

Learning Grants by SRP- Elementary Sample

Robotics and Innovations

Cash Requested \$4,944.55

Project Description

On behalf of the students and teachers, I am proposing an SRP Learning Grant for \$4,944. 55. An SRP Learning Grant would be spent on purchasing 18 Simple and Powered Machine Sets by Lego as well as 10 Lego WeDo 2.0 Core Sets. These materials would further enhance and support our current Robotics Program.

With the purchase of these materials, 50-60 students at a time will be engaged in furthering their problem solving skills as well as their coding and programming skills using the Lego WeDo 2.0 kits. Students who are using the Simple and Powered Machine Sets will be engaged in exploring and building machines, investigating motorized machines, and studying gearing mechanisms. The software that these materials require would be installed on our existing computers.

Statement of Need P. T. Coe Elementary School is a Title 1 School within the Isaac Elementary School District. One hundred percent of our students receive free lunch. Our students typically do not enter school with any previous school experience such as Head Start or Preschool; their early literacy and math skills are lacking. Many of our students are English Language Learners and we have a large group of refugee students from countries where regular school attendance wasn't possible due to conflicts and wars. Despite the differences among our students, one fact is very clear: our students are smart, curious and capable. Our teachers, parents and community want for our students to be prepared for the workforce that they will enter. We understand that in order for our students to be ready to compete for the technology jobs that will exist in the future, they must first be taught what that world entails. Engaging our students with these powerfully educational and fun Lego products, will be the vehicle with which we hope to accomplish this goal.

Currently, our school has three Robotics Teams that compete in FIRST Lego League. The robots that we have for our teams were donated to our school or purchased with funds that no longer exist. We do not have a funding source to purchase these Lego sets. With the purchase of these additional materials, we hope to build our capacity for our Robotics Program and ensure that our students have a very concrete grasp of abstract concepts such as motor design, power sources, balance, and mechanization.

While our students enjoy participating and competing in Robotics competitions, we have found that we need to offer more concrete, foundational experiences that will serve as building blocks for their Robotics training. We have discovered that our students need experiences with the very basics of motion and machinery in order to fully comprehend the coding and commands that they are using in Robotics programming. The purchase of these Lego materials would also allow us to include about ten times the number of students who are currently involved in Robotics.

Project Description and Timeline

By using these materials, we are working toward addressing several content areas in the Arizona College and Career Readiness Standards. The content areas we are addressing include: Educational Technology, Art, Science, Mathematics, and English Language Arts. Some of the Concepts and Performance Objectives that will be taught through the use of these materials include:

- using models to examine real world connections
- using technology to generate knowledge and new ideas
- defining problems and investigate solutions
- decoding and understanding nonfiction, informational and functional texts such as directions, schedules and timelines
- writing informative, explanatory texts that use details and temporal words to signal event order
- organizing data and clearly communicating findings to a work group using appropriate vocabulary specific to the task
- orally describing how components in a system influence one another
- understanding spatial relationships and the way objects move
- solving problems involving measurement and intervals of time
- reasoning abstractly and quantitatively
- using technology and media strategically and capably
- orally presenting ideas and models to an audience using relevant evidence to support their reasoning

There are also social and behavioral expectations that support our school wide discipline plan, Positive Behavioral Interventions and Support (PBIS) that will be effectively modeled by implementing the new materials, such as:

- engaging cooperatively to respectfully agree and disagree
- cooperation
- exhibiting kindness and respect to others
- responsibility for self, others and materials

If awarded an SRP Learning Grant in May, we would purchase the Lego materials immediately and implement them according to the following timeline:

May, 2017 Purchase Lego WeDo 2.0 kits and Simple and Powered Machine Sets

August, 2017 Train teachers on the new materials and develop a plan for shared usage as well as storage, install Lego software on laptop and desktop computers in classrooms as well as in the school's computer lab

September, 2017 Begin using the new Lego materials in K-5 classrooms during the regular school day, recruit students to participate in the 21st Century After School Program in classes that will be using the new Lego materials, FLL Robotics Season begins

October, 2017 Community event to showcase our students' Robotics projects and innovations using the Lego materials

November, 2017 Robotics Scrimmage at Carl Hayden Community High School

December, 2017 FIRST Lego League Robotics Competition

January, 2018-May, 2018 Continue to share the Lego materials among K-5 classrooms during the regular school day, introduce new students in the 21st Century After School Program at a rate of about every 6 weeks.

Spring, 2018 Community event to showcase our students' Robotics projects and innovations using the Lego materials

May, 2018 Year end celebration for our students to acknowledge their growth and contributions to our Robotics Program

We anticipate using these materials for years to come. As such, materials will be periodically inventoried for wear and completeness of kits and sets.

