

2011 Annual Performance Report
NASA SCIENCE, ENGINEERING, MATHEMATICS AND AEROSPACE
ACADEMY (SEMAA)

Administered by: Paragon TEC, Inc.
Type of Agreement: Contract

Project Manager: Darlene S. Walker
John H. Glenn Research Center
(216) 433-8664

PROJECT DESCRIPTION

NASA SEMAA is a national education project designed to increase the participation and retention of historically underserved and underrepresented K-12 youth in the areas of science, technology, engineering, and mathematics (STEM).

SEMAA targets students in grades K-12 and their parents/adult caregivers, and offers three core components:

- A NASA-designed, hands on, inquiry based curriculum aligned to national science, math, and technology standards at each grade level, K-12, and connected to research from the NASA mission directorates
- An Aerospace Education Laboratory (AEL), featuring cutting edge aerospace technology that gives students experience with aeronautical and reduced gravity simulations
- A Family Café to promote sustained parental involvement in their child's STEM education

The NASA SEMAA project currently operates at 15 sites located in 14 states across the nation. Site locations include community colleges, four-year colleges/universities, Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), Tribal Colleges and Universities (TCUs), primary/secondary schools, science centers and museums.

PROJECT GOALS

The goals of SEMAA are to:

- Inspire a more diverse student population to pursue careers in stem related fields
- Engage students, parents and teachers by incorporating emerging technologies
- Educate students by utilizing rigorous STEM curriculum enhancement activities that meet national math, science and technology standards and encompass the research and technology of NASA's four Mission Directorates

PROJECT BENEFITS TO OUTCOME 2

Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.

SEMAA is the only K-12 STEM project in the NASA Elementary and Secondary Program education portfolio providing a seamless NASA pipeline for elementary and secondary age students, families and teachers.

In FY 2011, the SEMAA project contributed to Outcome II with the following accomplishments:

- A total of 61,963 students, parents/adult caregivers, teachers and outreach participants were served in FY 2011.
 - o SEMAA served 38,789 total students (21,280 direct student participants plus 18,509 indirect student participants)
 - o Forty-eight percent of direct SEMAA students were females
 - o The project served 202 students with special needs
- NASA STEM Pipeline Collaborative Activities:
 - o The project fostered the participation of NASA SEMAA students in more than 30 other NASA STEM pipeline collaborative activities and 50 Non-NASA STEM programs/projects, thus maximizing student exposure and interest in STEM and strengthening the national K-12 STEM pipeline.
 - o Participation in the following NASA projects/activities:
 - Summer of Innovation
 - Moon Buggy Competition
 - Engineering Design Challenges
 - For Inspiration and Recognition of Science and Technology (FIRST) LEGO League
 - NASA Explorer Schools (NES)
 - Minority STEM Forum
 - Astrobiology in Secondary Classrooms
 - Aerospace Education Services Project (AESP) Workshops
 - Team America Rocketry Challenge
 - The Interdisciplinary National Science Project Incorporating Research and Education Experience (INSPIRE) project

PROJECT ACCOMPLISHMENTS

Performance Goal 6.1.1.1: Provide educators nationwide with knowledge and tools with which to inspire students in the STEM fields.

APG 6.1.1.1: ED-11-3: 75,000 educators participate in NASA education programs.

- In FY 2011, SEMAA contributed to this APG by serving 430 pre-service and in-service educators in NASA education programs

Performance Goal 6.1.2.2: Provide elementary and secondary students with authentic NASA mission-based opportunities that build STEM knowledge, skills, and career awareness.

APG 6.1.2.2: ED-11-5: 600,000 elementary and secondary students participate in NASA instructional and enrichment activities.

- In FY 2011, SEMAA contributed to this APG by serving 39,789 (direct+indirect) students

APG 6.1.2.2: ED-11-6: 75 percent of elementary and secondary students express interest in STEM careers following their involvement in NASA education programs.

