

Texas Space Grant Consortium (TSGC)
University of Texas at Austin
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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 Texas Space Grant Designated Program was funded at a level of \$575,000 for fiscal year 2012

PROGRAM GOALS

The TSGC strategic goals align with NASA's Educational Outcomes. Our goals and programs serve multiple constituencies with emphases on customer focus, NASA-related content, the STEM (Science, Technology, Engineering and Math) pipeline, increased diversity, effective evaluation of programs, the development of partnerships, and program sustainability. NASA's Educational Outcomes and how TSGC's goals support them are summarized below.

NASA Outcome 1

Contribute to the development of the STEM workforce (Employ and Educate)

TSGC Goal A: Increase and Enhance Minority / Underserved Participation in our programs:

In 2012 we had 66 directly funded students in our Fellowship/Scholarship, Higher Education and Research infrastructure categories. (16 females and 50 male) 24 % were female. Our female percentage is slightly down from 2011, however 40.9% were minorities (27 minorities, 1 other, 11 Asian, 27 Caucasian), which is an increase from 2011. TSGC has a primary focus on increasing the number of minorities and females in its programs and increase quantity and quality of underrepresented minorities and females participating in our programs.

TSGC Goal B: Fellowship, Scholarships and Longitudinal Tracking: We have successfully tracked 100% of our students in 2010 and 2011. On average, since 2006 we have been able to track 86% of our awardees.

TSGC Goal C: Workforce Development and + Higher Education: Our ongoing *Design Challenge* matches design problems specified by NASA JSC engineering personnel with capstone engineering design classes at our affiliates. During Fall 2012/Spring 2013, twelve design teams and about 80 JSC mentors, topic providers, judges and NASA Showcase

participants were involved in this program. NASA JSC provided a list of potential research topics that were circulated to all affiliate representatives. We sent additional information that gave details about the awards, stating that preference would be given to minorities and women. Affiliate representatives were tasked with advertising the awards on their campuses. We also provided information on the program to the minority and women student organizations in Texas.

TSGC Goal D: *Research Infrastructure:* (TSGC New Investigator Program). We competitively award research initiation grants to assist new faculty members / researchers at our affiliates in the initiation of research aligned with NASA's strategic plan. We awarded one \$10K grant in 2012.

NASA Outcome 2

Attract and retain students and teachers in STEM disciplines (Educate and Engage)

TSGC Goal E: *Precollege and K-12:* Our efforts in this area focus primarily on Texas educators, and through them, their students. Our strategy focuses on enhancing K-12 educator knowledge in STEM disciplines and increasing underrepresented and underserved participation. We continue to offer the *LiftOff* summer program for teachers in conjunction with NASA JSC. In addition we are conducting *Science Saturdays* by inviting all students, and teachers (approximately 3000) who participated in *Summer Of Innovation (SoI)* camps in the summer of 2012 to a *NASA Science Saturday*, hosted by The University of Texas Pan-American, (one of 19 TSGC MSI affiliates). The students and their families conduct hands-on activities that support STEM education. Four teachers from each school district will conduct hands-on NASA activities in support of *Summer of Innovation 2013*.

NASA Outcome 3

Build strategic partnerships and linkages between STEM formal and informal education providers (Engage and Inspire)

TSGC Goal F: *General public, informal education and public awareness:* In this area, we leverage our contributions by adding speakers and resources to existing STEM education programs offered by other organizations. As examples of this effort, the TSGC director served as a technical judge for the central Texas regional *First Lego League* (FLL) competition in December 2008, and TSGC staff supported the 2013 NASA Day at the Texas State Capitol with rocketry activity for school children in March

TSGC Goal G: *Internal management:* We continue to focus on management efficiency and effectiveness in all of our activities. We are currently updating our strategic plan to assure clear alignment with NASA strategic goals. As an example of increased management efficiency, we have one affiliate meeting and one board meeting a year to reduce travel costs. Additional communications among affiliates utilize email, teleconferencing, and web-conferencing.

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

NASA Outcome 1

Contribute to the development of the STEM workforce (Employ and Educate)

To demonstrate the impact of the Fellowship and Scholarship programs, we provide quotes from 2012 participants.

“Participation in this program provided a valuable assistance for financing my college education. It also motivated me to pursue more degrees in aerospace related fields and conduct aerospace-related research throughout my education. I have continued my educational career by pursuing Master's and Doctoral degrees. The research I have been conducting over the course of my educational career seeks to develop and improve future space propulsion systems.

