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Paper Session I-C - Space Life Science Training Program

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The Spaceflight and Life Sciences Training Program, Successful Partnerships in Action

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NASA sponsors the Spaceflight and Life Sciences Training Program to attract bright, diverse undergraduate students, and expose them to exciting research and career opportunities available in the science and engineering disciplines required to maintain life in space. Kennedy Space Center manages and hosts the program, educating approximately 35 students each summer through a unique “hands-on + minds-on” course containing laboratory and field research activities, tours, and lectures. A primary objective of the program is to influence the career paths of the students early in their education. The SLSTP has been successfully meeting that objective since its inception in 1985. The SLSTP relies on partnerships with other NASA centers, academia, industry, professional organizations, and the Canadian Space Agency. Partnerships are vital to success in all phases of each SLSTP annual lifecycle including sponsoring, promoting, planning, implementing and improving.

Introduction

NASA and the Nation’s education system maintain a symbiotic relationship. NASA depends on the education system to produce skilled, knowledgeable workers. The education community uses NASA to motivate and encourage students to study science, mathematics, engineering and technology. NASA uses partnerships to provide effective education programs to augment the Nation’s education system. The Spaceflight and Life Sciences Training Program (SLSTP) uses partnerships to provide a unique program for undergraduate science and engineering majors.

The SLSTP is an intensive six-week training program designed to develop a cadre of scientists and engineers to support future space life sciences and engineering challenges. Undergraduate students from universities across North America compete to fill the positions available each summer at the KSC. The program introduces students to a range of space life sciences research objectives, engineering challenges, and the processes involved in conducting life science experiments in space. KSC educates students by providing hands-on laboratory research activities, ecological field work, tours, lectures and team-building exercises. Throughout the course, students discover that teamwork and partnerships are essential ingredients to success.

The SLSTP is funded by a partnership between KSC and three groups from NASA Headquarters: The Division of Life Sciences (Code UL), The Office of Space Flight (Code M), and the Minority University Research and Education Division (Code EU). The SLSTP’s management and implementation tasks are accomplished by a partnership between government, industry and academia. That partnership includes NASA/KSC, KSC’s Life Science Support Contractor (the Dynamac and Bionetics Corporations), Tuskegee University, NASA’s Specialized Center of Research and Training (NSCORT) for Advanced Life Support, Dine’ College’s American Indian Network Information Center (AINIC), and the Canadian Space Agency (CSA).

Elements of Successful Partnerships

Strategic implementation methods contribute to the SLSTP’s successful partnerships. The SLSTP partners have common goals, shared resources, and meaningful assessments to ensure the partnerships are satisfying collective programmatic goals, and individual partners’ goals.
Common Goals

The primary goal of the SLSTP is to expose talented, diverse, undergraduate science and engineering majors to the various career opportunities available in the Space Program. In the process of achieving that goal, the SLSTP helps its partners achieve numerous goals. These goals include academic excellence, increasing the population of female scientists and engineers, increasing cultural diversity in education and professional settings, enhancing the scientific and technical competence of all Americans, and expanding access to and understanding of NASA’s activities and associated benefits. The SLSTP’s partnerships are successful because each partner values the primary goal of the program, and each partner has individual goals that are achieved by participating in the program. The partners’ goals are complementary.

Leading educators agree that students learn best in an environment where they are allowed to discover answers through inquiry, by making observations and collecting data. Excellence in science and engineering education requires lessons be stimulating, engage the students’ interests, and involve their minds and hands. The SLSTP’s excellent science and engineering education opportunity is made possible by the qualified, dedicated employees of the Dynamac and Bionetics Corporations who provide interesting laboratory and field projects for students. Through their lab and field experiences, students learn first hand whether they have the aptitude, not just the intelligence, to be successful in their chosen fields of study. That lesson is invaluable to students and their future employers, and can not be learned from textbooks and academic lectures.

