

Virginia Space Grant Consortium (VSGC)  
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Old Dominion University Research Foundation  
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## PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Virginia Space Grant Consortium is a Designated Consortium funded at a level of \$575,000 for fiscal year 2013.

## PROGRAM GOALS

**VSGC Goal 1 - Conduct quality scholarship and fellowship programs including a bridge program for freshman and sophomore students, research awards for undergraduate and graduate students, community college STEM scholarships and teacher education STEM scholarships.**

**1.A:** Each academic year, award students in all four categories with scholarships and fellowships. Students will be competitively selected by review panels consisting of representatives from member institutions. Metric: Review panel for each program reports on the process and total number of awards; **1.B:** Award at least the minimum amount required by NASA in scholarship and fellowships to at least 60 students each academic year. Metric: Total amount awarded to total number of students in the five scholarship/fellowship categories; **1.C:** Each academic year, provide a percentage of awards to underrepresented minority and female students that is consistent with the diversity target as established by NASA (currently 24.6%). Metric: Total awards to minority students divided by total awards to all students; **1.D:** At least 90% of students receiving research awards will attend and present at the annual VSGC Student Research Conference. Metric: Total number of research awardees presenting at conference divided by total number of research awardees; **1.E:** Longitudinally track 100% of all students receiving significant awards to identify their next step in academia or the workforce. Metric: Total number of students longitudinally tracked to next step divided by total awardees; **1.F:** At least 60% of students receiving significant awards will be employed by NASA, an aerospace contractor, higher education or other educational

institutions. Metric: Total number of students employed in these categories divided by total number of awards; **1.G**: At least 45% of undergraduate students receiving significant support from VSGC will move on to advanced education in NASA-related disciplines in their next step. Metric: Total number of students in advanced education in these categories divided by total number of awards.

**VSGC Goal 2 - Offer quality higher education programs including internship programs in partnership with our member institutions and partners.**

**2.A**: Each academic year, provide paid internships for at least four students at NASA Centers or with industry partners. Metric: Number of students placed in internships;

**2.B**: Conduct at least one annual higher education project in partnership with Virginia's community colleges. Metric: Number of collaborative projects with community colleges or the System office; **2.C**: Each year, conduct at least two higher education projects in partnership with VSGC member institutions. Metric: Number of collaborative projects with members.

**VSGC Goal 3 - Promote diversity in all programs and activities by encouraging participation by underrepresented minority and female students and faculty.**

**3.A**: Each year, conduct at least one outreach event in partnership with Hampton University (HBCU) to promote programs and opportunities to students and faculty.

Metric: One Hampton University outreach event; **3.B**: Each year, conduct at least one outreach event in partnership with a non-member minority institution to promote programs and opportunities to students and faculty. Metric: One non-member MSI outreach program;

**3.C**: Each academic year, provide a percentage of student awards to underrepresented minority and female students that meets or exceeds the diversity target as established by NASA (currently 24.6% for underrepresented minorities and 40% females).

Metric: Total awards to minorities divided by total number of awards; **3.D**: Provide at least one STEM program each year for special needs faculty or students.

Metric: Number of programs provided; **3.E**: Undertake at least one collaborative program with a non-member minority serving institution each year. Metric: Number of programs provided.

**VSGC Goal 4 – Undertake programs that foster research capabilities at our member institutions and serve as a catalyst for linking university researchers to NASA and other opportunities.**

**4.A**: Conduct a New Investigator award program each year targeting tenure track faculty who are within the first five years of their academic career. At least five awards will be given annually and the research will have NASA relevance. Metric: Number of awards provided;

**4.B**: Disseminate at least 20 research opportunity announcements to statewide networks each year. Metric: Number of announcements disseminated; **4.C**: Facilitate at least five meetings with university researchers and NASA personnel, as appropriate, resulting in at least two collaborative proposals being submitted. Metric: Number of proposals submitted;

**4.D**: Support at least two experiential student research, mission and design programs each year. Metric: Number of programs supported.