“Arturo Acosta-Zamora, Columbia Crew Memorial Scholarship-UT El Paso

“Participating in the Design Challenge Program was awesome! The team and I got to work on a real project that my get to fly in space. Working on a real project with a NASA employee as your mentor is great! The program is a win-win-win scenario for all parties involved. Students get a real project to gain work experience, NASA gets fresh ideas on tough problems and gets younger generations excited about working in the aerospace industry! I loved having all the NASA folks there critiquing and cheering us on. I enjoyed the experience and hope that the University of Houston continues to participate in this competition.” *Lazaro Danny Rodriguez, University of Houston Fall 2012 Design Challenge Competition*

NASA Outcome 2

Attract and retain students and teachers in STEM disciplines (Educate and Engage)

TSGC's flagship K-12 program focuses on teacher education to use the leverage of excited teachers to help fill the STEM pipeline. Since 1990, TSGC has conducted an annual weeklong summer teacher workshop, *LiftOff*, at NASA JSC. Below is a highlighted quote from an educator who attended in 2012.

“Wow! *LiftOff* was such an amazing experience!! I'm still processing all the activities & information!! This was truly the BEST staff development I've ever experienced! THANK YOU! I taught a 6 hour workshop for our Gifted and Talented (GT) teachers on August 2nd using our *LiftOff* materials and it was a hit! I shared PowerPoint presentations, taught the moon phase bracelets, Solar System in your pocket and a bunch more! Everyone was thrilled! It was the easiest workshop I've ever prepared!! As I mentioned earlier, all of our elementary schools have a pull-out GT program and the theme for next year is "Exploring Systems in Space!! (How awesome is that?)” *Wendy Brake, 2012 Liftoff educator attendee.*

NASA Outcome 3
**Build strategic partnerships and linkages between STEM formal
and informal education providers (Engage and Inspire)**

A couple of examples of a successful measurable outcomes: As the primary partner with the Rio Grande Science Association's 2012 *Summer of Innovation (SoI)* project "Imagine Now...Innovate for the Future" TSGC assisted with training 148 educators who conducted NASA-themed camps with 2,551 underrepresented and underserved students. Three of the four program instructors were TSGC personnel. During an independent evaluation of the program, educators trained reported a 75% increase in their knowledge of STEM education and engagement as a result of *SoI* training. TSGC has assisted RGVSA in obtaining additional funding for summer camps and Family Science Recruitment events. This program has been highlighted nationally at the *Congress Lunch and Learn* and is currently expanding to reach *Boys and Girls Clubs* throughout the Rio Grande Valley.

The *LiftOff* Summer Institute gives priority to teachers who reach underrepresented and underserved audiences, 30% of the attendees report their students are 80% minority and over 90% on free or reduced lunch. These educators used *LiftOff* materials with over 1,500 students in their respective schools.

PROGRAM ACCOMPLISHMENTS TO OUTCOME 1, 2, 3

Outcome 1 - NASA Outcome 1
Contribute to the development of the STEM workforce (Employ and Educate)

TSGC Goal B - Fellowship and Scholarships and Longitudinal Tracking: TSGC annually awards 20 to 25 \$5000 graduate fellowships, 10 to 15 \$1500 Columbia Crew Memorial STEM undergraduate scholarships, and 10 to 20 Design Challenge Scholarships. A three person committee (two members from MSIs) selects the recipients each year. In 2012, we received 360 online applications and awarded 13 Scholarships (4 females, 9 males) (6 minorities, 4 Asian, 3 Caucasian), 21 Fellowships (6 females, 15 males) (7 minorities, 1 Asian, and 13 Caucasian). We also awarded 12 Design Challenge Academic Scholarships (10 males, 2 females, 5 Hispanics, 4 Caucasian, 3 Asian) and 3 NASA Academy students (2 females, 1 male, 1 Hispanic, 2 Caucasian). Seventeen additional students received team funding through the *Design Challenge*. (13 males, 4 females, 4 African Americans, 3 Asians, 6 Caucasian, 4 Hispanic).