Our goals for implementation of the new materials include:

-Accessibility for all our students - We anticipate that these materials will be used by all students, further enhancing and fostering language growth, critical thinking and collaboration. We have 32 General Education Classrooms and 1 Self-Contained Special Education Classroom, we look forward to the materials being used by all teachers and students on a rotational basis.

-Visibility - We want our parents and community members to know that we are developing Science, Technology, Engineering and Math pursuits among our students; for that reason, we will hold to community events, inviting guests to see and experience what our students are learning.

-Promotion of STEM - We want to use these new learning materials to promote STEM and STEM careers among our students. We want to encourage them to think, collaborate, problem solve, and test their ideas like engineers and scientists.

-Language Development - We want our students to learn and use the vocabulary necessary to orally express their ideas using the new Lego materials.

Student Impact Student Impact

We anticipate that 75 students will be able to use these materials at a given time on a daily basis during the regular school day as well as in the 21st Century After School Program. The materials will be shared among all of our Kindergarten through Fifth Grade classrooms. Depending upon funding, these materials may be used for extended learning opportunities such as Saturday School and Summer School.

Grade Levels Benefiting K, 1st, 2nd, 3rd, 4th, 5th

Evaluation Process

We will develop a Pre and Post Test to measure our students' knowledge, attitude and opinions of STEM as well as measure the College and Career Readiness Standards that the Lego curriculum addresses. We will also use the results of the AzMerit

Assessment.

The data will be compiled and compared. As students cycle through using the materials, they will be assessed using the Pre and Post test. The data will be kept and compared over the years so that we may evaluate our efficacy. In particular we are looking for gains in our math and science standardized test scores as measured by the AzMerit, NWEA Map (Northwest Evaluation Association Measure of Academic Progress) as well as periodic common formative assessments created by teachers. We will also record English Proficiency growth by examining data from the AZELLA (Arizona English Language Learner Assessment).

Budget Information

Expenses

Total Project Budget \$4,944.55

The SRP Learning Grant will be spent on the following materials:

Quantity	Item	Cost	Total
18	Simple and Powered Machine Set	\$169.95	\$3,059.10
10	WeDo 2.0 Core Set	\$175.00	\$1,935.45
	Shipping	Free	
	Grand Total		\$4,994.55

Staff members who teach with these materials after school will be paid by the 21st Century After School Grant.

We don't anticipate any other expenses associated with the implementation and use of the new Lego materials.

Our current technology, laptops Chrome Books, and desktop computers will support the use of the new Lego materials.

We aren't seeking financing from additional sources.

Learning Grants by SRP- Middle School Sample

Project Title Merging Science and Physical Fitness

Cash Requested \$5,000.00

Project Description

Science and physical education teachers will work collaboratively on a project to assess, measure and analyze student fitness progress. Students will track their own progress with data collected on a fitness app installed with an iPad mini. The 8th grade science and physical education teachers will work together by creating fitness plans for the students in the P.E. classroom, and then using this data in the science classroom to calculate and analyze the student's speed and velocity. By addressing the science standard of reading and interpreting graphs, as well as determining speed and velocity of an object, students will be able to use real-life and individualized data to practice this skill. In addition, the iPads may be used as a rolling STEM lab in which 6-8th grade students will be able to access virtual labs and collect scientific data with a portable device.

Statement of Need

57% of the school's families are on free and reduced lunch assistance program. A large number of students do not have regular access to online technology. By fulfilling the goal of supplying a class set of iPads, students will be able to experience instant feedback of data, as well as opportunities to make real-life connections to their personal fitness goals and the science of physics. Due to the portability of the iPad, students will be able to collect valid, reliable data in their physical education classes, and then use this data to make instantaneous connections between performance objectives in science and their own health and fitness goals. In addition, the 32% of students whose primary language is not English will be supported by the use of supplemental instruction of virtual science labs and visual data analysis by creating a rolling STEM lab. Other projects positively impacted by the introduction of the iPad minis would be during the science Ecology unit. Students will be able to bring these portable devices outside and conduct environmental field investigations. Due to the large population of students with limited access to such tools, SRP would be helping provide opportunities for students to experience such up to date technology, that these students may not have had otherwise.

Project Activities and Timeline

Students will use technology to collect and analyze individualized health data from their physical education class and relate it to the science of physics. The goal for the students is to make real life connections between science class and health goals. Students will collect data using an online fitness app on their iPad. Students will collect this data in their P.E. classes. This data will then be taken to their science class to be graphed and analyzed. This program will merge the Arizona middle school science standards of calculating speed, velocity and position of objects on a speed vs. time graph, along with the physical education standard of conducting a health self-assessment.