**Goal 5 – Provide quality precollege educational opportunities including professional development for precollege and pre-service educators and student-focused programs for students throughout the precollege pipeline.**

**5.A:** VSGC will provide professional development in STEM and using NASA resources to at least 40 teachers each year. Metric: Total number of teachers participating in professional development activities; **5.B:** VSGC will reach over 100 students by conducting selected student-focused programs and activities promoting participation in STEM and related careers. Metric: Total number of precollege students participating in student-focused programs; **5.C:** At least 75% of precollege educators participating in more than two days of professional development will use NASA resources in their classroom following the workshop. Metric: Total number of educators indicating they will use NASA resources in the classroom on a post-event survey divided by total respondents to survey; **5.D:** At least 60% of precollege educators receiving NASA resources or participating in VSGC-led short duration activities will use NASA resources in their classroom. Metric: Total number of educators indicating they will use NASA resources in the classroom on a post-event survey divided by total respondents to survey; **5.E:** At least 50% of all precollege students participating in VSGC-sponsored programs will express an interest in STEM careers. Metric: Total number of students indicating they have an interest in a STEM career on a post-event survey divided by total respondents to survey.

**Goal 6 - Conduct Informal Science Education programs in partnership with informal education members and partners.**

**6.A:** Sponsor at least one program each year with the Virginia Air and Space Center or the Science Museum of Virginia. VSGC will consider other appropriate informal science education opportunities as funding and partnerships permit with the goal of providing at least one other activity per year if funding and resources permit.

**Goal 7 - Serve as an effective steward of Consortium resources and a strong partner for STEM programs.**

**7.A:** Effectively leverage NASA Space Grant resources. Metric: NASA Space Grant funding will be leveraged by at least three dollars to one NASA Space Grant Dollar as evidenced in Consortium year-end Matching/Contributed Funding Report; **7.B:** Network with other Space Grants and Space Grant organizations. Metric: Evidence of networking and program partnerships; **7.C:** Network with NASA Headquarters and NASA Centers for program implementation. Metric: Evidence of networking and program partnerships; **7.D:** Build and sustain effective strategic partnerships, including relationships with state and federal legislators and officials. Metric: Evidence of state and federal support for VSGC programs and documented attendance by these individuals at select activities and events; **7.E:** Number of program partners working with VSGC each year. Metric: At least 30 non-member partners per year.

## PROGRAM/PROJECT BENEFIT TO OUTCOME (1, 2, & 3)

During FY13, VSGC received three significant awards, one related to NASA Education Outcome 1 and two related to NASA Education Outcome 2. These three awards are highlighted as one anecdote and are described in the appropriate section below along with two other program outcomes.

**NASA Education Outcome 1:** VSGC received a NASA Langley Research Center Team Award for management of the Langley Aerospace Research Student Scholars (LARSS) Program.

Based on an outstanding reputation for STEM programming, VSGC was selected by the Airport Cooperative Research Program of the National Academies' Transportation Research Board to manage its National Graduate Research Awards program. VSGC was also selected to continue management of the FAA's Design Competition for Universities, now in its eighth year.

Michael Smayda graduated with his PhD from the University of Virginia in May of 2012 and is now an aerodynamics engineer at SpaceX. He is currently running computational fluid dynamics in support of Falcon Heavy development and organizing a ground-wind loads wind tunnel test for both the Falcon 9 and Heavy vehicles. He is excited about seeing more hardware that he helped shape to be lifted off in the future, and he credits VSGC for providing support and opening doors to opportunities.

**NASA Education Outcome 2:** VSGC received two significant awards related to Outcome 2 during FY2013. For the Virginia Aerospace Science and Technology Scholars (VASTS) program, VSGC received a 'Programs That Work' award from the Virginia Math/Science Coalition. VSGC also received the Robert H. Goddard Team Achievement Award for the Virginia Space Coast Scholars program.