- In FY 2011, SEMAA exceeded this APG by achieving an 85% level of interest in STEM careers among SEMAA students (5,858 out of 6,908 respondents) who participated in the NASA SEMAA project

Performance Goal 6.2.1.1: Provide educator professional development experiences and materials that align to needs and opportunities identified by districts, states, Department of Education, professional organizations, and other stakeholders.

APG 6.2.1.1: ED-11-7: 5000, educators use NASA resources in their curricula after participating in NASA professional development.

- In FY 2011, SEMAA contributed to this APG by serving 430 educators who use NASA resources in their curricula after participating in NASA professional development

In FY 2011, SEMAA accomplished the following key milestones:

- Two new SEMAA sites were established via competitive solicitation. The sites are located at the University of Texas at EL Paso, and Hartnell College, Salinas, California. The sites serve predominantly Hispanic communities, increasing the project's ability to reach the target population. Both sites operated a 2011 summer session.
- In March, 2011, International Leadership Program participants from New Zealand, Hungary, Israel, Egypt, Bangladesh, Liberia, Mexico, Uruguay, Bahrain, Samoa, Thailand and Russia visited the United States to gain a greater understanding of our educational system. The participants visited the Martin University SEMAA site specifically to gain a greater understanding of the NASA SEMAA project, and the role it plays in K-12 STEM education. Members from Egypt returned for a repeat visit in July, 2011.
- United States Congressional Representative Jim Cooper recognized the Tennessee State University SEMAA site and staff for their role as advocates for educational excellence and rigor in the area of STEM education, as the site served its 10,000th student participant. Ceremonies in recognition this significant milestone was held April 9, 2011.

- Through collaborations with the Summer of Innovation project at Albany State University and Fernbank Science Center, Atlanta, GA, SEMAA engaged approximately 1,343 middle school students in STEM activities and 76 teachers in professional development activities.
- More than 100 NASA SEMAA teachers participated in a rocket building workshop at the New Mexico State University SEMAA site. The 4th-8th grade instructors engaged in the hands-on rocket building workshop conducted in the AEL, gaining an understanding of rocketry concepts, i.e., ballast, drag, propellant tanks, payload, control systems, turbulent airflow, and apogee.
- SEMAA at Wayne State University (WSU) received a \$15,000 grant award from DTE Energy, to support daily operations at the site. This marks the 5th grant awarded to WSU SEMAA site.
- Lorain City Schools, Lorain, Ohio celebrated the opening of their newly installed, state of the art AEL. Dedication ceremony was held on October 22, 2010. This is a newly established, independently funded standalone AEL site serving 400 middle school students.

Return on Investment:

SEMAA is designed to attract and retain students in STEM through a progression of educational opportunities by capitalizing on the exciting nature of NASA missions and its expertise, technology, and resources. As a result of NASA's investment in SEMAA, the project has engaged thousands of historically underserved and underrepresented K-12 students in the areas of STEM who may not have otherwise received the opportunity to participate in this kind of program or be exposed to the STEM content and hands on activities SEMAA continues to provide. In FY 2011 alone, the project demonstrated a significant return on investment by serving more than 61,000 students, parents/adult caregivers, teachers and outreach participants in NASA-related STEM content.

Moreover, the following examples highlight just a few instances of SEMAA's return on investment in FY 2011:

- Former WSU SEMAA Student, William Culp has pursued a career in STEM and is currently working in his chosen career field as an Engineer with the U.S. Army.
- Latasha Taylor Star, a former NASA SEMAA student graduated from Tennessee State University with a degree in engineering. She currently works as a systems engineer for Lockheed Martin.
- Liam Rattray, former NASA SEMAA student of Fernbank Science Center SEMAA, graduated Summa Cum Laude, and was recognized as Ivan Allen College Outstanding Undergraduate Researcher at Georgia Tech. As legislative aid for

Georgia Organics he received a \$50,000 grant for a renewable-energy project at Truly Living Well, an Atlanta community garden with organic fruits and vegetables.

