STEM Outreach Center

Institute for Excellence in Math and Science Education
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The team of the NMSU STEM Outreach Center is dedicated to increasing the achievement and participation of K-16 students in the STEM fields. The future economic well-being of New Mexico and our nation depends on students who have internationally competitive skills in mathematics and science. It is also essential that students are motivated to enroll and complete postsecondary programs leading to highly skilled STEM (science, technology, engineering, and mathematics) careers. But for the present, we are in a crisis situation pertaining to STEM education. For example, in South Korea 37% of the undergraduate degrees awarded are in the STEM fields; 47% in France; 50% in China, and 67% in Singapore. Only 15% of the U.S. undergraduate degrees are in the STEM fields.

In order to answer this call and help our community of students in southern New Mexico succeed in STEM, we have formed a strong STEM Outreach community that involves the participation of New Mexico State University, Dona Ana Community College, Las Cruces Public Schools, Gadsden Independent School District, Hatch Public Schools, White Sands Missile Range, the International Spaceport, many foundations, as well as federal and state legislators. These programs include after-school components, professional development for teachers, workshops for families, programs for NMSU STEM majors to teach, educational resources, and other initiatives designed to align and encourage the K-12 pipeline in the STEM fields.

We have a wonderful team of educators who are excited about the programs and dedicated to making sure that students meet success. Our offices are housed in O’Donnell Hall, room 136 and we have an Aerospace Education Laboratory in the Engineering Foreman building, room 213. We welcome everyone! Please stop by for a visit!

Susan Brown, Ph.D.
Director
The NMSU STEM Outreach supports Science Olympiad teams at LCPS middle schools and high schools. Science Olympiad is a unique opportunity for students to increase their interest and achievement in STEM fields. Local schools start a student after-school Science Olympiad team; participate in NMSU’s Invitational Science Brain Battle, then onto Regional Science Olympiad in Silver City, NM. After qualifying at the Regional event many teams continue onto State Science Olympiad at NM Tech. Science Olympiad’s ever changing line-up of events in all STEM disciplines exposes students to practicing scientists and career choices, and energizes classroom teachers with a dynamic content experience.
Science, Engineering Mathematics and Aerospace Academy

The Southern New Mexico Science, Engineering, Mathematics, and Aerospace Academy (SNM SEMAA) is a collaboration of NASA, New Mexico State University Colleges of Education and Engineering, Gadsden Independent School District, Las Cruces Public Schools, parents, and volunteers. SNM SEMAA is designed to encourage normally under-represented groups into the fields of science, engineering, mathematics, and technology through hands-on, inquiry-based science activities.

Southern New Mexico SEMAA consists of a combination of school-based curriculum enhancements, university organized enrichment activities, and parent outreach. Each component is designed to work seamlessly with the others as a comprehensive program to improve student achievement and increase participation in science, mathematics, engineering, and technology.

To inspire the next generation of explorers... as only NASA can!

SNM SEMAA GOALS

1. Encourage normally underrepresented students in grades K-12 into the fields of science, engineering, mathematics, aerospace and technology (STEM);

2. Engage students in inquiry-based learning, research, use of advanced technologies, peer support groups, and mentoring relationships with professionals in the STEM fields;

3. Facilitate the successful transition of students from high school to post-secondary programs in the STEM fields;

4. Develop partnerships with parents;

5. Provide opportunities for pre-service teachers to work with local schools and communities and to assist in-service teachers with implementing curriculum.
SNM SEMAA MAJOR COMPONENTS

1. Strengthen the K-12 math and science curriculum in southern New Mexico school districts to align with state standards and build interest in the STEM fields;

2. Provide academic enrichment and career awareness for K-12 students and develop student interest and success in higher education STEM fields through summer, Saturday, and after school aerospace academies and college experience programs;

3. Support student field trips that allow them to experience state of the art technology and engineering and science wonders;

4. Engage parents in their children’s academic learning and assist with developing pathways for student participation in higher education.
The STEM Outreach Center coordinated the proposals that were submitted to the New Mexico Public Education Department in response to the 21st Century Community Learning Centers Request for Proposals. Working with two school districts the Gadsden Independent School District (GISD) and the Las Cruces Public School District (LCPS), we are continuing and expanding our 21st CCLC sites for another four years.