## PROGRAM ACCOMPLISHMENTS

VSGC actively works with its members and many external partners to accomplish Consortium goals. NASA's funding investment is heavily leveraged by external funding from federal and state agencies and other nongovernmental sources. The external funding enhanced the VSGC's ability to staff and run a wide range of programs in concert with NASA goals.

### **Outcome 1:**

#### Scholarship/Fellowship/Internships (VSGC Goals 1-3)

VSGC met all goals and objectives and in Goal 1 for conducting the scholarship/fellowship program. For the 2014-15 academic year, VSGC competitively awarded 79 scholarships and fellowships through four different programs to students attending member institutions. VSGC awarded \$305,375 in scholarships and fellowships from

NASA Space Grant funds, Consortium funds, and State matching funds (\$170,000) to students attending Virginia universities.

A total of \$200,000 went to 40 students for Graduate Research Fellowships; matching funds of \$879,980 to support graduate research awards were also provided by member institutions. \$70,375 went to nine students for Undergraduate Research Scholarships. \$25,000 was awarded to 25 sophomore and junior students majoring in STEM through the Undergraduate STEM Bridge scholarship program. \$10,000 was awarded to five community college students majoring in STEM.

During FY13, VSGC held the annual Student Research Conference at which research awardees presented their research. In April 2014, Hampton University hosted the conference and sponsored the luncheon in honor of the awardees. VSGC met the student attendance goal as 100% of research awardees attended and presented their research. The event was also attended by faculty and NASA personnel, industry representatives, and state legislators.

VSGC also provided \$49,312 in Space Grant and Consortium funding to 11 students to support internships in 2014.

- Four student internships (one spring, three summer) at NASA Langley through the Langley Aerospace Research Student Scholars Program (LARSS).
- Teacher internship at NASA Wallops Flight Facility to support summer education programs.
- Student internship at the Marshall Space Flight Center.
- Student internship at Marshall Space Flight Center's Robotics Academy.
- Student internship at the Aeronautics Academy at NASA Glenn.
- Student internship through the Space Grant Science Mission Directorate internship program at Chandra Observatory
- Student internship at Applied Physics Laboratory.

The VSGC exceeded the diversity target by awarding 35% of all direct awards to minorities and 51% to female students. All students awarded are in the longitudinal tracking system, will be tracked to their next step, and reported in the future.

#### Higher Education (VSGC Goal 2)

All objectives within VSGC's Higher Education Goal 2 were met. VSGC collaborated with several member institutions for higher education projects as described below.

The Commonwealth STEM Industry Internship Program (CSIIP) continues to address the increasing demand for skilled STEM workers in Virginia, by linking undergraduate STEM students to paid internship positions with companies throughout Virginia. CSIIP operates with support from the Commonwealth of Virginia, VSGC, in partnership with Virginia Regional Technology Councils, and in collaboration with Virginia companies, Virginia colleges, and community colleges. CSIIP was expanded to a year-round program now available to full-time and part-time students as well as recent graduates. A total of

148 companies registered with CSIIP and posted 155 internships into the online system. More than 900 student applicants were pre-screened and ready for internship placement. As of this report, 53 students have been placed in internships while others are still interviewing candidates and making internship placements.

VSGC is a partner in Old Dominion University's (ODU) Engineering Early Advantage Program for Women (EEAPW). EEAPW is a four-week paid summer head-start program for female freshman engineering majors at ODU. The event includes academic and career enhancing activities in a unique engineering setting. Many activities are based at the Virginia Modeling, Analysis and Simulation Center (VMASC). VSGC provides the student stipend for the 15 female participants.