Timeline

February 28, 2017 - SRP Learn Grant Proposal Due

May 2017 - Grant Approved

May 2017 - Science department and physical education department teachers meet to collaborate on project for Fall 2017.

July 2017 - Classes resume in Chandler Unified School District

July 31, 2017 - project begins with student training on how to use fitness apps to track progress and collect data.

August 1, 2017 - students will take baseline fitness data in P.E. and collection of data in the online fitness app. Data to be collected includes timed distance/mile runs and timed fitness interval training exercises.

August 2, 2017 - students will learn how to calculate speed and velocity of an object, as well as how to analyze a distance vs. time graph with input of their individualized fitness data.

August 3rd - September 22, 2017 - students will track their individualized progress on a weekly basis using their fitness app. Students will be analyzing this data in their science class with weekly graphing and analyzing exercises.

September 27, 2017 - Students will compare their fitness baseline data along with their speed calculations from the beginning of the project to their current ability. Students will be able to see visual representations of their fitness progress with graphing exercises conducted in their science classes.

Student Impact The student population is 936 students and includes 6th through 8th grade. 8th grade students with physical science standards of calculating speed, velocity and graphing speed, along with those 8th grade students who are enrolled in P.E. will be impacted. Additionally, all students in grades 6th through 8th grade will have access to the iPad minis for research, data collection and virtual lab experiences. Not only will all current students be positively impacted by these devices, but they will continue to be utilized year after year.

Grade Levels Benefiting 6th, 7th, 8th

Evaluation Process

Success of the project will be evaluated by conducting pre-assessment baseline data in the subjects of science and physical education. In science, student's knowledge of finding and calculating speed and velocity of objects, along with representing this data on a distance vs. time graph will be assessed at the beginning of the project in August. Regular tracking and data collection from the students via the fitness app will be assessed on a weekly basis. Final data from the project will be collected at the end of quarter (September 2017). At this time, students will be able to compare their initial fitness levels along with their current fitness levels. Progress will be assessed by using the data collected in the fitness app and online graphs that visually represent the pre and post-assessment data. A semester cumulative assessment will be given in December in which the aforementioned standards are assessed. Finally, science AIMS tests will be administered in April 2018, in which these physical science standards will be assessed again.

Budget Information

Expenses

Total Project Budget \$5,000.00

Budget Narrative The total expense of the project is based solely on equipment. The cost of the 15 iPad mini 2s, along with protective covers and chargers would reach the maximum amount of the 5000.00 grant from SRP. No additional training or financing from other sources is applicable.

Cash Requested from SRP \$5,000.00

Itemized SRP Cash Expenditures:

iPad Mini 2 x 16 \$4,320.00

iPad Mini 2 protective covers x 16 \$208.00

charging cart for iPad minis \$300.00

Learning Grants by SRP- High School Sample

Project Details

Project Title From Mind to Design

Cash Requested \$4,921.75

Project Description

Our high school converted a former classroom into a “maker space” lab with emphasizing multi-disciplinary collaboration. We now have 6 designated lab stations, a few tools, and a dedicated space where we can build a community of STEM projects. We want to identify a small set of core ideas in each key discipline and inter-relate these ideas with other subjects. The grant would purchase 10 kits and products from 5 different themes impacting 350-400 students—sustainable energy, robotics, solar ovens, architecture and physical science. Every project would have different subject areas involved in each project. We start with building kits as our short term goal, since our current makerspace has only a few supplies, to a long term sustainable model, where students are given a project based on a problem and get materials to solve it. The kits are guidelines for interdisciplinary ideas in the short term.

Statement of Need Our Title 1 high school of 1850 students, 50% of whom are on free and reduced lunch, has a unique opportunity with our new “makerspace” lab. These materials start the ball rolling, with activities critical to the design, making, and exploration process. Each project intertwines ideas and materials for math and science students in a constructionist space. Successive years of state budget cuts have left us with only several alternatives for funding—writing grants or reaching out to local businesses. We are doing both; a local engineering company has helped remove carpet, donated tools and built lab tables. Yet the real need for our “makerspace” is to populate it with kits and materials to grow the program. The grant would allow us to begin using the space for meaningful projects. Further, the “maker space” aligns project based learning with critical math and science standards. In art classes and agriculture classes, students could assemble solar ovens and cook on site grown vegetables. Students in physics and algebra classes can build and test catapult focusing on structure and function. Students in geometry and science classes will build hydraulic robotic arms purchased with the grant funds. Students in integrated science classes will experiment with the eco wind generator project to work on system models for alternative energy. In addition, students can design and build their own projects as well with the challenge pack marker project. The challenge pack will include an assortment of mousetraps, wheels, axles, dowel rods, rubber bands and wood strips. In addition, the lab itself will be furnished with a 15 drawer storage cart, clear plastic containers, and engineering design posters, also purchased with grant funds. Overall, the “makerspace” will be a community of perceived common interest and a student design studio with interconnected projects.