- SEMAA leverages the influence of STEM professionals as well as SEMAA alumni to engage SEMAA students, parents/adult caregivers and educators through a variety of workshops, outreach activities, and speaking engagements. Utilizing a host of diverse learning experiences, the NASA SEMAA project continues to successfully attract students to STEM-focused content nationwide. SEMAA inspires students to become viable and qualified professionals. In FY 2011, 85% of SEMAA students surveyed indicate having interest in pursuing a career in STEM as a result of having participated in SEMAA. The following former SEMAA students are preparing for careers in STEM:

- o Former SEMAA student, Sandi Wills, of York College/CUNY SEMAA has entered the Virology Master's Program at Rochester University
- o Kamisha White, former Tennessee State University (TSU) SEMAA student, now studies Mechanical Engineering, as a Junior at TSU
- o Former WSU SEMAA student, Ryheam Josey, now studies Engineering as a freshman at Ferris State College, MI.
- o Former WSU SEMAA student, Jordan Blanding, now studies Computer Science as a freshman at Kentucky State University
- o Former SEMAA student, Nastassja Heard, is now studying engineering as a freshman student at WSU
- o Former SEMAA student, Mystique Till, is now studying engineering as a freshman student at the University of Michigan
- o Former WSU SEMAA student, Chelsea Spenser, is now a freshman who studies Biology at TSU
- o Former York College SEMAA student, Ameer Blake now studies engineering as a freshman student at Howard University
- o Former TSU SEMAA student and SEMAA Team Robotics Captain, Will Butterworth, is now a freshman who studies engineering at TSU
- o Former Albany State University (ASU) student, Aric Cuffie, now studies Mechanical Engineering at Georgia Southern

IMPROVEMENTS MADE IN THE PAST YEAR

Significant SEMAA improvements during FY 2011 included:

- Aerospace Education Laboratory Enhancements:
 - o AEL Mars Robotics Laboratory (MRL) was upgraded to be compatible with the Lego NXT Mindstorms Kits. The NXT Robots were successfully

integrated with all six missions of the MRL Curriculum Enhancement Activities (CEA).

- o Incorporated Smart Skies CEA into the AEL.
- o Worked with the AEL Wind Tunnel vendor to operate GDJ wind tunnels remotely to observed Airfoil, Golf Ball and Venturi experiments via a web browser and internet camera.
- SEMAA Awareness Day was instituted to promote neighborhood awareness of the NASA SEMAA project. SEMAA Day events were held at 11 SEMAA sites attracting more than 8000 participants including the general public, community leader, business leaders and congressional representatives.
- Continual improvements have been implemented to the NASA SEMAA website to include the addition of a “SEMAA Highlights From Across the Nation” section on the SEMAA home page. The section is presented in the format of a rotating slides arrangement and showcases events and SEMAA sites from across the project with refreshed content being added on a quarterly schedule.

PROJECT PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

SEMAA sites are required to develop partnerships annually that will both enhance and sustain STEM project services beyond NASA funding. During Fiscal Year 2011, SEMAA leveraged over \$2.6 Million dollars in partnership funds (including both financial and in-kind support) for K-12 STEM education, constituting more than a 100% match to the total project budget provided by NASA. SEMAA has leveraged over \$24.9 Million dollars in funding for K-12 STEM education from 2004 – 2011.

Roles and Responsibilities of SEMAA stakeholders and partners

Organization	Responsibility
NASA HQ	Provides funding for the SEMAA Project.
NASA Glenn Educational Programs Office	Serves as the SEMAA Project Manager providing guidance and overall project management.
NASA Center Education Offices	Support the SEMAA sites in their region.
NSO Contractor Paragon TEC, Inc.	Manages the National SEMAA Office (NSO); oversees the day-to-day operations of the SEMAA sites. Works with NASA to establish new SEMAA sites as well as installation of AELs.
NASA Glenn – On Site Contractors, SGT, Inc./Paragon TEC, Inc.	Support Service Contractors who support the project management efforts of the SEMAA project.
SEMAA Sites	Deliver the SEMAA project to students, families, and teachers. Key personnel at the SEMAA Sites include the Site Director and the AEL Coordinator.
Partners/Stakeholders	Provide financial and/or in-kind contributions to enhance and sustain SEMAA beyond NASA funding.