VSGC, in partnership with Colorado Space Grant Consortium, offered a RockOn! workshop in June 2014. RockOn! is a workshop for faculty and students in which participant teams learn to build a small sounding rocket payload from kits and launch it on a sounding rocket at NASA Wallops Flight Facility. The hardware in the kit can be used on future custom RockSat payloads and possibly CubeSat flights. Full impact data will be reported by the Colorado Space Grant Consortium. VSGC sponsored one team of three students from Old Dominion University and one team of two students from Virginia Tech to participate in RockOn.

VSGC provided \$3,000 to support four ODU undergraduate student members of the Students for the Exploration and Development in Space (SEDS) organization to attend the 2013 Space Vision Conference at Arizona State University. These students will continue to provide outreach to other higher education and precollege students on the virtues of space exploration and STEM careers. VSGC will integrate these student role models into future projects as appropriate.

VSGC partnered with five member institutions including Hampton University (HBCU) and two non-member HBCU institutions, Virginia State University and Norfolk State University, to submit a successful proposal to the Space Grant Innovative Pilot in STEM Education CAN for a project providing middle-school pre-service teachers with scholarships, support, and professional development to become effective STEM teachers.

VSGC partnered with faculty and administrators from Virginia State University (VSU), a non-member HBCU, and Old Dominion University to submit a proposal to NSF's Improving Undergraduate STEM Education program to target female freshman engineering majors with retention strategies and academic support. Proposal is pending.

No funds were requested for STEM programs for students or faculty with special needs. VSGC will continue to offer this support in the future and seek partnerships in this area.

#### Research Infrastructure (VSGC Goal 4)

VSGC met all objectives in Goal 4 including disseminating more than 20 research opportunities, sponsoring experiential student research programs, and facilitating meetings to discuss proposals.

The New Investigator Program (NIP) is designed to strengthen Virginia's research infrastructure by providing startup funding to Virginia Space Grant university personnel who are conducting research that is directly aligned with NASA's mission. This opportunity is made available to those who have yet to become established researchers. Five faculty members from VSGC-member institutions received an award of \$10,000 each for their research project. Program guidelines stipulate awardees must be tenure track faculty who are within the first five years of their academic careers, and they must be U.S. Citizens. Faculty may propose research within the full range of NASA missions and activities. Proposals were reviewed by a panel comprised of VSGC Advisory Council members representing the various universities and NASA personnel. Awardees were from: College of William and Mary, Old Dominion University and the University of Virginia. List of awardees: Dr. Gary Koenig, Hierarchical Three-Dimensional Electrodes for Lithium-Sulfur Batteries; Dr. Kareem Ahmed, Flame Extinction Physics-Based Reduced Order Model for Fuel Flexible Low-Emission Combustion; Dr. Andrey Chernikov, Towards Automatic Curved Element Mesh Generation; Dr. Mumtaz Qazilbash, High Temperature Superconductivity in the Iron-based Materials; Dr. Phoebe Dreux, Using Molecular Bioassays to Assess Iron Limitation of Diatoms in the California Current System.

VSGC Director coordinates and leads a statewide small satellite working group to encourage and facilitate partnerships to grow student-led projects. Members of the group include representatives from higher education and NASA partners. These meetings have generated ideas and partnerships for future proposals. Other meetings with faculty researchers and NASA personnel were conducted. Five collaborative proposals with member and non-member intuitions were submitted.

VSGC continued to support collaboration between Virginia Tech and NASA's Johnson Space Center (JSC) that involved student projects in the area of intelligent textiles and wearable technologies for space flight. Sixteen students in two classes worked on five different projects for JSC. The projects included: a one-handed keyboard; a noise-cancelling vest for use on the International Space Station; an electronic checklist for the cuff of the space suit; a glove for testing sensors embedded in the space suit; and, a modified cargo transfer bag for dual use as a bag and wearable radiation shield. Ten of the students and two faculty advisors attended the Wearable Technology Symposium on April 21 at JSC. Each team gave a short presentation followed by a poster session with the NASA mentors. They also visited the old mission control center from the Apollo era as part of the JSC tour. The teams continued working on the projects after receiving feedback from the mentors.

