weekday evening session, a Saturday morning session will also be available. The sessions will last about 2 hours and will involve the family working together to solve a household math problem and working together playing logic games. Area businesses are also being asked for small donations to cover refreshments and door prizes at these sessions. Math Standards classes have a 50% turnover rate each semester, so first semester "Family Math" sessions will be repeated during second semester.

9. Budget

Quantity	Item	Unit Cost	Total Cost
1	TI Navigator System – 32 student	$4,000.00	$4,000.00
4	TI 84+ Graphing Calculators	120.00	480.00
1	Texas Instruments Smart View for 84+ calculator	135.00	135.00
1	Online Training Course for teacher – "High School Mathematics Using TI Navigator"	225.00	225.00
	Total Budget		**$4,840.00**