

NASA Response to The INSPIRE Women Act (P.L. 115-7)

**Engagement Activities for K-12 Girls
To Inspire the Next Generation of Women in STEM**

July 2017

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1.0 Introduction

The INSPIRE Women Act (PL 115-7) directs NASA to encourage women and girls to study science, technology, engineering, and mathematics (STEM), pursue careers in aerospace, and further advance the Nation's space science and exploration efforts. It specifically requires support of the following initiatives: NASA GIRLS and NASA BOYS, Aspire to Inspire and Summer Institute in Science, Technology, Engineering and Research (SISTER). The Act also requires NASA to develop a plan to facilitate and support both current and retired astronauts, scientists, engineers, and innovators, including early career female astronauts, scientists, engineers, and innovators, to engage with K–12 female STEM students and inspire the next generation of women to consider participating in STEM fields and pursuing careers in aerospace.

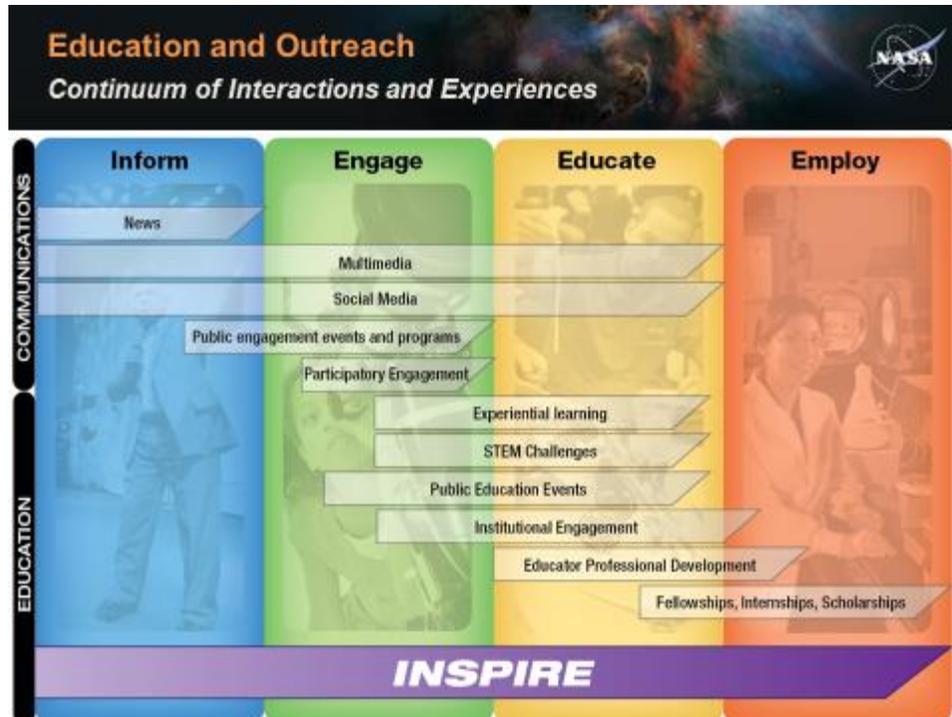
In compliance with the Act, this document provides an overview of NASA's existing engagement activities serving K-12 female STEM students using current and retired astronauts, scientists, engineers, and innovators; highlights promising practices/approaches in existing activities; discusses existing authorities that facilitate or support these activities, and outlines an approach to identify and develop appropriate enhancements to the agency's efforts.

NASA's engagement activities may not target a single gender, and are therefore developed to reach both genders. For the purposes of this report, NASA has limited its focus to programs or activities with targeted elements for young women and girls and success stories in bringing young women and girls into the STEM pipeline. This report is not a summary of all existing NASA education and outreach programs.

2.0 Existing Activities

Many NASA organizations develop and execute the strategy, planning and implementation for a broad and diverse set of engagement and education activities. NASA mission directorates and centers play a vital role across the spectrum of these efforts, with their programs and organizations providing support to planning and execution of activities.

The INSPIRE Women Act addresses efforts that span across the scope of NASA's endeavors in public engagement and education, with a focus on mentorship and opportunities that provide young women and girls experiences interacting with NASA's women in action. NASA endeavors to provide unique opportunities for K-12, undergraduate and graduate students to be exposed to STEM through a spectrum of engagement as depicted below.



NASA’s activities leverage the agency’s unique mission of research and discovery as a powerful context for inspiration and student learning. NASA remains committed to advancing and promoting STEM in several capacities: concepts, careers, and awareness for learners, educators and institutions. NASA immerses learners in content and activities providing a critical bridge to gain exposure and to pursue STEM careers. Additionally, NASA seeks to attract and retain diverse students in STEM career fields and build the domestic capacity of organizations to advance STEM research and programming by providing access to world-class research and technology facilities, mission data, and technical experts.

NASA’s public engagement activities align with NASA’s strategic goals and communication priorities. NASA’s public engagement activities seek to inspire, inform and engage the public and targeted stakeholders, and are often intended to promote interest and foster participation in NASA’s mission, and to develop exposure to – and appreciation for – STEM. NASA conducts a comprehensive set of activities to effectively convey, and provide an understanding of, NASA’s work, its objectives and benefits to target audiences, the public and other stakeholders, including NASA employees.

For the purposes of this plan, NASA interpreted the Act to define all relevant activities as those that encourage or engage K-12 female STEM students and employ or involve astronauts, scientists, engineers, and innovators. NASA determined “innovators” to include most NASA employees, because of the nature of the Agency’s mission.