VSGC provided support to Virginia Tech for a student-led team to participate in the Rock-Sat X program hosted by NASA Wallops. Funding supported 18 undergraduate students to design and build a payload. The payload will test a space pressure sensor onboard a sounding rocket. Student team members will perform all design and testing of the payload resulting in a successful installation of the experiment aboard the sounding rocket. VSGC supported the launch fee and hardware and materials.

**Outcome 2:****Higher Education (VSGC Goal 7)**

The Director and staff annually brief Virginia Congressional and state legislators. VSGC works with state officials and legislators to assist with STEM and aerospace policy advocacy. The Director serves on the Governor's Aerospace Advisory Council. The Council consists of legislative, industry, and other members. VSGC serves as a key advisor for STEM education on the council. The Director is also a member of, and co-facilitates with the NASA Langley Research Center Director, the Informal Aerospace Working Group of about a dozen aerospace sector leaders in Virginia including the NASA Wallops Flight Facility Director, the Directors of the Mid-Atlantic Regional Spaceport, National Institute of Aerospace, and the Virginia Department of Aviation as well as industry representation. The goal of the group is collaboration for STEM education and workforce development as well as aerospace advocacy for the Commonwealth including extensive planning for the Commonwealth's annual Aerospace Day and supporting events. VSGC assisted in the coordination of the aerospace sector data and messages for the meetings with state policy makers.

The VSGC Director and staff participate in other activities such as the Virginia Science Education Leadership Association, the Virginia Society for Technology in Education, and the Virginia Association of Science Teachers. State cabinet officials and state legislators have participated in VSGC programs such as the Student Research Conference, the Commonwealth STEM Industry Internship Program, and the Virginia Aerospace Science and Technology Scholars (VASTS) program. Nearly all state legislators have been active in recognizing VASTS Scholars from their districts.

**Precollege Programs (VSGC Goal 5)**

VSGC's suite of precollege programs includes projects targeting both students and teachers and aligns with NASA's areas of emphasis. Evaluation instruments and surveys were conducted with all participating teachers. VSGC met all Goal 5 objectives reaching more than 1,000 students and providing professional development to more than 750 teachers to assist them in becoming better STEM educators and effectively using NASA resources in the classroom.

The VSGC reached over 1,000 precollege students through several student-focused programs. The VASTS program is an interactive online STEM learning experience, highlighted by a seven-day residential summer academy at NASA Langley Research Center. High school juniors selected to participate in the program are immersed in NASA-related research through interaction with scientists, engineers and technologists. Top performing students in the online course are selected to attend one of three residential summer academies hosted by Langley. A total of 520 students participated in the online course and 180 attended the summer academies. The program is a partnership between the VSGC and NASA Langley with assistance from the Virginia Department of Education and industry. VASTS is modeled after the NASA-award winning Texas Aerospace Scholars program developed by NASA Johnson Space Center.

VSGC coordinated four engineering technology-themed STEM Exploratory Saturday programs for 265 middle school grade students and 248 parents through the Greater Peninsula Governor's STEM Academy in partnership with Thomas Nelson Community College (TNCC), NASA Langley Research Center, ECPI University-Newport News, and Canon Virginia.

Building on the excitement around scientific exploration missions launched from NASA Wallops Flight Facility and the Mid Atlantic Regional Spaceport, and with funding from the Commonwealth of Virginia through VSGC-member Old Dominion University, the VSGC established the Virginia Space Coast Scholars (VSCS) program. VSCS is designed to inspire high school sophomores who possess latent science and technical skills to participate in a dynamic online STEM learning experience. VSCS is an informal online learning experience highlighted by a seven-day residential summer academy at NASA Wallops Flight Facility for qualifying students. With a focus on scientific exploration, students are introduced to STEM concepts that are integral to earth and space-based missions launched or conducted from the Virginia Space Coast on the Eastern Shore. Students are introduced to the connection between science and technology for orbital and suborbital science missions, how science drives the engineering and technology designs and decisions for flying payload on high altitude research balloons, sounding rockets, unmanned aerial systems, aircraft, or medium-class rockets, and STEM careers associated with NASA missions. In 2013-14, 254 students participated in the online modules and 80 students attended two Academies.

