SCIENCE foundation ARIZONA
INNOVATION AT WORK

Helios STEM Schools Updates

Helios Education Foundation

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Issue 2

Inside

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

At the Alhambra Elementary School District (AESD) we are just over a month into the full implementation of our STEM Engineering Class. Matthew Flory, STEM Teacher at Cordova Middle School, had this to say about this new class offering:

> "Offering an engineering class at Cordova this year is unprecedented for… our district. The opportunity this grant has provided for our campus is eye opening for all 160 8th grade students that take part in this program. With eight different modules for the students to work through, they are provided with an assortment of hands-on activities. Students enter the room excited to begin their lab, and have taken ownership of the success of their modules. Overall, it has become an incredible success through grant funding, district and administrative support, and the devotion of the students. The academic vocabulary used in the articles and required in their digital journal entries also bridges our transition into the Common Core curriculum and upcoming PARCC assessment."

Mr. Flory also added that students rave about the new engineering course and that many of them list this as their favorite class.

As AESD moves forward with this mandatory class (currently implemented in two schools and impacting 250+ students), we anticipate teachers and students will make connections to their existing science, math, and technology curriculums. AESD views these first engineering classes as being a starter step into the "Introductory" level of implementation on the STEM Immersion Guide, with a hope to transfer this learning experience to other 8th graders within our district.

Mr. Flory helping students with a hydrogen powered car.

Mr. Flory and students working with magnetism and electricity.

Mr. Flory working with a student.

Altar Valley School District

Kathryn Zanin, STEM Coordinator

October was an exciting month for teachers and students in the Altar Valley School District. Students in Ms. Venglarcik's 5th / 6th grade PEAK class attended a two day one night field trip a top Mt. Lemmon with graduate fellows from the University of Arizona's College of Science Sky School. The field trip allowed students to collect data and record information in their science notebook on the trek up the mountain. In addition the graduate fellows led students through an inviting range of introductory field experiences in meteorology, geology, and biology. Highlights for students included the chance to program a telescope, to control the remote that moves the dome doors, and to peer at space objects inside and beyond our solar system. Students observed tree rings and played motivating learning games such as "getting to know a tree" with a blindfold and 2 peer guides. Many came away stating their favorite activity was the predator/prey game where they tried out the roles of each in a hide and seek fashioned game. Students spent time silently listening to the sounds of an afternoon meadow. Some had time and inclination to write poetry. It was great to come back and have immediate connections to our classroom STEM lab where student teams were challenged to develop ways to measure wind with student-designed and built anemometers.

In addition, Ms. Garcia, our 6th grade math science teacher, and Ms. Cavazos, our preschool teacher, spent two days planning and designing a cross aged field trip with the Sonoran Desert Museum (SDM) Education Department. Sixth grade students will be studying plants and animals of the Southwest as they take on the role of docents for preschool children during a tour of the museum in December. Students in Ms. Garcia's class will receive training in both desert species and how to properly interact with a child who is in preschool. The joint venture between the SMD and AVSD allows students an opportunity to experience science and the real world in a unique manner. Students are not the only ones who experienced new and exciting adventure this month. Teachers had an opportunity to be reminded of what life is like as a student.

Finally, the members of the STEM Professional Learning Community (PLC) met on October 22nd at the UA Science Tech Park Executive Board room for full day training, planning and developing lessons to use in their classrooms. Dr. McCann, Superintendent, challenged teachers to build the tallest structure possible using only spaghetti, tape and a marshmallow. He used this activity as the back-drop for presenting an overview of the HELIOS grant and the vision of STEM being offered to students from preschool through eighth grade. Next, teachers gladly took on the role of students when Sara Torres and Stephaine Frimer of Science Foundation Arizona presented a STEM lesson using rubber band cars as their conduit for instruction. Teachers ended their day planning and developing STEM lessons to be implemented the following week as part of Dr. McCann's quest for teachers to take a risk and try teaching STEM lessons.

Overall, October was an exciting and challenging month for both students and teachers of AVSD as each took a risk to extend their science background.

Bagdad School District

Karen Anderson, STEM Committee Member

In spite of an autumn chill, BUSD#20's interest in STEM has not cooled down in October:

- 1st and 4th grade classes have been identifying plant and animal life that are present this time of year in the Bridle Creek Habitat Enhancement Area (BCHEA). Upon returning to the classroom, they produced watercolor drawings representing what they'd observed. In the spring, they will follow this same process, then discuss and evaluate the seasonal changes there.
- Six pumpkins and lots of sunflower seeds were recently harvested from the elementary school garden. They are now in the process of drying the seeds for eating, as well as saving some for a later garden planting.
- Data collection is on the minds of elementary teachers! PD instruction has included learning how to garner important assessment and evaluation information via Galileo testing.
- Elementary students and teachers participate in ongoing 45 minute training sessions every other week regarding online research, then follow up with practical application of research skills during weekly 35 minute computer lab sessions. By the end of the school year, students will produce a product using their new skills.
- 7th grade science students have regularly been using the BCHEA for on-site learning.
- The Community Wellness Walk at Bridle Creek (held Oct. 8) was a great opportunity to explain the use of BCHEA to local residents.
- The Community Star Gazing event, held in conjunction with the Halloween Carnival, was a smashing success! It was quite a sight to see over a hundred costumed zombies, fairy princesses and the like, all lined up waiting to look into telescopes and see deep space! More Star Parties are on the horizon!
- Vrroom! Vrroom! The high school STEM club has started work on their solar car.
- A BHS team competed last week in Mortimer Farms' (Dewey, AZ) Annual Pumpkin Toss. Their trebuchet catapulted pumpkins to a record breaking 262 feet winning them first place in Distance Throw—with the nearest competitor over 100 feet behind them.

Congress School District

Stephanie Miller, Superintendent

October and November were busy months at ***Congress Elementary School***. STEM focus continues with After School Programs, ST Math, Family Outreach, and Professional Development.

The After School Programs with a STEM focus included Rock and Mineral Club, Drama Club, and STEM Club.

- ✓ The Rock and Mineral Club created a Rock Walk around the school's playground walking track. A generous donation from Wickenburg Gem and Mineral Club allowed for signs to be put by groupings of rocks. Students now can learn about rocks and minerals as they walk.
- ✓ The Drama Club did a focus on recycling. The final performance for parents was in November. Students in the K-2 grades sang, danced, and performed around making our world a better place.

- ✓ The STEM Club students, in grades 3-8, are doing Legos WeDo Robotics. Students are working collaboratively in teams, learning about robotics, and experiencing activities that incorporate the Arizona College and Career Readiness Standards. STEM Club will have a parent outreach event in December as a part of their culminating activity.

ST (Spatial Temporal) Math continues to be a well-loved activity for students. Students are asking to spend more time on the ST Math program. Teachers are easily able to monitor and support students as they problem solve with a penguin named JiJi. In addition, the monthly reports provided by ST Math are beneficial for setting/monitoring student learning targets.

Two parent nights were held. The first was a focus on technology. Parents learned about Internet safety and interacted with web available math manipulatives and activities to support learning. The second parent night was a focus on science that relates to the universe. This event was called Read to the Stars. Families learned about constellations, examined their weight on various planets, and looked through telescopes. Experts facilitated three different centers.

First Trimester Honors Assembly was held and Voice Thread was used to show parents the STEM updates. A PowerPoint with embedded pictures and videos was used. Varying students read through the presentation via video clips as a part of using the Voice Thread product.

Teachers are finishing the fifth, and final, professional development module of Defined STEM. The modules have included learning about the Defined STEM product, Common Core Standards, instructional strategies that raise rigor in the classroom, and teaching to varied learning styles. In December, Defined STEM will be hosting a webinar. The webinar will focus on thematic lesson planning that reaches across multiple disciplines to support the learning of the Arizona College and Career Readiness Standards.

Finally, three staff members were able to attend the Building Capacity in Science Instruction through the Framework for K-12 Science Education hosted by the Arizona Science Teachers Association. This was made possible by additional funding support by Science Foundation Arizona and the Helios Foundation. Focus of the conference was on the Next Generation Science Standards (NGSS). It was a great opportunity to learn from experts while also having time to collaborate with other educators and Science Foundation Arizona STEM grant "sister" schools.

W.F. Killip Elementary School

Ted Komada, STEM Coordinator

October and November have been great months with the Helios STEM School Pilot project at Killip Elementary School. An absolutely amazing and committed staff of teachers and support personnel have successfully moved the curriculum component of the project from a professional development focus to an instructional planning and implementation stage. The scope of this planning will reach every student across all grades at the school by the end of the first semester.

These units use grade-level appropriate Science text aligned with the Next Generation Science Standards (NGSS) to teach Arizona's College and Career Ready English Language Arts standards. All instructional units have a hands-on, project-based learning component that engage the students in applying the science content to real world scenarios ranging from simple mechanical physics to the cause and human impact of the 2011 Tsunami in Japan.

"Can you hear me now?"
1st grade sound waves

Grade Level STEM Units Created:

- Kindergarten – Force and Motion: "Smashing Pumpkins"
- 1st Grade – Structure and Function: "Fish Fins"
- 2nd Grade – Engineering Design: "Boat Build & Pioneer Wagons"
- 3rd Grade – Force and Motion: "Work Smarter, Not Harder"
- 4th Grade – Structure and Function: "Adapt to Make it Work"
- 5h Grade – Earth's Systems: " Where Spheres Interact"

While the instructional planning and implementation will continue throughout the 2013-2014 school year, the winter months will bring a focus to the community partnership component of the HSSP program. We will be identifying and meeting with existing as well as new community partners. We will establish a STEM Advisory Council that will initially focus on creating a community-wide awareness of STEM education and the work we are doing at Killip Elementary. We will also be meeting with local technological and STEM business/industry representatives to explore partner-ships that can connect our student's classroom content with real-world application of that content.

