STEM ON STATION (SOS)

FY 2016 ANNUAL PERFORMANCE REPORT

FUNDING SOURCE:
OFFICE OF EDUCATION
SEAP

LINE OF BUSINESS:
STEM ENGAGEMENT

MANAGING ORGANIZATION:
JOHNSON SPACE CENTER
OFFICE OF EDUCATION

ACTIVITY MANAGER:
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ACTIVITY DESCRIPTION
The fields of science, technology, engineering, and mathematics (STEM) help power our economy and advance our society. In a complex, ever-changing world, we need students – our future leaders and explorers – equipped to take on new challenges. To do this, we must ensure students develop the necessary STEM knowledge and skills to work through tough problems and come up with creative and effective solutions. NASA Education’s STEM on Station (SOS) is working to do just that, all while connecting students and educators to the International Space Station.

SOS uses the space station, its crew, and the onboard research to inspire, engage, and educate students and educators. From a comprehensive website to conversations with astronauts in space to hands-on STEM activities developed through high-profile partnerships. SOS is committed to working “Off the Earth, For the Earth...and in the classroom” to advance NASA and the nation’s STEM education and workforce pipeline through NASA’s missions and unique assets.

ACTIVITY GOALS
The primary goal for SOS is to engage students and educators in the International Space Station mission by tying educational activities to mission objectives. This occurs through a variety of components including:

• STEM on Station website – the single-point distribution site for space station content, resources, and opportunities for students and educators
• ISS Interactive Events – live, in-flight education downlinks between astronauts onboard the space station and students hosted at educational organizations
• On-Orbit Education Demonstrations – develop, implement, and distribute videos of on-orbit demonstrations aligned with K-12 STEM education standards
• STEM Challenges – develop STEM challenges focused on current and future spaceflight
• STEM Flight Projects – students use the ISS as a platform for STEM payloads and research
• STEM Public Education Events – includes working with the Astronaut Appearance Office and NASA Education to highlight the space station at major education events
• Partnerships - engage partners to support, develop, and promote SOS resources and opportunities
• Promotion Campaigns – develop promotional strategy involving media, social media, NASA Centers, federal agencies, educational organizations, and other audiences
• Hands-on Kits – demonstration items, talking points, and lesson plans related to the space station for NASA Centers along with corresponding training

Additional goals include:
• Use technology to deliver educational resources and opportunities
• Capture appropriate metrics to support NASA Education goals and APIs
• Identify opportunities to highlight Center-specific contributions to the space station, on-board research, and the space station’s role in the Journey to Mars
• Engage existing or new partners to enhance our education reach
ACTIVITY BENEFIT TO PERFORMANCE GOALS
SOS contributes to the following FY 2016 Performance Goals:

2.4.2: Continue to support STEM educators through the delivery of NASA education content and engagement in educator professional development opportunities.

-and-

2.4.4: Continue to provide opportunities for learners to engage in STEM education through NASA-unique content provided to informal education institutions designed to inspire and educate the public

-and-

2.4.5: Continue to provide opportunities for learners to engage in STEM education engagement activities that capitalize on NASA unique assets and content

SOS contributes to 2.4.2 by working closely with the Educator Professional Development (EPD) Line of Business to connect STEM on Station content to EPD workshops and activities such as Microgravity University for Educators (MgUE) and MUREP Educator Institutes (MEI).

SOS contributes to 2.4.4 by working closely with informal organizations including the Museum Alliance and the NASA Visitor’s Center Consortium to provide presentations, content, and education kits. SOS also connects with informal education institutions to opportunities including STEM challenges and in-flight education downlinks.

SOS contributes to 2.4.5 through opportunities including mISSion imaginaTIon - a space station-focused STEM challenge, in-flight education downlinks, and a variety of resources available on the STEM on Station website.

ACTIVITY ACCOMPLISHMENTS
FY 2016 was a big year for SOS. Activity accomplishments include the conclusion of the One Year Crew Education Initiative, a large scale education activity that served as the foundation for SOS. The One Year Crew Education Initiative, tied to the One Year Mission of NASA astronaut Scott Kelly, included the development of a nationwide design challenge, the engagement of education offices across the Agency, the debut of a newly redesigned NASA Education website, and the development of new and the continuation of existing partnerships, both internal and external.

The cornerstone of the One Year Crew Education Initiative was mISSion imaginaTIon, a design challenge developed in collaboration with Texas Instruments (TI). The challenge asked students to look at four systems/solutions currently in place on the space station – food/nutrition, habitat, waste management, and orbital debris avoidance – and use research, the engineering design process, and their imaginations to apply this knowledge to similar problems we will have to solve as part of the Journey to Mars. Students in grades 6-12, working individually or in teams of up to five, used videos and additional content available at www.missionimagination.com to work through each challenge and develop solutions.
The total number of downloads for the student and educator guides was 1,937 with over 11,600 visits to the website. In order to be eligible to win the challenge, students had to submit their design guide with complete solutions to all four problems and a short video outlining their experience. Thirty-one complete entries were received, and a team of five 7th grade students from Hyde Park Middle School in Las Vegas won the challenge. The winning team received a space-themed goody package, their choice of TI technology, and the opportunity to share their solutions with NASA astronaut Ricky Arnold.