VSGC received funding from the Commonwealth of Virginia through the University of Virginia, a member institution, for Building Leaders for Advancing Science and Technology (BLAST). BLAST is an on-campus, summer STEM experience for rising 9-10 grade high school students. Offered free, BLAST brings STEM alive through a series of innovative experiences led by university faculty and students at the University of Virginia and Virginia Tech. Demonstrations and activities showcase exciting science and engineering topics with the goal of increasing student curiosity and engagement in STEM. In 2013-14, 240 students participated in three BLAST sessions.

VSGC provided funding to the TJ Aerospace Initiative at Thomas Jefferson High School for Science and Technology (TJHST) to support the TJ SOAR (Strategic Outer-Atmospheric Aerial Reconnaissance) project. The TJ Aerospace Initiative is the student aerospace organization for TJHSST, one of the leading high schools in the nation. TJ Aerospace is formally made up of two clubs: Excelsior Aerospace Club and Rocketry Club, collectively participating in various aerospace endeavors, competitions, and outreach initiatives. TJ SOAR is a dynamic UAV platform which will be launched from a weather balloon during 2014. VSGC funding was used to source parts and supplies.

Through several programs and sponsorship of a statewide conference, VSGC provided professional development to more than 750 teachers to assist them in becoming better STEM educators and effectively using NASA resources in the classroom. Virginia Space Grant supported the annual professional development conference hosted by the Virginia Association of Science Teachers (VAST) in fall 2013. This conference is attended by

over 500 science teachers and administrators from Virginia. VSGC also exhibited and presented Space Grant programs during a breakout session.

Virginia Space Grant sponsored teacher workshops in partnership with the Virginia Air and Space Center. The workshops topics included Mars Colony and Searching for a Habitable Planet. Workshops were held in March 2014 and targeted teachers and informal educators in grades K-9 in the Hampton Roads region. Forty-nine classroom teachers and 10 informal educators participated.

VSGC partnered with NASA Glenn Research Center, NASA's 21<sup>st</sup> Century Community Learning Centers (21CCLC), NASA Langley Research Center, and the Virginia Department of Education to coordinate and host a workshop for 17 teachers and administrators from the Hampton Roads 21CCLC sites. NASA 21CCLC program has developed unique STEM challenges for the U.S. Department of Education 21CCLC sites that were piloted in fall 2013. The STEM challenges are based upon real mission data and experiences that occur during human and robotic exploration of the solar system. Educators can use three challenges for grades 5-8 and each challenge comes with an educator guide, videos and resources to help educators conduct the challenges and engage the students. VSGC Education Programs Manager Rudo Kashiri led the instruction and facilitated the workshop.

VSGC presented a GEOTREK-12 workshop and information session at the 2013 VAST Conference to more than 20 educators. VSGC also updated the GEOTREK curriculum and content during the fiscal year. VSGC supported the GEOTREK Coordinator and two GEOTREK instructors to attend ESRI's Teachers Teaching Teachers (T3G) workshop. GEOTREK's mission is to introduce K-12 educators, via face-to-face workshops and seminars, the value of geospatial technology in the classroom and the job market, as well as help them gain an understanding of our world's connectedness. All curriculum is aligned with state SOL.

Virginia Space Grant partnered with the Center for Excellence in Education (CEE) to offer a professional development experience for teachers titled Bite of Science, Dinner with a Scientist. This one-day workshop hosted by the Virginia Air and Space Center was attended by 25 teachers. Dr. Bill Moore, Geophysicist and Professor at Hampton provided the keynote presentation.