Tuskegee University’s involvement in SLSTP is crucial to achieving many of the partners’ goals. In order to accomplish its varied SLSTP responsibilities, Tuskegee University formed the NASA SLSTP Academic Partner Alliance (NSAPA) with the NSCORT on Advanced Life Support (Rutgers) and Dine’ College. Together, they conduct the logistical aspects of the SLSTP. They recruit students of cultural, racial, ethnic, gender and geographic diversity. They hire Project Counselors from around the country to help administer logistical and curricular activities of the course. They conduct evaluations and maintain metrics to measure the SLSTP’s effectiveness and identify opportunities for improvement. They help the SLSTP students and alumni identify opportunities for educational and career growth and development. And, the scientific and engineering expertise of the NSAPA members complement the NASA research objectives performed by KSC’s LSSC.

The SLSTP course enhances the scientific and technical competence of the participating students. It also exposes students to a variety of NASA activities, and the benefits of the Space Program. The knowledge reaches far beyond the students. Because the SLSTP experience is so meaningful to students, the graduates become ambassadors, conveying the knowledge to people in their hometowns and universities. Many alumni also enjoy carrying the lessons back to elementary and secondary schools in their areas. Because the students are recruited from diverse geographic regions, the scientific and technical competence of a broad range of Americans is enhanced, and messages describing the activities and benefits of the Space Program are delivered to constituencies far from KSC.

Shared Resources

Successful partners effectively share resources between and among themselves. When resources are effectively integrated and leveraged, the partnership can accomplish “more with less”.

The SLSTP partnerships share a robust pool of talented scientists and engineers. This enables the SLSTP to maintain its standard of excellence. It also enables the partners to expand their individual capabilities by exchanging ideas, and sharing professional networks and affiliations, which further increases their benefit to NASA. The LSSC employs scientists and engineers that are working on NASA-sponsored research and development initiatives to support NASA’s Human Exploration and Development of Space (HEDS) enterprise. Tuskegee University’s Center for Food and Environmental Systems for Human Exploration of Space (CFESH) and Rutgers’ NSCORT are also involved in NASA-sponsored research initiatives.
which support the HEDS enterprise. And, as a participating member of the International Space Station Program, the CSA’s involvement in the SLSTP further supports NASA’s HEDS initiatives. The ethnic and geographic diversity found in the SLSTP partners enables the SLSTP to provide effective recruiters and mentors for all of the targeted student populations. The NSAPA is comprised of members from traditionally under-represented minority populations, and it actively works to ensure those populations receive an opportunity to become part of the Space Program. The SLSTP partners reside in many states across the United States, including Florida, Alabama, New Jersey, New Mexico, Colorado, Washington D.C., Maryland and Virginia; and Canada.

In addition to sharing resources with other partners, each SLSTP partner uses its unique resources to accomplish its SLSTP functions. For example, the LSSC integrates existing personnel, facilities, research activities, and mission related ground and flight projects into the SLSTP curriculum. The LSSC also integrates research activities performed by the Merritt Island National Wildlife Refuge into the SLSTP. The overall SLSTP curriculum leverages the resources available throughout three of the LSSC’s primary research and development functions: Controlled Biological Systems, Environmental and Ecological Systems, and Flight Engineering & Operations.

Another robust resource from the SLSTP is the SLSTP Alumni Organization. Nearly 600 students have completed the program, and actively support the SLSTP’s goals and objectives through community, education, and professional activities.

### Meaningful Assessments

The SLSTP must continue meeting its partners’ needs to remain successful. The SLSTP partners consider each other to be customers. Mutual respect and open communication help foster an environment where all partners can succeed. Additionally, the SLSTP’s customers include the SLSTP students, the SLSTP alumni, American taxpayers, and the Nation’s education system.

The SLSTP must stay relevant to the needs of its partners and the Space Program in order to enjoy continued success. The SLSTP management must remain cognizant of incipient trends in the Space Program, and sensitive to the effects of Public opinion on NASA appropriations activities. The Space Program profits when the general public understands and appreciates the benefits of its activities. SLSTP graduates make excellent ambassadors, conveying that information to many people. They represent diverse ethnic populations and geographic regions, and they are enthusiastic about the Space Program and its mission and benefits.

The SLSTP uses numerous indicators to measure its effectiveness in meeting customers’ needs. These include data from student surveys, goals and objectives of funding organizations, and data describing the post-graduate status of hundreds of SLSTP alumni.

Student surveys continue to show that SLSTP is meeting the students’ educational needs. Survey data confirms that students consider it to be one of the country’s best undergraduate educational experiences. As the program continues to expand its international partners, the SLSTP should be considered one of the best undergraduate experiences in the world.

