



Helios STEM Schools Updates



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Issue 4

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A Message from Science Foundation Arizona

Science Foundation Arizona is honored to be working side-by-side the seven programs selected as Helios STEM Schools. This program's key premise is that STEM education is an integrated, interdisciplinary approach to learning that provides problem-based and relevant experiences for students. Ultimately the initiative will support the successful implementation of Arizona's College and Career Ready Standards and the anticipated Next Generation Science Standards.

Each school or district is transforming its approach to STEM education in a way that addresses its particular needs and builds on its unique advantages. Successfully implemented programs will prove they can be sustained and measured and will ultimately offer STEM models that can be used statewide. The schools describe their progress in this newsletter to share lessons learned and to express appreciation to everyone contributing to the programs' successes.

Alhambra Elementary School District

Mark Lialaberte, Academic Coach

STEM continues to be an ongoing focus in the Alhambra Elementary School District (AESD). We started the year by kicking off a new round of students engaging in our STEM ActionLabs at Granada East School and continue the process at Cordova Middle School.

In addition to our STEM ActionLabs, AESD is pleased to have a robust extra-curricular STEM Club Program. In this article we highlight two STEM clubs, FIRST LEGO League and MESA in addition to a STEM happening (Intel Engineering Day). These two clubs (in addition to our Engineering is Elementary and Design Squad – highlighted in an earlier article) provide an environment where students can explore engineering and the design process – all while building 21st century skills such as creativity, critical thinking, problem-solving, decision-making, communication, and collaboration. In all, more than 800 students attend over 25 clubs within AESD.

Robotic Success at Catalina!

The Catalina Builders, Catalina Ventura School's first ever robotics team, competed against 31 other teams in the regional FIRST Lego League (FLL) competition at Carl Hayden HS on December 7, 2013. In conjunction with Catalina teacher, Hanna Saigh, District Academic Coach, Mark Laliberte, and volunteers from Vertech Industrial Systems; the Catalina Builders began learning basic programming skills, mechanical design, and how to research and design a solution to a real world problem. All of this was done in only three short months. Students had to program an autonomous robot that would successfully complete missions on a game board, demonstrate knowledge of FLL Core Values by completing a team work event at the competition, as well as presenting the judges with their idea of a Smartphone app that would assist citizens during a hurricane.



Congratulations to the Catalina team as they were awarded the Judges Award. This award is given to a new and upcoming team that merits recognition from the judges.

MESA (Math, Engineering, and Science Achievement Program)

Congratulations to Alhambra District schools' Math, Engineering, and Science Achievement (MESA) teams as they did an outstanding job at the regional competition held at ASU on Saturday, February 22, 2014. Over 150 7th and 8th grade students participated in this all day event. The regional's format was changed this year to recognize participation and provide feedback for the various events, instead of issuing place awards. Judges used the actual scoring sheets to provide feedback to each team. Team members look forward to following the engineering process to make improvements and achieve greater levels of achievement at the State Competition on April 12, 2014. Best of luck to all our teams!



Intel Engineering Day

On February 28, 2014, twenty-two Intel engineers visited Granada East and Cordova Middle School. The Intel Corporation and the Alhambra Elementary School District have a thirteen-year partnership that promotes the field of engineering, the importance of attending college, and the problem-solving processes that are at the core of the engineering profession. The Intel Engineers, led by Monty Carson, visited every 7th and 8th grade classroom at Granada East and every 6th and 8th grade classroom at Cordova Middle to do a presentation on engineering and the the importance of pursuing a college degree. The Intel engineers also led students in an engineering design competition where they partnered with students to design and build clay boats. Later in the event, two students (a boy and a girl from each participating classroom) participated in an egg-drop competition and the Cordova students had lunch with the engineers. All in all, over 750 students participated in the event and all had a great time. It was an outstanding day of developing future STEM professionals.



Altar Valley School District

Kathryn Zanin, STEM Coordinator

Rodeo Days and A Night at the Museum were two events which truly enhanced AVSD's STEM Initiative through fun and exciting learning activities. Preschool capitalized on Tucson's annual rodeo celebration, "La Fiesta de los Vaqueros" as the children explored science concepts related to solids, liquids and gas using a western theme. The week long adventure began with the preschoolers listening to the story *Ooblek* and played with it to see how a liquid can sometimes act like a solid. Following the ooblek lesson students made butter to show a liquid changing into a solid. The weeks' celebration ended with students making root beer floats to demonstrate how a solid, liquid and gas would react when mixed together. Laughter and squeals of delight could be heard as the root beer flowed over the ice cream as foam bubbled over the brim of the cups. Several days into March the children were still talking about the fun experiments they did during Rodeo Week. Terri Cavazos, PK teacher, commented in a follow up meeting that, "My students still talk about the experiments and the fun they had, especially with the ooblek."