At least 90% of teachers in all VSGC professional development workshops indicated intent to use the materials received and NASA resources in post workshop surveys. VSGC will continue to survey all teachers during the academic year to measure actual use of materials. Precollege students participating in VSGC programs completed post event surveys to evaluate their experience, and to rate their interest level in STEM courses, majors, and careers. When considering student-self reported data indicating a positive interest in STEM, with at least an interest in any one individual STEM field, 100% of precollege participants expressed an interest in STEM.

### **Outcome 3:**

#### Informal Education Programs (VSGC Goal 6)

VSGC exceeded its informal education program goal by sponsoring one informal educator workshop and three additional projects in partnership with the Virginia Air and Space Center.

VSGC partnered with Old Dominion University to coordinate and host a workshop for informal educators titled, Virginia Informal Environments: Cultivating Vines of Commitment for STEM (VINES). This professional development workshop was attended by 55 education specialists at museums, zoos, parks, and historic sites across Virginia. The highly interactive, day-long workshop provided attendees with strategies and materials to promote enduring personal connections between informal education venues and their visitors. Attendees learned how to: connect the mission and values of their organization with STEM-related concepts and skills; how transformative learning experiences and role exploration promote children's motivation to pursue STEM; design a program, exhibit, or summer camp curriculum that encourages transformative learning; and identify strategies to assess the impact of education design.

VSGC sponsored the 2014 Star Grazing Night hosted by the Virginia Air and Space Center, a Consortium member. A total of 107 people attended the event. Star Grazing Night was a fusion of science and food in a festive atmosphere designed to motivate and inform the public at large about NASA missions and events. VSGC provided funding to support the Virginia Air and Space Center to plan and offer a teacher professional development workshop in fall 2013 through the Center's "Train, Teach & Involve" program. The Mars focused workshop impacted 59 fifth grade teachers in the Hampton Roads region of Virginia.

VSGC collaborated with the Virginia Air and Space Center (VASC) to submit a winning proposal to NASA to support the STEMtastic project. STEMtastic includes VSGC coordination of a one-week professional development workshop for teachers in grades 4-5, and VASC will host the workshop in July 2014 and provide follow-up support.

### PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES

**Student data and Longitudinal Tracking:** Total awards = 100; Fellowship/Scholarship/Internships = 90; Higher Education/Research Infrastructure = 10; 34% of the total awards represent underrepresented minority funding and 43% of the total awards were to female students. All awardees are still enrolled in the STEM academic program as when funded.

**Minority Serving Institutions:** VSGC partnered with five member institutions including Hampton University (HBCU) and two non-member HBCU institutions, Virginia State University and Norfolk State University, to submit a successful proposal to the Space

Grant Innovative Pilot in STEM Education CAN for a project providing middle-school pre-service teachers with scholarships, support, and professional development to become effective STEM teachers. Hampton University (HU) hosted the 2014 VSGC Student Research Conference and Luncheon. VSGC presented scholarship/fellowship and research opportunities to faculty and students at Hampton University during visits to the campus. HU hosted a lunch and learn event for undergraduate and graduate students majoring in STEM to learn about scholarship/fellowship opportunities. VSGC partnered with faculty and administrators from Virginia State University (VSU), a non-member HBCU, and Old Dominion University to submit a proposal to NSF's Improving Undergraduate STEM Education program to target female freshman engineering majors with retention strategies and academic support. Proposal is pending.

**Education Priorities Alignment:** VSGC scholarship/fellowship and higher education programs align with all of NASA's educational priorities including authentic, hands-on student experiences in science and engineering disciplines rooted in NASA-related issues, and the incorporation of real-life problem-solving and needs as context for activities. Several student research projects through the scholarship/fellowship program focused on NASA research priorities such as traditional aeronautics disciplines and climate change. Supported projects reflect diversity in institutions, faculty and student participants. Existing partnerships with community colleges are strengthened through projects such as the GAITE Saturdays and the outreach to community colleges through the ODU Small Satellite Technologies Laboratory project.

