



## Helios STEM Schools Updates



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Issue 6

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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.

Now in our second year of the program, we see each school or district transforming its approach to STEM education in a way that addresses its particular needs and builds on its unique advantages. These programs are already showing signs of becoming STEM models that can be used statewide. In each newsletter the schools describe their progress and share lessons learned, expressing appreciation to everyone contributing to the programs' successes.

# Alhambra Elementary School District

*Mark Lialaberte, Academic Coach*

As the Alhambra Elementary School District (AESD) continues to grow our STEM program, sustainment and replication have always been two of our top priorities. With this in mind, we are pleased to report great news: AESD has expanded the existing STEM Lab program to another school! Montebello School now has it's own Paxton Patterson Action Lab, a skilled and trained teacher, and all the necessary support to help students on the road to receiving a quality STEM education. This brings the total number of students impacted by our engineering labs to greater than 500 in the 2014/2015 school year.

Thank you again to SFAz for the resources necessary to kick-off this giant step towards bringing two of our schools closer to the next step on the STEM Immersion Guide.

In addition to our STEM Labs, AESD has been busy with other STEM activities as well, such as our MESA (Math, Engineering, and Science Achievement) clubs.

## **MESA Club Success**

AESD is pleased to announce the MESA Team from Montebello School, lead by MESA advisor Kelby Milgrim, took home two awards this past summer at the MESA National Challenge in Portland, Oregon. The national challenge this year was to design, engineer, and operate a low-cost, environmentally sustainable, easy-to-operate prosthetic arm that could perform a variety of real life tasks (i.e. picking up everyday items and placing them in a box, tossing items into a bucket).

Alhambra's Montebello MESA Team earned first place in the country in the "Design Efficiency" category! Design efficiency is the ratio of design performance to design mass. Points are awarded for different performance tasks (ball toss, object relocation) then those numbers are divided by the mass (or weight) of the arm; and Montebello's prosthetic arm out-performed, and weighed almost nothing, compared to other teams submissions from across the country!

In addition, Montebello's MESA Team earned a third place award in the "Technical Paper" category. The technical paper offered a close examination of the engineering design process, especially as it related to all the major design choices and STEM concepts.



# Altar Valley School District

*Kathryn Zanin, STEM Coordinator*

This summer the Discovery STEM Summer Camp at Altar Valley paved the way for students to actively engage with Problem Based Learning lessons around energy themes. Students in three grade level bands, 2<sup>nd</sup> – 3<sup>rd</sup>, 4<sup>th</sup>-5<sup>th</sup> and 6<sup>th</sup> – 8<sup>th</sup>, used the topics of weather, wind energy, and amusement park physics to guide their exploration of energy. Teachers were provided with everything they needed to be successful; curriculum, overview of days, lesson plans, activities, and materials. At the end of Summer Camp teachers gave the STEM Coordinator feedback on lessons and activities. In addition concept maps were used to determine the success of the summer school program and teachers were asked to survey students' background knowledge three times throughout the summer. The data, across all grade level bands showed that students' academic vocabulary and connections to the concepts increased as the weeks progressed. The feedback is now being used to improve the curriculum for next year. In year two, topics will be extended to include electricity & magnets, solar and thermal energies.

In addition, in August the STEM Initiative increased participants to include pre-school, kindergarten and first grade teams. Teams meet once a week to discuss science concepts, themes, and ideas presented in their FOSS kits. FOSS kits are used as the bridge to building lessons inclusive of technology, engineering, mathematics, reading and writing. Teachers will receive training on science notebooks, formative and summative assessments, and backward lesson design. In addition, teachers will have an opportunity to observe other teachers in the process of strengthening their own pedagogical practices. Six of the original eight STEM PLC teachers returned to extend the STEM Initiative through curriculum / lesson writing, and mentoring teachers at their grade level. This group of teachers will meet once a month to receive training on mentoring, and curriculum writing.

A new school year brings challenges, yet the dedication, enthusiasm, and energy all the teachers bring to the STEM Initiative in the Altar Valley places students in a position for learning to occur.



# Bagdad School District

*John Depanfilis, STEM Coordinator*

There has been a lot of exciting news and changes taking place at Bagdad Unified School District in the past few months. Due to all of the hard work this last school year, our school's grade went from a "C" to a "B". There have been multiple programs added to the schedule in order to promote STEM. A Paxton Patterson Action Lab was put in place to give the middle school students an exciting opportunity to freshen up on their 21<sup>st</sup> Century Skills with a variety of hands-on labs. Some of the other programs added to the schedule include Computer Science, Consumer Science, Industrial Tech, Construction Trades and additional Aviation classes for middle and high school. Students will test their skills in flying and math while utilizing flight simulator software through Lockheed Martin.