The 21st CCLC sites provide a high quality after school program in elementary, middle, and high schools. The programs included are: SEMAA (Science, Engineering, Mathematics, and Aerospace Academy), DiMA (Digital Media Academy), Reader’s Theater, and AfterMath. All of the programs work together to increase interest and engagement in and understanding of STEM (science, technology, engineering, and mathematics) fields; increase reading skills; parental/family involvement; physical education and obesity prevention; and professional development for participating teachers. Each program component promotes an active learning environment that reflects the latest research in the neuroscience of learning.
The 21st CLCC’s provide 2.5 hours of after school engagement throughout the academic year. Threaded throughout the program are Family workshops/Festivals as well as an active community involvement.

The staff of the STEM Outreach Center provides professional development for the instructors of all of the programs as well as support throughout the academic year. The success of this program is documented in the smiles and comments from the students, educators, and families as well as the higher scores in reading, math, and science on the NM standardized test for GISD and LCPS students.
Quality teaching promotes quality learning in the classroom. The acknowledgement that teacher empowerment is the keystone to school reform has been widely documented and the vision of SC2 reflects this.

Our program involves intensive week-long institutes in the summer that includes scientists, mathematicians, and other professionals providing rich content knowledge of the science topics studied as well as hands-on, inquiry based activities to truly understand the content presented. Investigations are emphasized so our teachers will experience inquiry learning and understand the learning process that occurs when science is taught as an active subject. Each institute has a theme that unifies the scientific concepts that are explored throughout the week. Teachers have the opportunity to discuss issues, lessons plans, and learn from each other.

SC2 professional development continues throughout the school year providing support through monthly professional development opportunities in addition to before and/or after school professional development opportunities. The events allow continuity of support so teachers can implement inquiry-based curriculum in the classroom.

When highly qualified teachers are prepared and excited about teaching science and have access to resources, the students’ scientific literacy and interest will increase. These students will be prepared to continue in science classes at the high school level and beyond in a postsecondary career path. The Scientifically Connected Communities project provides a high quality professional development program that includes sustained support, is connected to classroom practice, helps the teachers reflect and refine their teaching, promotes incremental change, provides collaboration, and challenges pedagogical beliefs and practices.

THE VISON OF SC2

To increase scientific interest, participation, and achievement for all students by providing professional development for K-12 educators that promotes and supports science standards-based inquiry learning in the classroom.
SC² Goals

Focusing on public elementary, middle and high schools in New Mexico that primarily serve minorities and students underrepresented in the science fields, the goals of Scientifically Connected Communities are to:

1. Provide high quality professional development for teachers that increase student scientific inquiry and mastery in their classrooms;

2. Increase K-12 educators’ science content and brain-based learning strategies knowledge;

3. Supply classroom resources and materials for classroom implementation of scientific inquiry;

4. Establish and support a professional network as colleagues share educational Best Practices.
The SEMAA Aerospace Education Lab (AEL), is an electronically enhanced, computerized classroom that puts cutting-edge technology at the fingertips of NASA SEMAA students from K-12 grades. It engages students in real world challenges relative to both aeronautics and space exploration. The AEL houses real aerospace hardware and software including an Advanced Flight Simulator, a laboratory-grade, a research wind tunnel, and a working, short-wave radio receiver, AR Drones, and hand-held global positioning systems, or GPS, for aviation.

In addition to serving SEMAA students, the AEL also engages community groups, outside organizations, and the general public at large in exciting outreach programs conducted year-round. Visitors can explore technology through ‘hands on/minds on’ activities that model real-world challenges in aerospace.
Every summer the SEMAA staff hosts a multitude of summer camps, all levels of robotics to flight camp, rocket camp, to reverse engineering camp, kitchen chemistry and we even have a Science Olympiad camp. Visit our website the first week of April for applications and more information regarding the summer camps!
Family Festivals

It has been documented through research that parental involvement contributes to higher grades & test scores, graduation rates, positive attitudes & behavior, attendance, expectations, quality of work, and plans for the future. It is very important to our programs with the STEM Outreach Center that the families are involved. We have two family workshop coordinators who are dedicated to providing experiences that benefit the families of our student participants. We host a minimum of 8 workshops per year per school site and the workshops are designed from the surveys from the parents at each school site with the help from our community partners, Word One Consulting, La Semilla – Farm to School, and People Skills, Inc. These workshops are scheduled for Saturdays or in the evenings and may include topics such as: bullying, positive parenting discipline, scholarship applications, technology, and others as indicated by the parents.
Along with these workshops, Family Festivals will be planned that involve the families and together they work on a problem (ex. building the propeller that works the best) as well as promote critical thinking and inquiry based active learning. We offer these Festivals every other month in the evening in order to promote participation.
Each year the U.S. Space & Rocket Center in Huntsville, Alabama hosts the Great Moonbuggy Race. Students are required to design a vehicle that addresses a series of engineering problems that are similar to problems faced by the original Moonbuggy team. The STEM Outreach Center supports two teams: San Andres High School and Mayfield High School.