March 11th Robles Elementary was transformed into a museum extraordinaire. Children, parents and guests were ushered into the festivities with a formal ribbon cutting ceremony and welcomed into the halls of the museum with a lit entry way. The halls were decorated to reflect the partners who were working with teachers in each room presenting hands-on STEM related activities. Parents, children and guests traveled between rooms gathering information, conducting experiments and gleaned new insights from ten partners and eight grade level teams. The dedication and commitment to excellence demonstrated by teachers and partners alike helped to make the evening's event a great success.

Parents attending a presentation by the Intel Corporation said, "This is exactly what I needed to hear. Now I know what I need to do to help support my child and prepare them for college." Chandra Young, Principal of Robles Elementary school said, "Night at the Museum was fabulous, the best event this year!" Many of the same sentiments were overheard as parents left the evenings' celebration of STEM.

The evenings' event ended with parents, children and guest waiting in excited anticipation to hear their name announced as a lucky winner for one of ten baskets. Baskets were made possible by the generous donation of Nicholas Fire Wood, San Pedro River Valley Salsa Company, and Altar Valley Parent-Teacher Association. Cheers, laughter, and sighs were heard as a name was drawn from each ticket filled bucket. At the conclusion of the night families were given a bag containing a science experiment to complete at home. Parents and children alike continued to talk about their experience at the *Night at the Museum* for several days.



Proper use of a fire extinguisher explained to a middle school student by a member of Three Points Fire Department.



Snakes alive! Students and parents had an opportunity to touch living animals from the Arizona-Sonora Desert Museum.

Bagdad School District

Karen Anderson, STEM Committee Member

The Helios STEM grant, supported by Science Foundation Arizona, has provided us with numerous opportunities to enrich and expand many of our existing programs. This month we'd like to highlight a couple of the specific STEM programs that our grant has impacted. In addition to helping us purchase new laptops for each of our high school students and teachers, we also purchased a variety of software that is increasing our student's abilities to work with tools from business and industry.

Bagdad High School Welding program-Instructor Mr. Arron Rotteger

Bagdad welding is using STEM to prepare students to go into the modern work force. The process of welding has not changed since the invention of electrode coating at the end of WW1. In the last twenty years, significant changes to the work place include the use of robots and computers. Most high schools have neglected to change and have not kept up with what employers are asking for. We are trying to avoid this problem by introducing new technology into our welding program. We have purchased a CNC plasma-cutting table. This allows our students the ability to not only become proficient welders but also know the basics of CAD and CAM software, which was purchased through our grant. This is the first step to joining the 21st century.

Bagdad Upper Level Math- Instructor George Diehl

Currently, in our high school math classes we are using Pearson's Math XL and MyMathLab, which are supported by the Helios STEM Grant. These programs allow the students to complete assignments online, and include learning aids such as "View an Example", Ask the Instructor, video tutorials and a digital textbook. On top of the built in help, students can work a particular style of problem until mastery. If they get a problem wrong there is a "similar exercise" tab, which allows them to retry that style of problem. I have found that most students like this feature and with help, will work through problems until they have mastered a concept.

Bagdad Engineering Program- Instructor Mr. Pradip Misra

Mindstorm Ed. Robotics and CAD are grant-supported components in the Engineering classes. This is our second year of Mindstorm robotics and our first year of CAD. The response to the Engineering program has been encouraging. We have tripled the number of students from last year. That itself is an indicator of the increased interest in Engineering among our student population. As both the Engineering classes are 100 % project-based, students are showing a great level of interest in learning about the concepts and application of Science and Engineering. The Robotics program has helped them in many ways, namely the key areas of Physics, anatomy, chemistry and Math.

Congress School District

Stephanie Miller, Superintendent

Hooray for Science, Technology, Engineering, and Math (STEM)! The Science Foundation Arizona Grant, with funding support of the Helios Foundation, helps support funding for our After School Drama/STEM Club, After School STEM/Legos Robotics Club, VoiceThread, Defined STEM, and ST Math.

After School Programs

Drama Club and STEM/Legos Robotics Club.

The STEM Club students, in grades K-2, are busy with a hands-on LEGO robotics program. Students have learned the engineering process, programming basics, and have completed several of the LEGO Wedo curriculum projects. The students are currently building an animal of their choice and creating its corresponding habitat. They will present these projects to the school and parents in April.



3rd through 8th grade Drama Students are busy preparing a play about the evolution of education. The play will have a focus about how technology has been incorporated and is used to support learning. We look forward to a parent performance in April.

Voicethread

Voicethread has been used to help document STEM club experiences. Voicethread was used as a product for a DefinedSTEM lesson in 5th Grade, allowing students to upload a presentation on how to build an aquarium. 1st graders created an ELA project by creating an original book and presented it via Voicethread.

ST Math

Students are continuing to develop great problem solving skills. The majority of students are over 70% completed on their ST Math syllabus progress. Many students have completed the grade level ST Math syllabus and have moved into the challenging puzzles portion of the ST Math program.



Defined STEM

Teachers have taken their designed lesson plans from Defined STEM and are applying them in the classroom. During a March professional development, teachers shared their successes with one another and then brainstormed as a group how to bring it to the “next level” in the upcoming 2014-2015 school year. Ideas included field trips, experts brought into the school via Skype, and pairing with partner classrooms through Voice Thread.

