Tennessee Space Grant Consortium
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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 Tennessee Space Grant Consortium is a Designated funded at a level of $785,000 for fiscal year 2009.

PROGRAM GOALS

The goals of the Tennessee Space Grant Consortium are in line with the national goals and objectives of the National Space Grant College and Fellowship Program. We aim to promote science, technology, engineering and mathematics throughout the State of Tennessee at all educational levels. We work with schoolchildren, undergraduate and graduate students, K-12 teachers and preservice teachers, college and university faculty and members of the general public to support and encourage knowledge of and opportunities within STEM areas to benefit our state, NASA and our country as a whole.

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

Outcome 1*: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals*.

Bryan Gaither, a recent graduate in physics at Austin Peay State University, has completed his robotic sensing platform, dubbed "Frank." Bryan began his from-scratch fabrication of Frank three years ago with support from the Tennessee Space Grant Consortium. His involvement with this project and others that he participated in for three years in the NASA Robotics Program at Goddard Space Flight Center have cemented Bryan's desire to pursue Mechanical Engineering in graduate school. He is currently employed at Johns Hopkins University in Baltimore as he makes plans for graduate study.

At East Tennessee State University, Space Grant funds have been used to study Photometric Monitoring of Post-AGB and Pre-Planetary Nebulae Stars: Extension to Southern Hemisphere Objects. Aside from research goals, another goal is to provide students with training and experience and encourage them to seek a career in STEM. During the 2009 – 2010 grant year, a female undergraduate student had the opportunity to work on this project. She graduated in May, 2009 with a B.S. degree in Physics. This student is now employed in the area of astronomical data analysis.

PROGRAM ACCOMPLISHMENTS

Outcome 1

NASA Summer Programs

Metrics from Proposal- "Success will be measured by tracking the participating students through their future educational and career endeavors. It is our goal that most students remain active in STEM fields."

Outcomes- We were fortunate to have had ten students from Tennessee colleges and universities selected to participate in NASA summer programs. All of these students, who are still enrolled in their degree programs, had positive experiences at their respective summer programs.

Photometric Monitoring of Post-AGB and Pre-Planetary Nebulae Stars: Extension to Southern Hemisphere Objects- This project, conducted at East Tennessee State University, is associated with workforce development in that funds are used to support an undergraduate student as a research assistant. The goal is to provide students with training and experience and encourage them to seek a career in a STEM field of study.

Metrics from Proposal- "At least one undergraduate student will be supported in this project each year. Success will be measured by the student's graduation with a degree in a STEM field. We will track the student's progress through their educational and career endeavors."

Outcomes- A female undergraduate student supported with 2009 funds graduated in May, 2009 with a B.S. degree in Physics. This student is now employed in the area of astronomical data analysis.

Fluid Management in Reduced Gravity- Dr. Marchetta at the University of Memphis supervised several students in the development of a three-dimensional flow simulation to model phase-separation in reduced gravity.

Metrics from Proposal- "Students will publish and present the results of the research effort at a recognized regional and/or national aerospace conference. We will track these students' progress through their educational and career endeavors."

Outcomes- The efforts purported herein were accepted for publication and presentation at the AIAA Region II Student Conference in April, 2009 and the AIAA Region II Student Conference in April, 2009. The two participating students received BSME with Honors degrees, which were awarded at commencement in the spring of 2009.

OUTCOME 2

Vanderbilt Aerospace Club- This club has engineering undergraduate student

members.
Its activities are funded by the Tennessee Space Grant Consortium and the Department of Mechanical Engineering. The VU Aerospace Club participates in the NASA-Marshall sponsored University Student Launch Initiative (USLI). This is a year-long effort, involving launch vehicle and payload design, design reviews etc; eventually culminating in a final launch. The Vanderbilt University team placed first in the closest to altitude competition. The VU Aerospace Club participated in the AIAA Southeastern Regional Team Competition in Cape Canaveral, FL and secured the second place. For both these achievements, the VU Aerospace Club received an AIAA Special Prize from the Tennessee Section of the AIAA. Faculty mentor Professor Anilkumar received the AIAA Faculty Booster Award.
Metrics- "To motivate participating students to pursue advanced graduate studies and, eventually, pursue careers in aerospace engineering. We will be tracking the students' progress towards these goals."
Outcomes- Of the six participating students who received their BS degrees (in engineering) in 2009, one has gone to work for NASA, three have gone to work in NASA-related industries and two have gone on to graduate school in STEM fields.

Fisk Altitude Achievement Missile Team- The Fisk Altitude Achievement Missile Team (FAAMT), was originally formed in response to the USLI rocketry competition put on by NASA Marshall Space Flight Center.
Metrics- "Successful completion of the 2009 ULSI rocketry competition. We will also track participating students in their STEM educational and career paths."
Outcomes- FAAMT successfully competed in the 2009 ULSI competition. The FAAMT outreach program has impacted over 3,500 students during the past three years. The team has established a partnership with the University School of Nashville. They have participated in Family Science Nights at Margaret Allen Middle School and the Vanderbilt Center for Science Outreach. We will track participating students as they graduate from their current programs.

