

OKLAHOMA NSF EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH

Girl Scouts: A Strategic STEM Partnership

Although gains have been made, women are still underrepresented in America's science and engineering workforce, holding just 28 percent of S&E jobs, according to a report released by the National Science Board in 2014.

Oklahoma EPSCoR is influencing the next generation's participation in this sector through a strategic partnership that was forged with the Girl Scouts of Western Oklahoma (GSWO) last year. Through the EPSCoR-GSWO STEM Initiative, young girls are becoming more confident in their ability to participate in science, technology, engineering and math (STEM). GSWO has a strong, established network in Oklahoma, with approximately 12,000 girls participating in the program each year. The group's territory covers more than half of the state's 77 counties.

Through Oklahoma EPSCoR grant funding, GSWO now has a STEM coordinator whose singular role is to help the organization's Scouts and troop leaders discover STEM.

Coordinator Chris Simon, with support from EPSCoR researchers, Drs. Renee McPherson and Jody Campiche, developed hands-on environmental science kit curriculum for all ages of Scouts.

The original curriculum has been partnered

with newly developed STEM kits-in-a-box to complement the Girl Scouts It's Your Planet—

Love It! Leadership Journey books. Through these specialized kits, Daisy, Brownie, Junior, Cadette, Senior and Ambassador Scouts

Confidence levels soared to 83%

after Scouts experienced the new EPSCoR kits.

explore topics that range from discovering plant structure and function to engineering an aqueduct. All of the supplies that troops need to perform the experiments are

provided, as are easy-to-follow guides that convey clear understanding of the scientific process.

The materials were recently presented to attendees at the Girl Scouts National Concontinued on page 2



UPCOMING EVENTS! Mark your calendar to participate in these upcoming OK EPSCoR events.



STUDYING CLIMATE State-of-the-art research sites provide important information for scientists studying the environmental impacts of climate variability.



RESEARCH OPPORTUNITY AWARD PLUS Program expands opportunities, builds partnerships & excites the next generation.



ROA+ AWARD RECIPIENTS Six regional faculty members receive 2015 Research Opportunity Award Plus funding.

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-vention in Salt Lake City, Utah.

"The response from troop leaders and CEOs at the convention was one of elation and excitement, because nothing like this exists anywhere else in the country," explained Simon.

Before experiencing the EPSCoR kits, only 47 percent of Scouts surveyed indicated that they could see themselves working



MARK YOUR CALENDARS

GIRLS' TECH TREK PROGRAM JUNE 7-13, 2015 Southwestern Oklahoma State University Weatherford, OK www.okepscor.org/calendar/2015-techtrek

AUTHENTIC RESEARCH EXPERIENCES FOR TEACHERS

Urban Ecology, Oklahoma City, OK Kiamichi Forest Research Station, Idabel, OK www.okepscor.org/calendar/aret

CHOCTAW NATION'S JONES ACADEMY STEM CAM

JULY 13-17 & 24-29, 2015 Jones Academy Boarding School Hartshorne, OK www.okepscor.org/calendar/jones-stem

HYDROLOGICAL INTERNSHIPS FOR LANGSTON UNIVERSITY STUDENTS SUMMER 2015

State Sites, U.S. Hydrological Survey www.okepscor.org/education/collegestudents in a science or engineering field. After participating in the project, those same Scouts' confidence levels soared to 83 percent.

More than 800 girls are currently exploring STEM through these unique environmental science-themed kits. Every troop in the service area will have access to the materials by the end of the year.

As Scouts complete the curriculum, they will earn EPSCOR STEM badges that can be

proudly displayed on their uniforms as proof of their accomplishments (as seen in cover photo). More than 200 Scouts have earned badges to date.

The EPSCoR/GSWO partnership will provide long-term benefits for troop members, as GSWO has committed to sustaining the STEM coordinator position and science kits post-grant award.

For more information, contact Chris Simon at csimon@gswestok.org.



EPSCOR RESEARCHER PRADEEP WAGLE AND UNIVERSITY OF OKLAHOMA GRADUATE STUDENTS YUTING ZHOU AND RAJEN BAJGAIN DEPLOY A SURFACE FLUX TOWER TO MEASURE WATER AND CARBON EXCHANGES BETWEEN THE ATMOSPHERE AND LAND SURFACE.

Oklahoma EPSCoR researchers have established five new state-of-the-art research sites that provide important, up-todate information for scientists studying the environmental impacts of climate variability on grasslands and croplands. The sites, located in El Reno and Marena, provide continuous measurements of key ecological variables in native grasslands, improved pasturelands, and winter wheat croplands.

Automated sensors at the sites capture air and soil temperature, atmospheric and soil moisture, wind speed and direction, carbon dioxide and methane concentrations, and other important factors. Measurements are taken using airborne- and space-borne sensors that measure optical and thermal properties of vegetation and soil.