- **Fellowship and Scholarships and Longitudinal Tracking:** We track students funded in previous years. 41 TSGC funded students were tracked as they progressed in FY12 (SG participation supported from FY06-FY12 funds)
 - 20 are pursuing advanced degrees in STEM disciplines
 - 2 accepted STEM positions at NASA contractors
 - 3 accepted STEM positions in industry
 - 1 accepted a position at NASA
 - 2 accepted STEM positions in K-12 academia
 - 7 accepted STEM positions in academia
 - 6 went on to positions in non-STEM disciplines

TSGC Goal C- Workforce Development and Higher Education: Our *Design Challenge* matches undergraduate student design teams from TSGC affiliates with NASA mentors and real-world space-related design projects. Since 2002, the program has supported NASA mission-related research activities through student design projects with 218 design teams. In addition to student designs, the program has resulted in the development of interdisciplinary space-related courses at both introductory and advanced levels. During FY 2012-2013, 12 teams at 6 TSGC affiliates participated and four affiliate institutions developed courses that directly incorporated the *Design Challenge* into their degree plans. During FY 2012-2013, 39 students participated in the program (7 female, 32 male) (17 minorities, 12 Caucasian, 8 Asian, 2 other). (43.5% minority participation).

TSGC Goal C - Higher Education Proposal Opportunities: We competitively award new higher education projects to faculty and staff members at our affiliates at a \$15K level matched with \$15K from their home institutions. In 2012, we awarded one new project Texas A&M Commerce, “*Development of an On-line Introductory Astronomy Course with On-line Laboratory at Texas A&M University - Commerce*” (1 Male, Caucasian).

TSGC Goal D - Research / New Investigator Program: TSGC provides research start-up funding of \$10K, matched by the recipient’s home institution, to two to five new faculty each year. These funds are awarded competitively to young investigators starting space-related research programs. In 2012, two new Research grants were awarded. University of Texas at Tyler “*Drug Delivery Model Using Molecular Dynamics Computation.*” (1 Female, Asian), University of Houston – “*Advanced Epoxy Resins for Space Applications*” (MSI affiliate, 1 Female, Caucasian)

NASA Outcome 2

Attract and Retain students and teachers in STEM disciplines (Educate and Engage)

TSGC Goal E - K-12 Education Program: TSGC’s K-12 program focuses on teacher education to use the leverage of excited teachers to help fill the STEM pipeline. Since 1990, TSGC has conducted an annual weeklong summer teacher workshop, *LiftOff*, at NASA JSC. *LiftOff* emphasizes STEM learning experiences by incorporating a space science theme supported by NASA missions. Teacher participants are provided with information, materials, and experiences through hands-on activities and field trips. The theme for *LiftOff 2012* was “*Space Innovations and Exploration*”. 50 teachers attended the weeklong workshop. Of the total, 37 were female and 13 male, (12 minorities: 10 Hispanic, 2 African American and 38 Caucasian) (24% minority, 74% female). The teacher features (sharing of lesson plans among educator participants) and opportunities to interact with scientists and engineers dedicated to space missions are highlights for the educators attending. *LiftOff* Alumni Teachers conduct space-related training sessions which reach approximately 2,000 Texas teachers annually.

TSGC Goal E - K-12 Education Grants: TSGC provides K-12 Education grants matched by the recipient’s home institution, to two to five affiliate faculty each year. These funds are awarded competitively. In 2012, we awarded 3 K-12 projects at \$15K each. University of Texas at Austin “*Preparing Teachers and students for the 21st Century through emerging Technology*”

based Professional Development” (1 Female, Asian, Disabled); Austin Planetarium, “*Mobile Planetarium Outreach Program*” (1 Male, Caucasian), San Jacinto College - “*Space Settlement Design Competition*” (MSI Affiliate, 1 Female, Caucasian).

TSGC Goal E – *Teacher Professional Development- Summer of Innovation:*

In spring of 2011, the Rio Grande Valley Science Association was awarded one of the national NASA *Summer of Innovation* grants with TSGC as the primary partner. TSGC led the professional development of formal and informal educators for *Summer of Innovation* 2011 and 2012 148 teachers were trained in four NASA content strands to prepare them to conduct summer camps for youth. Over 2,700 youth were reached in summer 2012. In addition to the training for summer camps, teachers participated in professional development to expand and enhance their earth and space knowledge to better prepare them to teach in the classroom. The TSGC Outreach Coordinator, Margaret Baguio, was asked by Leland Melvin to participate in NASA’s *Congressional Lunch and Learn* panel in Washington DC, highlighting the Texas *SoI* successes. TSGC is assisting with two multi-day training sessions for teachers and training for informal educators who lead the *Boys and Girls Clubs* in the summer 2013.