Challenger Center Missions and Related Mathematics Activities for Preservice Teachers- Ninety-eight preservice teachers participated in the set of six workshops during the 2009 grant year.
Metrics- "This set of workshops will be an early professional development experience for these preservice teachers, with goals to (a) improve and maintain their skills in mathematics and science, (b) encourage them to take an active role in planning for mathematics and science experiences in their [future] schools and (c) be able to encourage their [future] students to participate in mathematics and science activities."
Outcomes- The six workshops included a morning mission and activities at the Challenger Center. The flight directors at the Challenger Center provided an in-depth, interactive review for each station and activity. Connections were made between Earth and physical science concepts and mathematics. Students listed the mathematics and science concepts present in the activities: sorting, sequencing, matching, fine motor skills, following directions, measuring, graphing, composition and decomposition of shapes, spatial reasoning, using units, prediction, symmetry, scientific method, and cooperative work.

OUTCOME #3

Mission Cards at the Adventure Science Center- The TSGC sponsored some of the educational supplies for the Adventure Science Center's new "Sky & Space" wing.
Metrics- "The primary goals are to increase public understanding of NASA's exploration missions, to encourage students to pursue disciplines in science and math and to inspire the public with renewed interest in the continuation of space science research."
Outcomes- Three hundred fifty-eight K-12 students attended the new Living in Space demonstration from September through December, 2009. During this same time period, 427 K-12 students attended the updated Newton in Space presentations, 1,280 K-12 students participated in Destination Space outreach programs in classroom and assembly presentations and 294 K-12 students participated in Newton in Space via distance learning.

Planetary Geosciences Institute Space Outreach-
Metrics- "The goal of outreach program is to increase awareness about our Solar System among the population of mostly rural east Tennessee. Paul Lewis works within state educational frameworks and standards to bring this information to many thousands of people each year."
Outcomes- These outreach programs were again a tremendous success during the 2009 – 2010 grant year. Many thousands of people from the eastern part of our state took advantage of the opportunity to learn about our skies.

Engineering a Future- Summer Edition- Local industry engineers, engineering Professors and undergraduate engineering students (all female) presented a four-day residential summer camp at Tennessee Technological University for the purpose of introducing seventh and eighth grade girls to careers in engineering via hand-on activities.
Metrics- "The purpose of this program is to educate young girls on specific STEM content areas (the various engineering disciplines) and to inspire them to join the nation's future engineering workforce. We hope to improve enrollment of female students into engineering disciplines by increasing awareness and interest at an early age. The participants from the initial workshop will be starting college soon and we will try to monitor the number of participants who enroll as engineering students at TTU."
Outcomes- The answers to the participant survey show increased interest in STEM careers, however they also show that plenty still needs to be done to continue informing young girls about engineering as a viable profession. Our efforts to increase Hispanic participation are moving forward. For the first time, we expect at least five Hispanic girls this coming year. We are considering broadening it to include ninth graders this coming summer.

PROGRAM CONTRIBUTIONS TO PART MEASURES

- Longitudinal Tracking: Student Data and Longitudinal Tracking: Total awards = 52; Fellowship/Scholarship = 19, Higher Education/Research Infrastructure = 33 ; 21.2% of the total award represent underrepresented minority F/S funding. During the FY09

program year 2 graduated and are pursuing advanced STEM degrees, 4 accepted STEM positions in industry, 5 accepted STEM position in academia, and 1 went onto a non-STEM field.

- Course Development: Two new or revised courses. Fisk University and Vanderbilt University continue to offer and improve upon courses connected with their rocketry programs.

- Matching Funds: For the 2009–2010 grant year, our lead and affiliate institutions provided 1-1 matching funds for all NASA funds excluding Fellowship/Scholarship.

- Minority-Serving Institutions: During the 2008 – 2009 grant year we continued to have excellent relationships with Minority-Serving Institutions. Fisk University and Tennessee State University are HBCUs. Several of our other affiliate institutions continue to have active and meaningful collaborations with these schools.

IMPROVEMENTS MADE IN THE PAST YEAR

Our Consortium has essentially maintained the structure and practices that have enabled our success during the past several years. As always, we strive to work as a unified Consortium to meet our goals and objectives at our individual Affiliate Institutions, as a statewide body and in concert with national priorities. In addition, we convened a professionally facilitated Strategic Planning meeting to help us chart our course for the new five-year grant period.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

Vanderbilt University, Lead Institution. National private research university granting degrees through the Ph.D.
Austin Peay State University, Affiliate Institution. Public master's level university.
Columbia State Community College, Affiliate Institution. Two-year public community college granting Associate's degrees.
East Tennessee State University, Affiliate Institution. Public Ph.D. level university.
Fisk University, Affiliate Institution. HBCU. Private master's level university.
Middle Tennessee State University, Affiliate Institution. Public Ph.D. level university.
Oak Ridge Associated Universities, Affiliate Institution. A consortium of 99 doctoral-granting academic institutions.
Rhodes College, Affiliate Institution. Private undergraduate liberal arts college.
Tennessee Education Association, Affiliate Institution. Statewide representative body of K-12 educators.
Tennessee State University, Affiliate Institution. HBCU, Land-grant school. Public Ph.D. level university.
Tennessee Technological University, Affiliate Institution. Public Ph.D. level university.
The University of Memphis, Affiliate Institution. Public Ph.D. level university.
The University of Tennessee at Chattanooga, Affiliate Institution. Public Ph.D. level university.

The University of Tennessee at Knoxville, Affiliate Institution. Land-grant school. National public research university granting degrees through the Ph.D.
The University of Tennessee Space Institute, Affiliate Institution. Public Master's and Ph.D. level school. Only confers graduate degrees.