One of the ways teachers and volunteers showed support to the STEM program this summer was to donate their time in teaching summer workshop classes. These week-long summer workshops provided students with an array of classes that included Rocket Rally, Mad Scientists, Cooking, Computer Mania, Craft Activities, and additional work on team work skills during a Volleyball Workshop. There was a large turnout of kids ranging from 6 to 14 years of age.

Finally, the Rodeo club put on their 1<sup>st</sup> Annual Cardboard Boat Regatta Team Challenge competition. Bagdad students competed in the challenge, which helped raise money for the Rodeo Club. Five teams from the school researched, designed, engineered and built cardboard boats that were raced at the local pool. There was a huge turnout for this event. It was necessary for each boat to be able to carry one or two passengers across an Olympic size swimming pool. This challenge created a lot of excitement and awareness of the STEM program. Two boats raced at a time with the winner moving on to race another opponent. The high school entered two boats, while the 6<sup>th</sup> and 7<sup>th</sup> grade classes entered three boats. One of the 7<sup>th</sup> grade classes brought home the gold for the design category, as well as winning the boat race for the school class challenge. Mr. Rotteger's high school team won the people's choice for their cardboard boat. This will be an annual STEM challenge that students and the community can look forward to for years to come.



# Congress School District

*Stephanie Miller, Superintendent*

Hooray for Science, Technology, Engineering, and Math (STEM)! The Science Foundation Arizona Grant, with grant funding by the Helios Foundation, helps support five targeted areas. This is the second year of a three-year grant.

## After School Programs

The STEM Club students, in grades 2-4, are busy with the hands-on LEGO robotics program. Students are extending learning from last year's Legos class or are learning robotics basics if they are new to the club. In the STEM Drama Club kindergarten through second grade students are preparing a play about biomes. The fine art of acting along with learning about STEM concepts are integrated into this outstanding club. We are looking forward to a final play performance from the K-2 group in December.

## Voicethread

Voicethread is now being used in classrooms to facilitate lessons and document some impressive STEM projects.

## ST Math

Students have started ST Math. The ST Math program has been extended to 6<sup>th</sup> grade this year. Identified students in seventh through eighth grade also get to use ST Math to increase their mathematic skills.



## Defined STEM

Teachers are still using the Defined STEM product to support them as they create cross curricular/thematic STEM units for the students. Third grade is finishing a unit on bees, while fourth grade finished a unit on the scientific process. Teachers are working on creating two thematic STEM units this year; one for use in the fall and one for use in the spring. Students will be introduced to experts in the field of science as well as have the opportunity to take a STEM themed field trip to reinforce learned concepts.



## Grant Related Opportunities

In August two students and three representatives from Congress Elementary staff were able to attend the statewide Scitech Kickoff Conference that was held in Scottsdale. Students and staff had the opportunity to share the various STEM activities happening in the school as the school transitions into a more focused culture of science.

Finally, the Arizona Super Bowl Host Committee has chosen the STEM Drama Club as an innovative club to highlight during its 2014 STEM Superhero Awards Luncheon. Congress School was selected to create a centerpiece display showcasing the club. The centerpiece is almost finished and will be a great source of Congress Cougar Pride!

# W.F. Killip Elementary School

*Ted Komada, STEM Coordinator*

My name is Ted Komada, STEM Coordinator for the HSSP project at Killip. I love my job.

- **5:00am** Alarm goes off. "...67 clip boards, drill, skill saw, screws and carpenters square. Got it, except the clipboards."
- **5:45** Eastside Walmart. Only 16 clipboards. Crud.
- **6:15** Westside Walmart. 0 clipboards.
- **6:45** Good news! Last minute confirmation of a biologist for today's trip with 5th grade.
- **8:00** Sams Club. 50 clip boards... again, "Whew".
- **8:30** Overhead paging, "Mr. Komada to the 5th grade wing. We need our clip boards."
- **9:00** Interview for Extra Curricular STEM positions. Strong candidate, I love it when it happens that way.
- **9:30** Get 5th grade on the busses and headed to Lake Mary.
- **10:00** Class 'A' forgot their crate of sack lunches. Pick them up and head back out.
- **10:45** Drop off lunches, check with guest scientists, check with teachers... What do you mean there's no restroom out here? Gee, no one thought of that during planning... crud.
- **11:00** Shuttle kids to the outhouse up at the boat dock, watch an amazing group of teachers, scientist and kids explore Earth's 4 spheres and their interactions at the lake.
- **2:00** Sunburnt. Load "bus", that's right, singular, the other one broke down.
- **3:00** 5th grade is back at Killip. Teachers, students, scientists and parent chaperones are all very pleased and feeling proud of a 1st run for the field experienced aligned with the Earth's Interacting Spheres unit. Well done everybody.
- **3:10** Hustle robotics kids through snack. We have a lot to do today.
- **3:15** Assist the robotics team build their tournament table. Kids and power tools... always an exciting combination.
- **4:30** Dismiss robotics, clean up.
- **4:45** Gather and set up materials for family night. 5th grade Lunch-Lab Biosphere bottles, STEM club Earthquake building designs, Composting materials/display and Robotics gear. Check.
- **5:20** Print visuals for family night. Printer informs me it can't print black and white because it's out of yellow ink.
- **5:30** Family night. So incredible to watch our kids excitedly show their parents and community members STEM work from Robotics, STEM club, Friday STEM, 5th grade and Lunch Lab. Especially rewarding was watching the 5th graders, apply knowledge they learned in their Earth's Spheres unit and out at the lake today, to the Biosphere Bottles they had built during their lunch recess time.