These new observation sites provide scientists with a comprehensive, advanced ability to study the interactions between the atmosphere, vegetation, and soil across a variety of climate conditions, including drought. The measurements are important for use in computer models that project how vegetation will react to changing weather. More accurate projections will provide direct benefits for land managers and agriculture producers.

The field measurement sites are also used for educating students and other researchers about ecology, climate, agriculture, and geospatial technologies. The lessons learned will benefit the next generation of scientists, farmers, ranchers, land and water managers, and other decision makers.

Because the observations obtained from the sites are so extensive, other researchers from across the U.S. and internationally are partnering with the Oklahoma scientists to use the data, as well. Observations from the EPSCoR project have served as "ground truth" data for the development of the NASA Soil Moisture Active Passive satellite mission, which aims to produce maps of soil moisture at local to global scales.

Thanks to Xiangming Xiao, OU, for his assistance with this story.



PICTURED BELOW/INSET: ROA+ RESEARCHER VALERIE O'BRIEN MARKS A COLONY OF CLIFF SWALLOW BUGS WITH FLOURESCENT TEMPERA PAINT TO STUDY THEIR MOVEMENTS, WHICH HAVE BEEN AFFECTED BY CLIMATE CHANGE. ABOVE: A PETRI DISH OF MARKED SWALLOW BUGS.

The Oklahoma EPSCoR Research Opportunity Award Plus (ROA+) program allows regional university faculty members from primarily undergraduate institutions in Oklahoma to perform research at one of Oklahoma's comprehensive research campuses during the summer months. The program enhances regional university faculty members' research experiences, while also supporting the development of ongoing collaborations with their counterparts at the comprehensive research campuses.

One of the primary goals of the program is for regional university faculty members to experience growth and gain confidence as researchers. Valerie O'Brien, a Tulsa Community College assistant professor of biology and 2014 ROA+ recipient, says that her experience met that objective.

O'Brien's collaborative research project with University of Tulsa Researcher Charles Brown tracked the response of cliff swallow bugs, a nest-based parasite, to climate change.

"When I was hired as a biology professor at a traditionally non-research oriented institution in Oklahoma, I was concerned that avenues which allowed me to continue to make scientific contributions would be severely limited if not eliminated," explained O'Brien. "However, the ROA+ has shown me that it is possible to be both an effective classroom teacher and a scientist," she said.

O'Brien and her ROA+ colleague have continued working together. They are currently pursuing an NSF proposal and are preparing a paper for publication.

ROA+ funding not only facilitates collaborations and supports researchers'

growth, it also engages a new generation in the research process. As a requirement of funding, visiting ROA+ researchers incorporate their research experiences into their classroom curriculum when they return to their regional universities.

Students who have participated in classes

sponsored by the ROA+ program have had high praise for the experiential learning experience. They say that information previously available only through a textbook or lecture now has more dimension and they better understand how scientific principles apply to them and their course work.

Student Sarah Vrla says that she believes most

students experience that moment in class when they question, "Why do I need to know this?" But through the ROA+, "I've been able to see a hands-on application of things I've learned in various science courses," she explained.

Professor O'Brien sees the benefits of the program for students, as well.



"I know that students benefit from being taught by a working scientist," O'Brien said, "and that exposure to original research can help them envision themselves in STEM careers."

ROA+ participants are selected annually on a competitive basis, with research proposals in the area of climate variability receiving preferred consideration. Last year,

researchers from nine different Oklahoma universities partnered together to work on ROA+ funded research and to share those research experiences with their students. The 2015 award recipients are identified in the box below.

For more information, contact Gina Miller, outreach coordinator at gmiller@okepscor.org.



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ROA+ 2015: RESEARCH OPPORTUNITY AWARD PLUS RECIPIENTS

FACULTY MENTOR & LAB

Akhtar Ali, TU Andrew Dzialowski, OSU Le Gruenwald, OU Nicholas Materer, OSU Kenneth M. Nicholas, OU Keith Willett, OSU

VISITING RESEARCHER

Kyeorda Kemp, NSU Suneeti Jog, NSU Kewei Sha, OCU Dane W. Scott, ECU Fazlur Rahman, OSSM Sanchari Ghosh, NSU

RESEARCH FOCUS

Climate Change & Plant Immunity Climate Variability & Wetlands Climate Sensor Data Compression CO₂ Converted to a Useful Product Green House Gas Conversion Water Management



OK EPSCoR is funded through awards from:



HOW TO GET INVOLVED: 405.744.9964 WWW.OKEPSCOR.ORG





Because STEM is a part of Oklahoma's Future.

The Oklahoma Experimental Program to Stimulate Competitive Research (OK EPSCoR) was established by the National Science Foundation in 1985 to strengthen Oklahoma's exploration and growth in science, technology, engineering and mathematics. OK EPSCoR's central goal is to increase the state's research competitiveness through strategic support of research instruments and facilities, research collaborations, and integrated education and research programs.

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