TSGC Goal E - *Teacher professional Development short term activities:*

As a result of TSGC’s history of activities in STEM education, we are often contacted to conduct STEM training activities for teachers. During the 2012-2013 grant year, we conducted workshops at The *National Science Teacher Association* (NSTA) meeting for approximately 40 teachers and assisted in the NASA booth answering questions and distributing educational materials. Other short term teacher development activities include a 3-hour short course the *Conference for the Advancement of Science Teachers* (CAST) (30 participants), two one-hour workshops for 60 educators, the *Space Exploration Educator Conference* (20 participants), *Rio Grande Valley Mini-Cast* (25 participants), Gidden Elementary (30), and the *Texas Regional Collaborative for Science and Math* (24 participants).

NASA Outcome 3

Build strategic partnerships and linkages between STEM formal and informal education providers (Engage and Inspire)

TSGC Goal F – *Informal Education:* Our goal in this area is to promote STEM education, increase public awareness of STEM initiatives and demonstrate program successes. We continue to collect “Success Stories” to highlight the activities and accomplishments of students and teachers that have participated in our programs. We have collected over 100 success stories to date. We maintain an extensive website (www.tsgc.utexas.edu) and a TSGC fan Facebook page ([http://www.facebook.com/pages/NASA-Texas-Space Grant/286095539201?v=wall](http://www.facebook.com/pages/NASA-Texas-Space-Grant/286095539201?v=wall)) with over 950 fans to date. TSGC continues to host the “*Ask-A-Scientist*” link on the consortium website which answers space-related questions provided by teachers, students, and the general public. Questions come in daily. We provide interesting and engaging interactive educational space related experiences through the TSGC website and newsletter “*Voyage to Spread Space Excitement*” reaching over 2,500 monthly. Our flagship K-12 program, the *LiftOff* Summer Institute continues to impact teachers all over the state and nation. Teachers are now sharing their expertise at area Science Nights, Career Days, and Regional and State Conferences. In addition, TSGC has taken the lead in connecting informal education organizations, such as the *Boys and*

Girls Clubs and 4-H with the *Summer of Innovation Program*. We participated in the *NASA Day at the Texas State Capitol* and provided hands on activities to approximately 800 attendees.

In 2012, TSGC sponsored an event at the University of Texas - El Paso, “*The Space Science Day*”, at El Paso Science Center. Hands-on activities reached over 750 school children and 1275 people altogether. Astronaut Danny Olivas gave a speech to the crowd, read to the younger kids, and signed autographs. Attendees participated with museum exhibits and viewed displays.

Outcome 3 – TSGC Goal G - *Management and Infrastructure*: We continue to seek ways to manage our program activities more efficiently. We review our strategic plan annually, seek external support, require matching from affiliates on most of our programs, and augment activities initiated by other groups whenever possible. We leverage programs wherever possible.

Student outreach STEM initiatives: TSGC collaborated with the University of Texas Center for Space Research to sponsor the *NASA ROSES Summer Internship* program for high school students. This competitive program offered 12 high school students the opportunity to work beside scientists and engineers in a university setting on four NASA satellite missions. The program involved climate education and analysis of satellite data. The students also conducted space science hands-on activities led by TSGC staff and *LiftOff* alumni teachers.

TSGC personnel participated in several elementary and high school programs both short term and long term in 2012. Below we list the name of the activity followed by the number of students impacted. A number without a word following it indicates students only. A number followed by “participants” indicates a mix of students, teachers, and parents; *McNeil High School STEM Academy* (20); *Boy Scout Jamboree* (60); *Chisholm Trail Middle School* (30); *Bridgepoint Elementary Science Day Workshops* (44); *Spring Hill Elementary* (200 participants). *Fern Bluff Elementary* (200 participants), *Deer Creek Elementary Family Science Night* (300 participants), *Earth Science Week Career Fair* (300), *Eanes Elementary* (90), *Expanding Your Horizons* (60); *Women in Astronomy* (75 participants); *LiftOff Teacher Student programs* (5280 – the average of 120 students per *LiftOff* teacher is derived from follow-up questionnaires filled out by the teachers); *Briscoe Elementary* (250 participants); *SoI* site visits (450); *Texas School for the Blind* (14); *Austin Museum Day* (350 participants), *Steiner Ranch Elementary* (500). In total, these activities reached more than 7000 students, teachers, and parents.

