Grant S9 – ES Individual

Primary Horizon Grant Focus Area: STEM

Have you received a Horizon Award previously? Yes

When did you receive a Horizon Grant previously? Fall 2012

Number of Students Affected: 125

Amount Requested: 1500

Grade Level(s): 4th and 5th

Enter your project title and brief description here: CITIUS, ALTIUS, FORTIUS! (FASTER, HIGHER, STRONGER!)

Capturing the gala of the upcoming Winter Olympic Games and responding to a plea from scientists at a recent TEDx ABQ event to engage our students in more Science, Technology, Engineering, and Mathematics studies (STEM), this innovative project combines STEM concepts with hands-on experiences. Students will design, manufacture, and experience Olympic sporting events through a venue of scaled-down models of Olympic sports incorporating basic physical science principles, mathematical formulas, and current technology.

Enter your project summary or overview here:
IDENTIFICATION OF EDUCATIONAL NEED:
International ranking, local test scores, general public opinion, and personal observations, indicate that children in the United States lack basic Science, Technology, Engineering, and Mathematics (STEM) knowledge, practice, and experience. This STEM-based project responds to that educational need by creating an opportunity for students to apply basic physical science, technology, engineering, and mathematics skills in a very innovative fashion.

GENERAL PROJECT DESCRIPTION:
Aligned with the Common Core State Standards for math, science (Matter and Force unit), and technology, CITIUS, ALTIUS, FORTIUS! (FASTER, HIGHER, STRONGER!) develops academic skills and knowledge in an innovative fashion; providing students the opportunity to design, manufacture, and experience scaled-down models of individually selected sports of the Winter Olympic games. Each student will research an Olympic sport; select one sport of his/her choice, study the physical science aspects of the selected sport, design a scaled-down model of the sport maintaining the essential attributes of the sport, use the scientific method to test and re-test the performance of his/her simulated sporting event; record a video presentation greeting participants, explaining the scientific principles associated with his/her sport, and explaining the rules for participation; record performance times and distances with precision instruments; post the results; and present gold, silver, and bronze medals to the victors.

BENEFITS TO STUDENTS:
Students enjoy learning through doing and this project utilizes a very fun theme - that of Olympic sports, to develop academic skills and knowledge that might
otherwise seem dry and boring if taught isolated. The likelihood of student learning therefore is increased and improved by application of STEM concepts in a student-selected activity. Students will also benefit from learning new technology skills which can be applied in other subjects' assignments. At the event, students will have the opportunity to articulate their learning and communication skills in a public setting.

MEASURES OF SUCCESS:
* Standard assessments aligned with the Common Core State Standards will be administered to the students for the science unit of Forces and Motion and the associated math units.
* Students will design, with the assistance of the teacher, a rubric for guiding their CITIUS, ALTIUS, FORTIUS! (FASTER, HIGHER, STRONGER!) project with the rubric serving to assess the quality, knowledge acquired, and completion of their projects.
* Journals with daily entries will be kept to record the progress of the projects.
* "Visitors" and "participants" (the other 4th and 5th grade students) will complete a pre- and post- assessment of concepts explained in the video presentations.
* Finally a survey will be distributed at "the games" to solicit constructive feedback.

Enter your project narrative here:

IDENTIFICATION OF STUDENTS AND STAFF:
This project will directly involve 22 fifth grade students and their classroom teacher. An additional 90 students from a combination of two 4th grades, one 4th/5th combo class, and one other 5th grade class along with their teachers will actively participate as "athletes" in the simulated olympic games.

MEASURABLE OBJECTIVES per Common Core State Standards:
This project closely aligns with 5th grade math, science, and technology standards of expectations for student proficiency to:

SCIENCE: Forces and Motion Unit:
* Explain how factors such as gravity, friction, and change in mass affect the motion of objects.
* Infer the motion of objects in terms of how far they travel in a certain amount of time and the direction in which they travel.
* Illustrate the motion of an object using a graph to show a change in position over a period of time.
* Predict the effect of a given force or a change in mass on the motion of an object.
* Compare the weight of an object to the sum of the weight of its parts before and after an interaction.