VSGC partners with Thomas Nelson Community College (TNCC) to offer credit for the VASTS online course and the VASTS Summer Academy. TNCC also hosted one of the Greater Peninsula Governor's STEM Academy (GPGSA) Engineering Technology Exploratory Saturday events. VSGC collaborated with the Virginia Community College System and three community colleges on an NSF-funded project to support geospatial technology pathways. Through this NSF funding, VSGC partnered with NASA Langley to host a service learning project where community college students conducted a tree mapping and assessment project.

In support of a NASA Space Grant area of emphasis, VSGC provided the New Investigator Program to strengthen Virginia's research infrastructure by providing startup funding to early career faculty from member institutions conducting research that is directly aligned with NASA's mission. VSGC's suite of precollege programs includes projects targeting both students and teachers and aligns with NASA's areas of emphasis. Several projects engage middle school students in hands-on activities and exposure to NASA scientific and technical expertise. Follow-up surveys were conducted of all participating teachers. One Space Grant-funded project provided Saturday programs for high school students on a college campus with the objective of increased enrollment in STEM disciplines and interest in STEM careers.

## IMPROVEMENTS MADE IN THE PAST YEAR

- FY13 was an excellent year for VSGC externally-funded programs. Five proposals were awarded out of six submitted. Three proposals are still pending and one proposal was declined. Total amount awarded to VSGC was \$1.86 million.
- Participation in VSGC programs by state legislators and members of the Governor's Cabinet continues to grow.
- VSGC is seen as a state leader for STEM educational programs by state educational agencies, the Governor's office, and the Virginia General Assembly.
- Addition of a full-time Media Specialist to the VSGC staff supported from non-NASA funding. The Media Specialist provides graphic arts, video production, website development, and photography support.
- Excellent external evaluations for both the Virginia Aerospace Science and Technology Scholars and Virginia Space Coast Scholars programs.
- VSGC increased awards to underrepresented minorities and female students. For direct funded students, VSGC awarded 51% of awards to female student and 35% to minorities.

## PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

VSGC members and partners play active roles in project development and implementation. In some cases, VSGC provides funding directly to member institutions for projects and the member institution has the lead. In other projects, VSGC staff may take the lead for project coordination working closely with partners for project execution. For competitive opportunities, the VSGC uses a panel of member and sometimes external representatives to make selections of which students or faculty to fund.

**VSGC Affiliate Members include:** College of William and Mary (higher education), Hampton University (higher education), Old Dominion University (higher education), University of Virginia (higher education), Virginia Polytechnic Institute and State University (higher education), NASA Langley Research Center (NASA Center), NASA Goddard Space Flight Center's Wallops Flight Facility (NASA Facility), Science Museum of Virginia (informal education), State Council of High Education for Virginia (state agency for higher education), Virginia Community College System (higher education), Virginia Department of Education (state agency for precollege education), MathScience Innovation Center (informal education), Virginia Air and Space Center (informal education), and Virginia's Center for Innovative Technology (statewide nonprofit that creates technology-based economic development strategies to accelerate innovation and the next generation of technology and technology companies).

VSGC scholarships and fellowships are open only to students attending affiliate institutions, including all 23 community colleges. Internship support is available to students attending any Virginia higher education institution. VSGC partners not only with affiliates but with many other organizations and institutions including industry and NASA Centers on projects. NASA Langley and NASA Wallops were key partners in several VSGC projects.

**The National Space Grant Office requires two annual reports, the Annual Performance Data Report (APD) and the Office of Education Performance Measurement System (OEPM) report. The former is primarily narrative and the latter data intensive. Because the reporting timeline cycles are different, data in the two reports may not necessarily agree at the time of report submission. OEPM data are used for official reporting.**