

NASA SCIENCE, ENGINEERING, MATHEMATICS AND AEROSPACE ACADEMY (SEMAA)

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

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PROJECT DESCRIPTION

The NASA Science, Engineering, Mathematics and Aerospace Academy (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 delivers three core components: a set of hands-on, minds-on K-12 STEM curriculum enhancement activities, a state-of-the-art Aerospace Education Laboratory (AEL), and an innovative Family Café.

The NASA SEMAA project currently operates at 14 sites located throughout 12 states and the District of Columbia. 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; and to 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 2009, the SEMAA Project contributed to Outcome II with the following accomplishments:

- 59,016 Students, Parents/Adult Caregivers, Teachers and Outreach participants were served in FY 2009
 - 40,471 Total Students (19,717 Direct Students and 20,754 Indirect Students)
 - 204 with Special Needs and 50% of Direct Students were Female
- NASA STEM Pipeline Collaborative Activities
 - Fostered the participation of NASA SEMAA students in 50+ other STEM programs/projects, thus maximizing student exposure and interest in STEM and strengthening the national K-12 STEM pipeline
 - Participation in Moon Buggy Race, Team America Rocketry Challenge, ISS Downlinks (Expedition 18 and 19), Mission Events at several AELs (STS-119 , STS-125, and STS-126), Engineering Design Challenges, Lunar Plant Growth, AESP Workshops, NES, and the INSPIRE project

PROJECT ACCOMPLISHMENTS

APG 9ED8: Increase the number of elementary and secondary student participants in NASA instructional and enrichment activities by 10% above the FY 2007 baseline of 408,774.

- Increased the number of elementary and secondary direct student participants in NASA SEMAA by 11% from FY 2007 when 17,773 direct student participants were served to FY 2009 when 19,717 direct student participants were served

APG 9ED10: Achieve fifty percent or greater level of interest in science and technology careers among elementary and secondary students participating in NASA education programs.

- SEMAA significantly contributed to this APG by achieving an 81.2% level of interest in STEM careers among SEMAA students (6,896 out of 8,491 respondents).

In FY 2009, SEMAA accomplished the following:

- Completed the beta testing of the Return to the Moon Discovery Path Curriculum, which will not only update the SEMAA curriculum with current ESMD content but it will also directly address one of the National Research Council (National Academies) recommendations for the SEMAA Project for updating the SEMAA Curriculum Enhancement Activities

- Supported the implementation and impact studies of the third party evaluation of SEMAA by providing data and reports, training staff, participating in interviews and improving processes for conducting the studies.
- Distributed the NASA SEMAA Strategic Communication Briefing Packet containing the National SEMAA DVD, talking point inserts and the NASA SEMAA Annual Report to support SEMAA site ongoing partnership and sustainability efforts. Updated the talking point inserts to reflect the new SEMAA portal website and data in the FY 2008 Annual Report
- Transitioned to the NASA approved database system, the Office of Education Performance Measurement (OEPM) system for the collection of student participant feedback data aligned to Education Outcome II and PART measures
- 17 SEMAA educators and National SEMAA Office staff in collaboration with Network of Educator Astronaut Teachers participated in an Aerodynamics Educator Workshop at NASA Glenn Research Center July 27 through July 31, 2009. The main theme of the workshop was Aerodynamics and NASA's cutting-edge, fundamental research to help transform the nation's air transportation system, and to support future air and space vehicles. The workshop equipped participants to use students' interest in airplanes to introduce math and physics principles and problems

Return on Investment:

Based on the quarterly performance reports and data collected from the funded NASA SEMAA project sites, the following examples highlight SEMAA's Return on Investment in FY 2009...

- Former Warren County SEMAA Site student, Zachery Coleman graduated cum laude from North Carolina State University and began his career as an Aerospace Engineer at Boeing in 2009. He credits the SEMAA project with inspiring him to study Aerospace Engineering and ultimately pursuing a career in that field

"SEMAA laid the golden brick road for success in the aerospace industry for me,"

- Robert Johnson, a former SEMAA student at SECME/Tennessee State University (Nashville, TN) participated in a college internship at NASA Glenn Research Center as a STEM college student and was hired as the AEL Coordinator
- Keller Tomassi, a SEMAA graduate from the Fernbank Science Center (Atlanta, GA), enrolled at the Georgia Institute of Technology to pursue a STEM degree

PROJECT CONTRIBUTIONS TO PART MEASURES

PART MEASURE – Student Involvement: Number of elementary and secondary student participants in NASA instructional and enrichment activities.

In FY 2008 SEMAA served 40,657 K-12 student participants. In FY 2009 the project served 40,471 students resulting in a < 1% decrease compared to FY 2008

PART MEASURE – Student STEM Career Interest: Percentage of students expressing interest in science, technology, engineering, and math (STEM) careers following their involvement in NASA elementary and secondary education programs.

In FY 2009, 81.2% of respondents (6,896 out of 8,491) expressed an interest in STEM careers, representing a 29.2% increase over the FY 2008 result of 52% and a 31.2% increase over the FY 2007 baseline of 50%

PART MEASURE - Cost per participant for NASA elementary and secondary education programs:

In FY 2009, the SEMAA Project served 630 educators and 40,471 students for a total of 41,101 participants (students and teachers) served. The project operated at a total cost of \$46.55 per participant in FY09 (Annual Budget = \$1,913,369 / 41,101 Total Participants). The project also served 6,815 SEMAA parents/caregivers during the FY09 Family Cafe component and 11,730 outreach participants

IMPROVEMENTS MADE IN THE PAST YEAR

Significant SEMAA improvements during FY 2009 included:

- Migration of the public SEMAA website into the NASA portal. Made compliance improvements in order to meet NASA IT requirements for websites. Launched the new SEMAA website with streamlined text and multimedia content, resources for targeted participants (students, teachers and families) and an interactive map feature
- Improvement and standardization of the SEMAA application process in order to meet third party evaluation needs and assessed compliancy requirements for the Privacy Act and Paperwork Reduction Act
- Introduction of new technology upgrades to the AEL. The Flight Simulator experience provides to AEL users in upgraded AELs was changed from Vision Dome Projector Technology to the latest Plasma Screen Technology. The Plasma Screen Technology allows for easier implementation of NASA Flight Simulations as well as a superior image display and presentation. This upgrade also provides AEL cost efficiencies supporting NRC recommendations

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 2009, SEMAA leveraged over \$3.5 Million dollars in funds (including both financial and in-kind support) for K-12 STEM education, constituting more than a 150% match to the total project budget provided by NASA. SEMAA has leveraged over \$18 Million dollars in funding for K-12 STEM education from 2004 – 2009.

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	Provide services to 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 Contractor 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.