MATH: (yearlong)
* Write simple expression that record calculations with numbers and interpret numerical expressions.
* Analyze patterns and relationships.
* Read, write, and compare decimals.
Perform operations with multi-digit whole numbers.
Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings.
Interpret multiplication as scaling (resizing).
Solve real world problems.
Convert like measurement units within a given measurement system.
Represent and interpret data.
Represent real world problems by graphing points.

TECHNOLOGY:
Integrate and evaluate content presented in diverse formats, including visually and quantitatively, as well as in words.
Use technology including the Internet, to produce and publish writing, and to interact and collaborate with others.
Gather relevant information from multiple print and digital sources.
Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

CRITERIA FOR FUNDING:
STUDENT ACHIEVEMENT WILL BE ENHANCED:
Students are more likely to put forth greater effort when their learning is individualized, meaningful, and fun! Offering a STEM-based, sports-oriented project facilitates students' learning as they enjoy applying academic concepts that yield desired results - such as winning a gold medal! The use of technology (an iPad which, to date the students have not had any access), provides incentive for the students to produce a higher quality final product. Participating in a large group event also enhances student learning and achievement as it is more exciting than simply being in the classroom.

INNOVATING NEW WAYS TO TEACH AND LEARN:
This project is not your typical science fair contest! This project epitomizes that learning has a purpose and that knowledge is applicable. In CITIUS, ALTIUS, FORTIUS! (FASTER, HIGHER, STRONGER!), students are challenged to identify scientific principles that affect Olympic sporting events so as to be able to replicate the principle in a scaled-down model, drawing conclusions that allow better performances in time or distance measures. The use of technology, i.e. an iPad to record students (audio and visual) explaining their selected sporting event, the scientific principles associated with the physics of the sport, and the rules for participating, demonstrates the appropriate use of technology in current educational applications.

PROJECT CAN BE EXPORTED
CITIUS, ALTIUS, FORTIUS! (FASTER, HIGHER, STRONGER!) can easily be exported to other schools and/or grades by duplicating its original design or by modifying its design to focus on the Summer Olympic Games, a school-wide Field Day event, or simply one class' desire to integrate their science and math standards along with technology, with other subjects for a similar project.
INTENDED WORK AND GENERAL TIMELINE:
Students will be introduced to the possibility of experiencing a local, simulated Olympics Games in November. Students will begin their second trimester of study on January 6, 2014, at which time the 5th graders involved in "hosting" the "Olympic Games" will begin to study Forces and Motion as the focus of their science studies. Research will earnestly begin for each student to select one Olympic sport, study its history, rules, and the actual performance of the sport. Each student will then design a scaled-down model of his/her selected sport, maintaining the sport's essential forces and motion qualities. The scientific method will be utilized to guide the students towards the creation of their sporting event venues. Examples of possible sports include Alpine skiing on a plaster of paris created slope; figure skating on a metal cookie sheet with a magnet underneath to guide the skater; or a luge run created by burying PVC pipe in an inclined clay-formed mountain. Students will record themselves with the technology of an iPad to explain their selected sporting event, the scientific principles associated with the physics of the sport, and the rules for participating. School laptop computers will be used to replay the recorded presentations at the event. February 21, 2014 will be the date of the school's Olympic event when hosting students will set up their pre-recorded presentations in the school's gymnasium, welcoming the participants and explaining the rules for participation. Gold, silver, and bronze medals will be awarded to the olympian victors.

Total Amount Requested: 1500.00

Purchased Services: 0.00

Equipment: 500.00

Supplies/Materials: 350.00

Other: 650.00

Enter your budget narrative here: To successfully accomplish the objectives of this proposed project, many basic scientific supplies, materials, and equipment will need to be purchased including precision stop watches, magnets, medals, plaster of Paris, clay, legos, levers, pulleys, etc. as determined by the ideas generated by the students. ($650.00)

Science-related books will be purchased to add to the classroom's library. ($350.00)

An 32GB Wi-Fi IPad mini will be purchased to record the students' 3 - 4 minute presentation introducing their sport, explaining the physical science principals behind the sport, and instructions for the visitors to participate in the re-created sporting event. The iPad skills learned by the students in this project will be generalized and used for many other future school assignments. ($500.00) (School laptop computers will be used to replay the recorded presentations at the event.)