TSGC partners and collaborates with numerous organizations each year. In these collaborations, we have trained informal educators, distributed materials to the general public, and conducted standards-based educational activities for students, parents, and the general public. In 2012, TSGC hosted and participated in the following informal education activities: *Environmental Institute Lecture Series* (300), *Austin Nature and Science Center* (100 participants), *Space Night with Austin Science and Nature Center* (50), *Earth Science Week Career Fair* (350 middle school students), *Texas Agri-life Extension Service* (25 informal educators), *AmeriCorp* (25 teachers), and *World Space Day* (150). These activities reached more than 1200 individuals.

PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES

Student data and Longitudinal Tracking: Student Data and Longitudinal Tracking: Total awards = 65; Fellowship/Scholarship = 65, Higher Education/Research Infrastructure = 65 ; 26 of the total award represent underrepresented minority F/S funding. During the FY12 program year 20 students are pursuing advanced degrees in STEM disciplines, 2 accepted STEM positions at NASA contractors, 3 accepted STEM positions in industry, 1 accepted a position at NASA, 2 accepted STEM positions in K-12 academia, 7 accepted STEM positions in academia, and 6 went on to positions in non-STEM disciplines. The remaining students have not yet received the degree that they were pursuing while they received their Space Grant award.

Minority Serving Institution Collaborations: The Education and Outreach staff of TSGC supported programs and proposals by affiliates, institutions, and partners that serve underrepresented and underserved populations. Minority Serving Institution involvement in our programs and proposals is one of our main focuses. In our Fellowship / Scholarship Selection Committee, two of the three members are from MSIs (U. of Texas El Paso and Texas A&M Kingsville). The other committee member is from Texas Tech.

We continue to contact as many of the student chapters of minority and women student organizations at our affiliates as we can find contact information for. We work via the internet and through our affiliate representatives. Our initial efforts have focused on student chapters of the National Society of Black Engineers (NSBE) [18], the Society of Hispanic Professional Engineers (SHPE) [18], Pi Sigma Pi Minority Academic Engineering Society [2], and the Society of Women Engineers (SWE) [17]. The numbers in brackets after each society name is the number of Texas Space Grant affiliates that have a chapter of that society.

In addition to the above projects, we have an ongoing \$50K two-year MSI focused project at Prairie View A&M University entitled “*Space Exploration Software Simulation Curriculum and Student Training*” that spans the period from September 2011 to August 2013. Also, the U. of Texas Pan American and the U. of Texas at Austin are intimately involved with the *Summer of Innovation Program* managed by the Rio Grande Valley Science Association (RGVSA).

We continue to partner with Citizens Schools, a nationwide organization that partner with middle schools to expand the learning day for children in low-economic communities. Our collaboration with the Rio Grande Valley Science Association (RGVSA) provided NASA resources to young Hispanic girls and “Girls in Science” camp co-sponsored by TSGC and RGVSA and has expanded programs for teachers, students and collaborations in the underserved area of Texas along the Mexico border. Programs with The Texas School for the Blind and Visually Impaired offered NASA materials to students, staff, and teachers who serve this underrepresented audience.

NASA Education Priorities

In this section, we state a NASA Education Priority in italics followed by a brief description of how we focus on that priority in our programs.

Authentic, hands-on student experiences in science and engineering disciplines – the incorporation of active participation by students in hands-on learning or practice with experiences rooted in NASA-related, STEM-focused questions and issues; the incorporation of real-life problem-solving and needs as the context for activities.

- TSGC provides support for the NASA High School Internship Program at the UT Center for Space Research. Students are mentored by project scientists and work on analyzing NASA satellite data.
- Texas Space Grant Design Challenge Program - matches undergraduate student design teams from TSGC member institutions with real-world space related design projects provided by the NASA JSC community.
- TSGC supports two to three smaller higher education projects each year and provides supplemental funding for student teams flying experiments on NASA's microgravity aircraft and supports student rocketry organizations.
- TSGC provides student support NASA Internships and NASA Academies.

Diversity of institutions, faculty, and student participants.

- Diversity: During the past year TSGC has continued to engage diverse audiences through student programs, teacher professional development, and with institutions who serve diverse populations. We submitted a midterm Consortium Improvement Plan in early 2013 that addressed how we plan to increase our minority involvement in our programs. In addition, we modified our scholarship program by merging the Columbia Crew Memorial Scholarship and our STEM Scholarship (now STEM Columbia Crew Memorial Scholarship) and increased the funding level from \$ 1000 to \$ 1500. Activities to increase minority participation were initiated about one year before the midterm Consortium Improvement Plan was required by NASA HQ. The 40.9% minority participation for the 2012-2013 year indicates that our activities are being successful.