The One Year Crew Education Initiative also included the development and distribution of three education kits that were shipped out to the Centers and the HQ Office of Education. These kits included demonstration items, presentations, hands-on EVA simulations, and engineering design challenges that allowed education specialists across the country to engage their audiences in the One Year Mission.

An additional component of the One Year Crew Educational Initiative was a collaboration with TIME For Kids magazine, made possible through the larger collaboration between the ISS Program Office, the Johnson Space Center Public Affairs Office and TIME. SOS provided education resources, imagery, activities, and links as well as content reviews. Using NASA materials, TIME For Kids created a space-themed mini-site, which also featured Kelly’s daughter, Charlotte, as a Kid Reporter. NASA content was also used in the magazine for articles and special features, including an ISS-focused issue. TIME For Kids also hosted an in-flight education downlink as a premiere event highlighting the collaboration. Students and educators from East Side Middle School in New York City gathered at TIME headquarters to participate in a twenty minute question-and-answer session. TIME For Kids reaches 3.5 million students and 5.3 million families annually through its publications and apps.

FY 2016 also saw the kickoff of a collaboration with the National Institute of Food and Agriculture (NIFA) and 4-H with the goal to develop a set of STEM-based education activities focused on the expeditionary skills used by astronauts in their training and onboard the International Space Station. Expeditionary Skills for Life include team care/self-care, cultural competency, leadership/followership, teamwork, and communication. Each highlighted skills will be tied to a STEM-based activity allowing students to consider how astronauts use these skills. The release of these activities will align with the upcoming spaceflight of astronaut and former 4-H member Peggy Whitson, who launched to the space station in November 2016.

During FY 2016, the SOS team facilitated 13 downlinks, reaching 6400 students and 525 educators. Additionally, the SOS website received 404,237 views in FY 2016.

**ACTIVITY CONTRIBUTION TO ANNUAL PERFORMANCE INDICATORS (APIs)**

SOS primarily contributes to ED-16-5: Engage with at least 750,000 elementary and secondary students in NASA STEM activities. Through activities such as in-flight education downlinks and mISSion imaginaTIon, SOS connects K-12 students to NASA through unique opportunities. Additionally, thanks to Center education specialists and their use of the kits developed as part of the One Year Crew Education Initiative, over 12,000 students and educators interacted with hands-on demonstrations and content related to the International Space Station, its crew, and the One Year Mission.

SOS also contributes to ED-16-2: Engage with at least 80,000 educators in NASA-supported professional development, research, and internships that use NASA-unique STEM content. By
collaborating with NASA Education’s Educator Professional Development (EPD) Line of Business, STEM on Station has brought its education specialists, content, and opportunities to a variety of EPD participants including through MUREP Educator Institutes (MEI) and online workshops.

SOS also contributes to ED-16-4: Maintain the NASA Museum Alliance and/or other STEM education strategic partnership in no fewer than 30 states, U.S. territories, and/or the District of Columbia. STEM on Station works closely with informal organizations across the U.S., including the Museum Alliance, to provide STEM on Station content and opportunities, including STEM challenges and in-flight education downlinks.

**ACTIVITY IMPROVEMENTS MADE IN THE PAST YEAR**
FY 2016 was the official start of SOS, after it grew from the One Year Crew Education Initiative. Throughout the year, SOS continued to grow and improve, creating a SharePoint site to help increase efficiency and reducing gaps in knowledge.

**ACTIVITY PARTNERS AND ROLE OF PARTNERS IN ACTIVITY EXECUTION**
- International Space Station Program Office – website development, content, and weekly meetings to look for collaboration opportunities
- NIFA/4-H – *Expeditionary Skills for Life* collaboration
- Center Education Offices/HQ Office of Education – promoting One Year Crew Education Initiative through the kits and other trainings
- Texas Instruments – *mISSion imaginaTion*
- TIME For Kids – feature stories, mini-website, and a downlink as part of the One Year Crew Education Initiative
- NASA Educational Technology Services (NETS) team – website development and promotion
- PBS Learning Media – Google Hangout for educators tied to Scott Kelly’s return to Earth
- NASA Office of Legislative Affairs – Congressionally requested downlinks, specifically one from Rep. Eddie Bernice Johnson (D-TX)
- Texas State University – development of third One Year Crew Education Initiative kit
- Digital Learning Network – platform used for trainings and special events
- Astronaut Office – SME support for *mISSion imaginaTion* and *Expeditionary Skills for Life*