I love my job.



# Salt River Elementary School

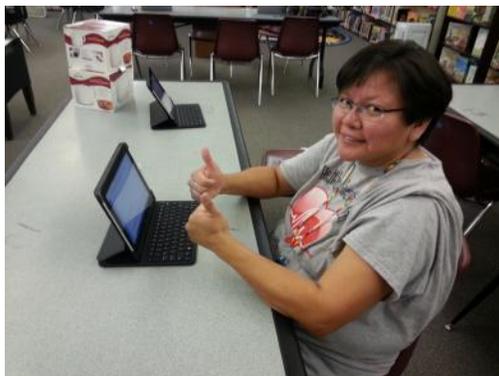
*Lynette Charlie, STEM Coordinator*

We have had a great start to a new year of STEM integration at Salt River Elementary School. Our focus has been on professional development and getting our new STEM tablets ready for our students and teachers.

**Here are a few examples of what we've been up to and how we continue to make STEM come alive at SRE:**

Salt River Elementary school teachers have been working hard on our year 2 goals of our professional development plan. Our focus has been on *Teacher Content and Practices* and *Leadership Development and Sustainability*. With new staff on board we have been able to engage them in the STEM development at Salt River Elementary.

In addition to the exceptional professional development our school was able to purchase a new tablet lab for our students. Teachers spent a Saturday morning learning how to implement the lab in their classrooms and integrate their STEM activities with the tablets; since the professional development students have been provided hands-on opportunities to use the lab and the reception from students and staff has been nothing but positive. Thank you Science Foundation Arizona for allowing us this opportunity!



3<sup>rd</sup> Grade Teacher, Anissa Bark, gives the new tablets a thumbs up!



100% engagement by our teachers



Our IT department standing by to ensure the tablets were up and running without any glitches.

# Yuma Elementary District

*Theresa Lowe, Grant Coordinator*

Year One of the Helios STEM School Pilot saw Yuma School District One bring science technology to fifth through eighth graders and training to teachers in seven elementary schools and three middle schools, reaching 3,500+ students, 70 teachers, and 37 administrators. This initiative mirrored two partner grants serving all other district schools making the Helios STEM Pilot a district-wide effort to enliven the teaching of science.

Here are the major impacts so far:

1. Expanding a district elementary-level science cadre to one teacher from each grade level at each school, to develop long-lasting science expertise at each site.
  - o Cadre members experience monthly three-hour to plan “5 E’s” lessons and expand their expertise in iPad use.
  - o Cadre members then have a full-day substitute so that they can model or team-teach the collaboratively designed lessons for their grade-level teammates and encourage additional science teaching.
2. Expanding middle-school interdisciplinary planning sessions to all district science teachers and all social studies and language arts teachers.
  - o Teacher teams designed eleven science- and project-learning-based units to be shared among all district teachers at the grade level.
  - o Teachers explored the major components of project-based learning.
3. Providing a mobile cart with 25-30 iPads to be shared among three to four elementary classrooms or three middle school science teachers.
  - o Each teacher attended a half-day training on basic iPad use.
  - o Science cadre members received additional iPad training monthly.
  - o Middle school science teachers received an additional three hours of training.

What Have We Learned?

- Students love hands-on science lessons, and teachers are enthusiastic about teaching them.
- Smooth iPad management includes knowing that when the devices must be shared among students is possible but requires being able to “work around” issues because the technology was designed for individual users.
- Finding time and resources for teaching inquiry-based science in elementary schools is challenging in the current context of high-stakes testing.
- Middle school teachers highly value the opportunity to meet for interdisciplinary planning. However, it is a new endeavor that pulls most of them out of their comfort level, and coordinating the pacing of multiple curricula, each driven by its own standards, is challenging.