Engineering students from NAU lend a helping hand to our "Bridge Builder" teams

Salt River Elementary School

Lynette Charlie, STEM Coordinator

During the months of October and November, Salt River Elementary teachers have been engaged in professional development that included classroom coaching. Teachers in grades K-6th reflected and discussed their 1st unit of science teaching and developed their understanding of the disciplinary core ideas of the framework for science and engineering practices. This was done using our current science programs. Teachers also used their science units to identify and define the S, T, and E concepts and guiding principles of STEM. Along with our professional development 6 teachers received in classroom coaching with our providers that helped them implement STEM in the context of the classroom.

Our biggest event at Salt River Elementary was our family STEM science night. The event took place on November 25th at Salt River Elementary School. This was our first event and what an overwhelming start it was. The night began with a ribbon cutting with key school personnel saying a few words to our families about our mission and vision for STEM. Families were then able to visit each grade-level and engage in hands-on STEM activities, visit with our guests for more hands-on activities: Intel, Science Foundation Arizona, AZ Tech Council, Butterfly Wonderland, SRPMIC Environmental Programs, Arizona Science Center and the Renaissance Festival. Our star attraction was our first Egg Drop Challenge. This event was open to our Salt River families. Over 60 families participated in this event. Through generous donations from Salt River Tribal Library, Salt River IT department, Salt River Student Council and Science Foundation Arizona, we were able to raffle off some very nice science related prizes. We do not have a final count on how many families attended our event; however, it was standing room only in our cafeteria. The 1st time this has ever happened, therefore we believe it was a successful event by many.

STEM Night Ribbon Cutting

STEM Night Egg Drop Challenge

Yuma Elementary District

Theresa Lowe, Grant Coordinator

October and November have been busy and energizing months for Yuma District One in our implementation of the Helios STEM Pilot.

Professional development and technology implementation have been the emphases. Here are the highlights:

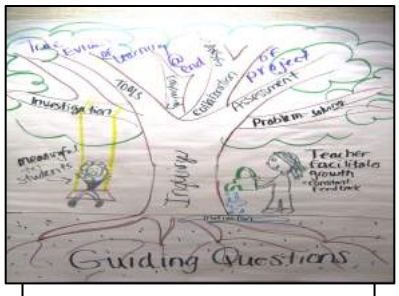
iPad Implementaion: iPad carts are being delivered to fifth grades in our elementary schools and to science departments in our middle schools. To ensure that they are used well, we have taken several preparatory steps: we surveyed our science teachers using iPads from another grant to see which apps they value; a committee led by our technology specialist further surveyed the cost and practical instructional uses of more than one hundred apps to narrow the list; all fifth through eighth grade teachers who will use the iPads received an initial half-day of training. Science teachers received three additional hours of iPad training, and training for elementary cadre members will be on-going during their workshops.

Elementary (Fifth and Sixth Grade) Teacher Professional Development: Three-hour monthly science workshops for our teacher cadre continued in October and November. Workshops have focused on problem-based activities that cadre members can take back to their schools, where each member receives a full-day substitute so he or she can further develop and share the lessons with all teachers at the grade level. Early results are promising; students in 88% of grade-levels at schools in the Helios Pilot exceeded the expected growth by wide margins from Fall pretest to November benchmark assessment, according to our district benchmark testing system (Galileo).

Middle School Science Teacher Interdisciplinary Planning: In October middle school science and language arts teachers met for their first full day to begin their interdisciplinary, project-based unit and lesson plans. In November the science teachers returned for another day, this time joined by their colleagues in social studies.. We examined documents supporting the Next Generation Science Standards, the Arizona College and Career Ready Standards in Math and English Language Arts, and the *College, Career, and the Civic Life (C3) Framework for Social Studies State Standards*. Teachers saw that all these documents aim to increase student proficiency with inquiry, problem solving, communication of ideas in the discipline, use of evidence to justify thinking, and of course, discipline-specific concepts. Teachers also explored Project-Based Learning, , and are applying what they are learning to their interdisciplinary plans.

All of our efforts have been significantly advanced by the personal, on-site and on-going support of the staff from Science Foundation Arizona, for which we are deeply grateful.

Elementary cadre members explore a lesson before sharing it with colleagues at their schools.



Graphic representation made by middle school teachers during professional development showing how instructional shifts in math, language arts, social studies and science all support each other.

Elementary students explore an engineering problem.