Engage middle school teachers in hands-on curriculum enhancement capabilities -- through exposure to NASA scientific and technical expertise. Capabilities for teachers to provide authentic, hands-on middle school student experiences in science and engineering disciplines.

- Each summer, TSGC conducts a weeklong summer teacher workshop, *LiftOff*, at NASA JSC. *LiftOff* emphasizes STEM learning experiences by incorporating a space science theme supported by NASA missions for middle school teachers. This train-the-trainer workshop reaches many teachers who are not able to physically attend *LiftOff* as each attendee trains 20 teachers after returning to their home district. .
- TSGC provides \$15K K-12 Education grants, matched by the recipient's home institution. These grants focus on developing materials for K-12 educators.
- NASA JSC has merged the Middle School Aerospace Scholars program with the *LiftOff* Summer Institute for 2013.
- Teacher professional development short term activities were described earlier in this report,

Summer opportunities for secondary students on college campuses -- with the objective of increased enrollment in STEM disciplines or interest in STEM careers.

- Annual participation in the Science and Engineering Festival which is a publically offered weekend of STEM booths, hands-on activities and educational programs.
- NASA ROSES Summer Internship Program - This competitive program offered 10 high school students the opportunity to work beside scientists and engineers in a university setting on four NASA climate education and analysis satellite missions while also conducting space science hands-on activities led by TSGC staff and *LiftOff* alumni teachers.
- Elementary and high school programs both short term and long term which are highlighted in this report.

Community Colleges – develop new relationships as well as sustain and strengthen existing institutional relationships with community colleges.

- 5 out of our 50 member affiliates are community colleges. Some of our scholarships are awarded to community college students, and one of our competitive \$15K project awards went to a community college (San Jacinto College).

Environmental Science and Global Climate Change – research and activities to better understand Earth's environments.

- Annual participation in Earth Science Week career fair.
- NASA ROSES Summer Internship Program - Ten high school students worked beside university scientists and engineers on four NASA climate education and analysis satellite missions while also conducting space science hands-on activities led by TSGC staff and *LiftOff* alumni teachers.

Enhance the capacity of institutions to support innovative research infrastructure activities -- to enable early career faculty to focus their research toward NASA priorities.

- Through our competitive New Investigator Program, we provide research start-up funding of \$10K, matched by the recipient's home institution, to between 1-5 new faculty each year. During 2012, we provided two such grants.

IMPROVEMENTS MADE IN THE PAST YEAR

The University of Houston has become a Minority serving Institution so we now have 19 MSIs out of 39 academic affiliates.

NASA JSC has merged the Middle School Aerospace Scholars program with the *LiftOff* Summer Institute for 2013 in recognition of *LiftOff*'s 23 year history of effective high quality teacher STEM enhancement programs.

In our efforts to leverage our contributions in General public, informal education and public awareness, we e-mailed hundreds of student organizations all over Texas about our programs, and we continue to add speakers and resources to existing STEM education programs offered by other organizations.

We were successful in our efforts to increase and enhance minority / underserved participation in our programs. In 2012, we had 65 directly funded students in our Fellowship/Scholarship, Higher Education and Research infrastructure categories (27 minorities, 1 other, 10 Asian, 27 Caucasian). We increased minority participation from 23.7% to 40.9 %. Our 2013 goal is to maintain this level of minority involvement in our programs. We continue to focus on increasing our female participation in our programs.

Major improvements in K-12 programming include engagement of underrepresented and underserved populations, expanded partnerships with those that reach underrepresented and underserved audiences, and strengthening collaboration with NASA Centers. The Education and Outreach staff of TSGC supports programs and proposals by affiliates, institutions, and partners that serve and engage underrepresented and underserved populations. Our partnership with the Rio Grande Valley Science Association (RGVSA) provided NASA resources to 500 pre-service and in-service teachers along the Texas/Mexico border of south Texas. While 75% of the teacher participants were minority, 99% of the students they reach are Hispanic and qualify for free or reduced lunch. During the Summer of Innovation collaboration, 148 formal educators and 4 informal educators received up to 40 hours of professional development and conducted NASA-themed 30 hour camps for 2,531 youth. TSGC was responsible for selecting NASA materials and provided 3 of the 4 professional trainers for content strands to prepare teachers to lead these summer programs. Two camp strands – Girls in Science and Underwater Robotics were for girls in Grade 4-9. TSGC’s focus for STEM programs at local schools for science days and family science nights gave priority to schools serving underrepresented and underserved audiences reaching over 1,000. 10 classroom teachers from the Rio Grande Valley that reach underrepresented and underserved audiences were selected for The LiftOff Summer Institute. This helps to bridge the *SoI* programs and classroom education. A collaboration with the Texas School for the Blind led to a multi-day space camp for main-streamed visually impaired students.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