Project Activities and Timeline

The grant would purchase 10 products from 5 different themes, impacting art, math and science students directly. Looked at as a pivotal learning laboratory, away from the insular, single use classrooms, it will be divided into 2 divisions. Division one will be the trial side, with emphasis on background research, specifying requirements to solve

problems and brainstorming ideas. Division two will be the product testing side, testing and making design changes to prototypes.

All supplies and kits purchased with the grant will be laid out and apportioned to respective subjects—art, physics, math and science classes—to account for how the materials will be distributed and to insure enough supplies for the next phase.

In division one, the maker side, 30 students working in teams of 4, will take 2 weeks to make their product. The teacher will take them to the makerspace 2 days a week. Classes will alternate every two weeks so over the semester 10 classes of 35 students (about 350 students) will participate. In division two, the testing side, those same classes will rotate to testing the projects and gathering data using a lab write up sheet. At the end of the semester, teachers from the classes will gather to assess the projects using student designed rubrics. As the grant writer, working with other teachers, we will reach out to the local business community for additional funding to sustain and enlarge the project outreach for more students.

Timeline

Action Date

Order equipment By June 30, 2017

Secure ADE STEM Specialist By August 1, 2017

Engineer Design Process Teacher training By August 15, 2017

Conduct student projects—making and testing First semester 2017

Night of Excellence February 2018

Design and Implement Website for Kit Building By March 2018

Write and Submit final report May 2018

Student Impact The “makerspace” project would have an exponential impact on 350-400 students, as STEM connections are made in science, math, and art. Students would be asking essential questions and making career connections, as they create and build a wide variety of hands on projects ranging from solar racers to hydraulic robotic arms. Hundreds of students will experience the application of learning as they set up and utilize a makerspace. In addition, we will make a website with pictures of finished projects called “DEHS Kit Builders” to share buildable prototypes with a larger audience. Our ultimate goal is to establish an online forum for STEM kit building where students can share ideas and projects.

The challenge is to create a learning environment that fosters student achievement. We want to strength STEM education as we raise our expectation that every student can master and integrate concepts from multiple disciplines for real life use. Better educational opportunities in STEM give students more power over their lives and eventual career choices.

Grade Levels Benefiting 9th, 10th

Evaluation Process

It is essential that teachers will be trained in the framework for incorporating science and engineering practices. We will invite a STEM specialist from the Department of Education to hold a workshop focusing on 3 essential topics—science and engineering practices; cross cutting concepts and applications; and core ideas that involve multiple disciplines. In the second semester, as a way of communicating results we will hold a

Night of Excellence where students will share and demonstrate their projects for parents and the community. Students for each multidisciplinary project will develop a rubric to evaluate their projects. As teachers we will also design worksheets for each project so different groups look at different problems in a project, not all groups looking at the same thing. All projects will be conducted following an experimental design model, including experimental setup, procedures for data collection methods, and evaluation of hypothesis. Our short term goal is to get materials for the makerspace. Our long term goal is to have STEM practices embodied in the school culture through sustainable projects focused on problem solving, testing, and interdisciplinary involvement in all STEM projects.

Budget Information

Expenses

Total Project Budget \$4,921.75

Budget Narrative

The grant would purchase 10 kits and products from 5 different themes impacting 350-400 students—sustainable energy, robotics, solar ovens, architecture and physical science. Every project would have different subject areas involved on aspects of the project, as different subjects work on the same project. We start with building kits as our short term goal, since our current makerspace has only a few supplies, to a long term sustainable model, where students are given a project based on a problem and get materials to solve it. Five other teachers would be involved. We are not requesting any technology like laptops or chromebooks. We will reach out through donorschoose type websites for parent and community funding.

Cash Requested from SRP \$4,921.75

Itemized SRP Cash Expenditures:

STEM kit	\$395.00
STEM supplies	\$520.00
sustainable STEM supplies	\$189.00
equipment for makerspace	\$269.75
STEM training for teachers	\$250.00
shipping	\$350.00
STEM kit	\$375.00
STEM kit	\$495.00
STEM kit	\$112.50
supplies	\$99.00
STEM kit	\$658.50
STEM kit	\$439.00
materials for solar oven	\$260.00
alternative energy supplies	\$410.00