Another effective indicator for the SLSTP is found in the methods whereby SLSTP meets its customers’ objectives.

<table>
<thead>
<tr>
<th>Customer(s)</th>
<th>Objective</th>
<th>SLSTP Method of Satisfying Goal</th>
</tr>
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<tbody>
<tr>
<td>Life Sciences Division</td>
<td>Increase public awareness and appreciation of the scientific rationale and public benefits of space life sciences research and technology development.</td>
<td>Equip students to be ambassadors conveying the knowledge they gain through SLSTP experiences to other students, educators and taxpayers.</td>
</tr>
<tr>
<td>Life Sciences Division, Office of Space Flight</td>
<td>Use the excitement of ground- and space-based research and engineering to support and enhance education at all levels (K-12 students and faculty; community college students and faculty; baccalaureate college and university undergraduate, graduate and postgraduate students, faculty and researchers).</td>
<td>Integrate college-aged students into existing research and engineering activities; support students’ efforts to transfer the knowledge gained to K-12 students in their communities.</td>
</tr>
<tr>
<td>Life Sciences Division</td>
<td>Maintain the quality of ongoing programs and improve coordination between the life sciences community and education opportunities sponsored by</td>
<td>Wherever feasible, use resources from other NASA sponsored programs (e.g., SIFT, MARS, NRC, graduate students, summer faculty, interns, etc.) and</td>
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<tr>
<td><strong>Line</strong></td>
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<tr>
<td>1</td>
<td>Life Sciences Division, Office of Space Flight</td>
<td>Improve intercenter and intracenter communication and coordination among space life sciences and other NASA organizations to increase the combined effectiveness of all NASA outreach programs and to enhance the transfer of information, knowledge, and technology.</td>
</tr>
<tr>
<td>2</td>
<td>Life Sciences Division, Office of Space Flight</td>
<td>Strengthen program partnerships (with complementary or congruent goals and objectives) between the NASA HEDS communities and other federal agencies, state and regional organizations, science and engineering technical societies, academic, non-profit, and commercial organizations.</td>
</tr>
<tr>
<td>3</td>
<td>Life Sciences Division, Office of Space Flight, MURED</td>
<td>Develop and implement programs that encourage women, underrepresented racial and ethnic minorities, differently abled individuals, and all other underserved groups to become active participants in the HEDS enterprise and assume their role as stakeholders.</td>
</tr>
<tr>
<td>4</td>
<td>Life Sciences Division, Office of Space Flight, MURED</td>
<td>Ensure that measurement and evaluation procedures are developed and implemented to assess the effectiveness of CODE UL, M, and EU outreach and education efforts in an accurate and timely manner.</td>
</tr>
<tr>
<td>5</td>
<td>U.S. Taxpayers</td>
<td>Improve the U.S. education system.</td>
</tr>
<tr>
<td>6</td>
<td>KSC Life Sciences community (NASSA and LSSC)</td>
<td>Comply with Life Sciences Division policy stating well-defined outreach and education efforts will be integral components of all Division-funded flight and ground-based activities.</td>
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<tr>
<td>7</td>
<td>KSC Life Sciences community</td>
<td>Increase public’s awareness of the benefits of Space Life Sciences research.</td>
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<tr>
<td>8</td>
<td>SLSTP students</td>
<td>Obtain a quality education that prepares individuals for successful careers.</td>
</tr>
<tr>
<td>9</td>
<td>MURED</td>
<td>Educate and develop a competent and highly skilled workforce, representative of America’s great diversity, to accomplish NASA’s mission.</td>
</tr>
<tr>
<td>10</td>
<td>MURED</td>
<td>Formulate and execute NASA’s MURED budget, develop policies, procedures and guidelines that enhance the involvement of HBCUs and Other Minority Universities (OMUs) in NASA’s mission.</td>
</tr>
<tr>
<td>11</td>
<td>MURED</td>
<td>Increase the Agency’s responsiveness to Federal mandates related to Historically Black Colleges and Universities (HBCUs) and Other Minority Universities (OMUs).</td>
</tr>
<tr>
<td>12</td>
<td>Office of Space Flight</td>
<td>Increase public awareness and appreciation of ISS and STS capabilities, and public benefits of the associated technology &amp; research.</td>
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<tr>
<td>13</td>
<td>NSAPA</td>
<td>Form strategic alliances which enable future growth and development of the organization(s) and its employees &amp;/or students.</td>
</tr>
<tr>
<td>14</td>
<td>NSAPA</td>
<td>Maintain excellence in science and engineering education for students.</td>
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One of the most important indicators for SLSTP is reflected in the data describing the activities of SLSTP alumni. Former SLSTP participants are associated with an array of activities related to the Space Program, such as:
- engineering work with JPL on the Mars Pathfinder project
- consulting with Lockheed Martin Corporation, Aeronautics Sector on the X-33/RLV Program
- researching changes in the Central Nervous System during long term space flight
- rewriting Medical Standards for Selection and Retention of Astronauts
- receiving NASA Space Grant Fellowship at MIT for Lunar/Mars Micro-Rover control
- researching Robotics for NASA/JPL
• participating in various NSCORT Programs
• flying two experiments on Space Shuttle and one on MIR Space Station
• analyzing brine shrimp data from Space Shuttle experiment
• planning missions for JPL
• authoring Rise from Earth book
• receiving NASA Graduate Student Research Program fellowship from NASA/ARC, to describe spaceflight and simulated spaceflight effect on bones
• working on satellite remote sensing for terrestrial ecosystem management with Oak Ridge National Lab, NASA/GSFC
• researching Space Medicine Microgravity-related cardiovascular activities
• designing hardware for JPL’s High Resolution Microwave Survey
• interning with MIT’s Center for Space Research in the area of Theoretical geoplasma physics
• participating in NASA/Langley and George Washington University Joint Institute for the Advancement of Flight Science
• aerospace engineering work with Bioserve Space Technologies
• interning with JSC and KSC
• receiving NASA GSRP Fellowship and NASA/GSFC Director’s Discretionary Fund Award
• bioengineer work for Lockheed Martin providing flight crew support in NASA’s Anthropometry and Biomechanics Facility
• researching the effects of gravity on the growth of oxide single crystals at MIT
• performing Experiment Support Specialist functions for STS-107
• performing experiments on the KC-135 program.