TSGC is structured to provide strong management input and oversight by representatives of its affiliate institutions. Affiliate representatives play a vital role in defining Consortium operations, goals, and funding distribution and are provided with many avenues for participation in consortium management and programs. They can stand for election to the Board of Directors (BOD), be a member of a consortium committee, advertise and encourage students to apply for our scholarships, fellowships, and NASA internships, distribute information about funding opportunities, review scholarship / fellowship applications, review proposals, assist in tracking program participants, and help to recruit and keep students involved in STEM activities. Below we list all TSGC affiliate members (MSIs are indicated by boldface type).

Four Year University Affiliates - 34

Angelo State University, Baylor University, Lamar University, Prairie View A&M University, Rice University, Southern Methodist University, Sul Ross State University, Tarleton State University, Texas A&M University, Texas A&M University Commerce, Texas A&M University Corpus Christi, Texas A&M International University, Texas A&M University Kingsville, Texas Christian University, Texas Southern University, Texas State University –

San Marcos, Texas Tech University, Trinity University, University of Dallas, **University of Houston**, **University of Houston Downtown**, **University of Houston Clear Lake**, University of North Texas, **University of Texas Pan American**, University of Texas at Arlington, University of Texas at Austin, University of Texas at Dallas, **University of Texas El Paso**, UT Health Science Center Houston, **UT Health Science Center San Antonio**, UT Medical Branch Galveston, **University of Texas San Antonio**, UT Southwestern Medical Center, University of Texas at Tyler

Community College Affiliates - 5

San Jacinto College, **Houston Community College**, **Austin Community College**, **El Paso Community College**, McLennan Community College

Industry / State / Non-profit Affiliates - 11

Austin Planetarium, Bob Bullock State History Museum, Don Harrington Discovery Center, Lockheed Martin, Office of the Governor, Southwest Research Institute, TX Higher Education Coordinating Board, United Space Alliance, University Space Research Association, Girlstart, Texas Medical Center

PARTNERSHIPS AND COLLABORATIONS

In Fall 2012, TSGC and NASA JSC personnel began to expand the scope and reach of the Design Challenge while simultaneously making it more cost-effective. The goal is to make problems of importance to NASA available to engineering capstone design classes at universities, at first in a Texas-focused pilot program and then across the nation. NASA would provide problems and mentors for engineering design teams, and would, it return, receive the results of the student design efforts. The program has its roots in the TSGC Design Challenge and in ongoing capstone design collaborations between JPL and the U. of Texas at Austin. A secondary goal of the TSGC-JSC collaboration is to facilitate the identification and formation of groups of experts (Interest Clusters) in technical areas of importance to NASA.

The NASA JSC CAREER EXPLORATION PROGRAM brings high school students from area minority campuses to attend the Design Challenge Showcase. The goal is to show high school students "what college has to offer" by viewing and interacting with talented and enthusiastic university / Design Challenge participants. These students attended the fall 2012 showcase and will be attending the 2013 spring showcase.

Other partnerships and collaborations in 2012-2013 include local schools surrounding the greater Austin area including *Fern Bluff Elementary*, *Round Rock Middle School*, *Austin Girls School*, and the *STEM Center for Excellence* where we conducted teacher and student workshops. We partnered with 9 school districts in the Rio Grande Valley which include Valley View, Pharr-San Juan-Alamo, Edinburg, Harlingen, McAllen, Donna, Mission, Weslaco, and Brownsville, and the *Boys and Girls Clubs* through this south Texas region to provide NASA resources, teacher professional development, and support for student camps during the Summer of Innovation program. Our partnership with the *Texas School for the Blind and Visually Impaired (TSBVI)* led to a multi-day space camp with visually impaired students from across the state. *TSBVI* transported youth to Austin for the camp and housed them in dorm facilities.

The National Space Grant Office requires two annual reports, this 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.