W.F. Killip Elementary School

Ted Komada, STEM Coordinator

Killip's focus on integrating a STEM curriculum and developing community partnerships has continued to be a focus of our work in February and March. The following is a summary of the units in implementation during the month of February. Units ranged from two to nine weeks in length, had hands-on components and all units are NGSS and Common core aligned and integrated.

The Kindergarten team developed and delivered a unit based on weather and the sun's effect on earth. The kids measured and recorded the amount of heat absorbed by some of the different materials commonly found on the earth's surface. They then used the understanding they gained to design and test a structure that reduces the warming effect of sunlight on a given area.

First grade spent 7 weeks learning about and understanding the relationship between the earth, sun and moon. Their favorites were identifying and creating the "Oreo Cookie Moon Phases" and designing then testing a variety of different sun dials.

Second grade has spent a lot of time working with the properties of materials this year. They have learned about the properties of Solids, Liquids and Gasses. We then gave them assortments of different materials from which they selected the best ones to design, build and test a boat that would be the most buoyant and a wagon that would roll the farthest off a ramp.

In February fourth grade finished off their unit on Energy, Fuel and Natural Resources which then flowed smoothly into Magnetism and Electricity. The energy unit finished up with a solar heater design and build that used soda cans painted black to collect heat from the sun. With an outside temperature of 40 degrees Fahrenheit the solar heater was pushing temperatures of 180 degrees.



4th Grade Heat Energy - Burn



4th Grade Heat Energy - Solar

Fifth grade used the couple weeks before spring break to explore the fairly simple NGSS standard asking the students to support an argument that the sun appears brighter than other stars due to comparative distance from the earth. Once the concept of the Sun's distance and brightness had been covered the unit went on to look at the different types of stars, where and why they fall in different places on the Hertzsprung-Russell Diagram.

Salt River Elementary School

Lynette Charlie, STEM Coordinator

Salt River Elementary is gearing up for their 2nd family STEM night! The theme is “Lift Off” and focuses on the engineering and physics of flight. We are so excited to be hosting our 2nd STEM night. Salt River community families will be able to participate in a flight challenge with the top 50 flights receiving a medal.

Our science leadership team has invited local businesses to get involved and we are looking forward to a great turnout.

This semester’s event will take place on April 28th, 2014 at Salt River Elementary School.

Here are a few additional examples of what we’ve been up to and how we continue to make STEM come alive at Salt River Elementary:

Professional Development: Three of our teachers attended the NSTA conference in Boston, MA this past week. They will be hosting a professional development activity to share what they have learned from this event with our teachers in May.

STEM After-school Garden Club: Our garden is growing! Our STEM Garden Club teacher has received two grants to ensure the program continues. These include the Seedlings Pilot Project from Digital Farm Collective and the Muhammad Ali Center for Peace Garden Grant. These grants will allow our STEM Garden Club to expand.

Mrs. Rave, the STEM Garden Club teacher has been a blessing to this program. She has worked very hard at ensuring its sustainability. Gardening is very important to the community of Salt River. Salt River students enjoyed their first harvest and are ready to plant new seedlings.



Yuma Elementary District

Theresa Lowe, Grant Coordinator

Yuma School District One's Helios STEM Pilot continued on schedule in the months of February and March, with an emphasis on Project Based Learning integrated unit planning at the middle-school level and continuing professional development and teacher collaboration days at the elementary level.



Middle school science teachers develop hypotheses based on their observations of a cube.

Middle School science teachers met for their fourth day of unit planning and professional development. Emphasis was on what true inquiry looks like. The teachers began the day with a Socratic Seminar in which they probed what we could learn from data collected during a recent survey of all middle school teachers regarding students' progress in using the Science and Engineering Practices in the NGSS. The purpose was twofold: to give teachers additional experience with Socratic Seminars so they would be comfortable using them in their lessons, and to show teachers how data can be used as the text on which to base a Socratic Seminar. After several hours devoted to collaborative unit planning, teachers ended the day with a demonstration of a 5Es inquiry lesson, using a cube activity provided to us by Sara Torres, our technical advisor. Middle school science teachers have now produced eight different integrated, project-based unit plans, which when finally formatted, will be shared across the district.



Sara Torres guides elementary teachers in exploring circuits.

The elementary teacher cadre continued their professional development with two more three-hour trainings, followed by collaboration days during which they demonstrated or co-taught the lessons in classrooms at all district schools. Lessons featured engineering "boats" that could hold the most weight in pennies, designing camouflage for "moths" to be placed in classrooms and then hunted by students playing predators, and understanding electrical circuits. We are especially grateful to Sara Torres for volunteering to share her expertise by teaching the sessions on electricity in March and April. As we had hoped, the workshop-followed-by-collaboration-day model has resulted in students across the district all consistently being exposed to the same high-quality science inquiry lessons.

How Many Ways Can You Design a Boat?