Each Moonbuggy is human powered and carries two students, one female and one male, over a half-mile simulated lunar terrain course including “craters”, rocks, “lava” ridges, inclines and “lunar” soil. Moonbuggy entries are expected to be of “proof-of-concept” and engineering test model nature, rather than final production models.
Being a part of the 21st century digital revolution, the world is connected in business, research, and even in our school communities. Technology has shaped the way people think, learn, and communicate. Looking at this generation of students, the collaborators of this program realizes that in order to make learning meaningful and relevant, technology is a key component. The overarching theme of DiMA is learning scientific, historical, mathematical content through inquiry and project based investigations using innovative technology to gather and analyze data as well as document their findings. The vision of DiMA is to provide students in the GISD and LCPS CLC’s opportunities to develop strong science, mathematics, and language arts knowledge and skills using technology as a tool for learning and communication in order to prepare the students for a successful career in the 21st century.

Goals of DiMA

1. Provide access to educational technology, film equipment, and software that will enhance students’ understanding of how to use the technology responsibly and effectively;

2. Encourage students to make connections between technology and science, and their everyday lives within their communities through rigorous curriculum that complies with GISD, LCPS and NM standards and benchmarks;

3. Challenge students to incorporate their peers, schools, and communities in projects that explore their multi-faceted and multicultural lives in the borderland.
Project GUTS

Growing Up Thinking Scientifically!

Project GUTS: “Growing Up Thinking Scientifically”, is a program facilitated by the STEM Outreach Center that promotes science, technology, math and engineering (STEM) for middle school students in Southern New Mexico. Project GUTS was designed for students from all different backgrounds to engage in scientific inquiry by investigating topics of interest to their local communities. Growing up thinking scientifically means learning to look at the world and ask questions, develop answers to the questions through scientific inquiry, and use critical thinking to assess which ideas are reasonable and which are not. One who grows up thinking scientifically sees science as a dynamic creative endeavor, a way of thinking, rather than a body of facts.

Students get an in-depth look at complex systems, models and simulation, and learn to create computer models from scratch. Students engage in problem solving and mathematical thinking at each weekly meeting. We offer a variety of activities to appeal to different kinds of learners: we work with agent-based models on the computer, we run participatory simulations with handheld computers, and are up and about collecting data and doing research. Subsequently, during each six-week after-school unit, students investigate a problem, interview experts and community members, gather data, and run experiments on their computer models to better understand the problem being studied. Students are assisted by Project GUTS facilitators, NMSU and high-school near-peer mentors in customizing existing models to reflect local conditions. Students upload their investigations to the Project GUTS website to be shared with peers, teachers and community members. At the end of each unit, students present their work, compare their models, and share their findings at the end of each unit at Roundtables that bring together Project GUTS club members from around the city.
In order to help meet the demand for fully qualified mathematics and science teachers in New Mexico, our STAND-NM (Science Teachers Acquired Through New Directions in New Mexico), facilitated by the NMSU STEM Outreach Center implements a new specialized pathway to secondary science teaching license for science majors. Research documents that the more content the teacher has the more the students in the classroom learn. Therefore, STAND-NM recruits science majors to earn a teaching license and commit to teaching in high-needs schools in New Mexico.

In addition, to participating in the STAND-NM program that emphasize strong content and pedagogical content knowledge, early field experiences, intensive student teaching, and induction mentorship, the Noyce Scholars also participate in either the Science, Engineering, Math and Aerospace Academy (SEMAA) or in lesson study groups at local schools. They also attend STEM conferences and have a NOYCE study room in the College of Education.

Our overall goal includes helping minority students from throughout the state of New Mexico to realize their dreams of becoming successful math and/or science teachers. It will further enhance the collaboration that has been established by the College of Education, the College of Arts and Science, and local school districts.
Friends and Funders of the Programs

- NASA
- New Mexico State University
- State of New Mexico
- U.S. Federal Government
- Intel

- Toyota USA Foundation
- Honda Foundation
- El Paso
- General Motors
- Tommy Hilfiger Foundation

- Qwest Foundation
- ADC Foundation
- National Science Foundation
- Las Cruces Public Schools
- Public Service of New Mexico

- Gadsden Independent Schools
- Hatch Valley Public Schools
- Engineering Information Foundation
- Qwest Communications

- Wolslager Foundation
- Lowell Randall (Goddard’s research member)
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