These indicators show that SLSTP offers a high Return on Investment to its customers.

Conclusion

NASA’s Kennedy Space Center, Life Sciences Division, Office of Space Flight, and Office of Equal Opportunity Programs sponsor the SLSTP to expose bright undergraduate students to exciting research and career opportunities available in Space Life Sciences and engineering disciplines. Thanks to the dedication and support of numerous professionals, the SLSTP has been successfully influencing the career paths of those students since its inception in 1985. NASA will continue to use this successful program to help build a solid space future through partnerships.

Additional information about the SLSTP can be obtained by visiting the web site: http://slstp.nasa.gov.

Acronyms and Abbreviations

• CFESH – Center for Food and Environmental Systems for Human Exploration of Space
• Code EU – NASA HQ’s Minority University Research and Education Division (a part of the Office of Equal Opportunity Programs)
• Code M – NASA HQ’s Office of Space Flight
• Code UL – NASA HQ’s Division of Life Sciences (a part of the Office of Life and Microgravity Science Applications)
• GSRP - Graduate Student Research Program
• HBCU - Historically Black Colleges and Universities
• ISS – International Space Station
• JPL - Jet Propulsion Lab
• JSC - Johnson Space Center
• KSC - Kennedy Space Center
• MARS - Mission to America’s Remarkable Students
• MIR – the Russian space station
• MIT - Massachusetts Institute of Technology
• LSSC - Life Science Support Contractor (the Dynamac and Bionetics Corporations)
• MURED - NASA HQ’s Minority University Research and Education Division
Biography

Shannon Potter became the Project Manager for the Spaceflight and Life Sciences Training Program in 1997. She joined NASA in 1986. Prior to her current position, Shannon worked as a Lead Automation Process Engineer in the Space Station Hardware Integration Office and as a Lead Systems Analyst and Software Engineer in the Shuttle Payload Processing Directorate’s Artificial Intelligence Laboratory. She graduated from the University of Central Florida with a Bachelor of Science in Computer Science. Her interests in biology and human cognitive processes, and a commitment to students of all ages attracted her to her current position.