Activities that reach the targeted demographic while fulfilling a broader purpose are discussed below.

2.1 Astronaut Appearances

Engagement by NASA’s astronauts is not typically gender-directed; however, any appearance before a mixed K-12 classroom will be certain to inspire and influence girls. Astronauts made a total of 592 public appearances in CY 2016 and the first quarter of CY 2017. Most were in-person, while some were virtual.

NASA uses conversations with astronauts in flight aboard the International Space Station to educate and engage K-12 students. In FY 2016 and the first half of FY 2017, NASA originated 23 so-called “downlinks” to discuss research taking place at the orbiting laboratory and answer questions from students. These two-way calls to space reached 24,717 K-12 students, along with 1,828 educators and 292 higher education students. Schools in 14 states and the District of Columbia were represented. Members of Congress participated in five of the events. A number of events in CY 2016 with female astronauts were designed to connect with young women and girls, in addition to providing boys opportunities to observe highly dedicated women devoting their life’s work to research and science in service to their nation.

Once retired, astronauts may choose to continue engagement activities as civilians. Given the size of the astronaut corps and the high demands for speaking appearances balanced with the demands associated with training and working in space, NASA centers may tap retired astronauts regionally for speaking engagement opportunities. In addition, NASA visitor centers may make arrangements with individual retired astronauts for appearances. For example, Space Center Houston and the Kennedy Space Center Visitor Complex both regularly have retired astronauts participate in their programs.

2.2 Speakers Bureau

Speakers Bureau requests provide opportunities to reach girls and young women. In CY 2016, NASA’s Speakers Bureau increased the number of fulfilled requests for speakers from 1,414 in 2015 to just over 1,500. Events were supported in 43 states, the District of Columbia, Puerto Rico and 25 international countries reaching an estimated audience of more than 1,046,000 people.

Percent of Speaker Bureau Events by Audience Type	
Children and Students	64%
General Public	14%
Non-Aerospace Business/Industry	9%
Young Adults (18-30)	5%

The Speakers Bureau, with staff at NASA Centers, coordinates with the STEM workforce for speaking engagements, placing appropriate speakers for specific events. Speakers Bureau staff members and their respective communications offices frequently interface with technical organizations and programs to monitor agency milestones of work being done and the employees assigned, to assign speakers to opportunities and to engage new Speakers Bureau volunteers and their subject matter expertise.

Both Astronaut Appearances and Speakers Bureau programs operate on a receive-and-respond basis as demand for astronaut and other employee engagement activities far exceeds supply. Both programs already are used to facilitate and support NASA STEM female staff engaging with the target demographic of girls in grades K-12. Astronauts and other NASA speakers regularly address female students in primary and secondary schools, but neither program has activities specifically directed at this audience.

2.3 Targeted Activities

The INSPIRE Women Act calls out three particular NASA programs:

- NASA GIRLS & BOYS: This is a one-of-a-kind experience (<https://women.nasa.gov/nasagirls/>) for middle school students to be mentored by NASA employees virtually, through Skype or Google chat. The child's mentor could be an engineer, an accountant, an astronaut, a trainer, or a mission controller. For five weeks, mentees complete online lessons in science, technology, engineering and math.
- Aspire to Inspire: The Aspire 2 Inspire website (<https://women.nasa.gov/a2i/>) offers content geared to spark the interest of all students, particularly girls. This program reaches formal education channels and an informal network of clubs, societies, and other institutions that focus on development of young girls. The content includes several short digital films highlighting career opportunities in STEM through the lives of early career women at NASA. The films and other content can be used for career days, merit badge requirements and other educational purposes. Program managers maintain a conversation with

interested audiences through a website comment page and relevant social media such as Twitter and Facebook.

- Summer Institute in Science, Technology, Engineering and Research (SISTER): This is an opportunity for middle school students to explore nontraditional career fields with women engineers, mathematicians and scientists. Targeted to rising seventh- and eighth-grade girls but also open to boys, the program introduces students to a technical working environment at NASA's Goddard Space Flight Center and Wallops Flight Facility. Students tour facilities, launch model rockets and participate in hands-on science experiments researched and developed by NASA women. They also learn about available high school, undergraduate and graduate educational programs and internships.

In addition, NASA is continually poised to develop and implement engagement activities to amplify appropriate and relevant current events of popular interest, in order to further public understanding of NASA's work and to foster STEM engagement. These are designed when suitable, to incorporate engagement opportunities that may be of keen interest to K-12 girls. A recent and excellent example is NASA's extremely successful Modern Figures campaign undertaken to coincide with the release of the motion picture "Hidden Figures." NASA entered into a Space Act Agreement with 20th Century Fox to collaborate on the movie, which was based on the #1 New York Times best-selling book by Margot Lee Shetterly. The story chronicles the life of NASA mathematician Katherine Johnson and her colleagues who were human computers critical to NASA's early success.

The team at 20th Century Fox worked with NASA to make the most of amplifying the story of Katherine Johnson. This included film screenings at NASA Langley Research Center, Kennedy Space Center and Johnson Space Center, the new National Museum of African American History and Culture and speaking engagements around the country including the Essence Festival, Martin Luther King Library, Historically Black College and Universities and most recently at the National Air & Space Museum with NASA women in STEM including astronauts. NASA created a website (<https://www.nasa.gov/modernfigures>) highlighting NASA women who are doing exciting work in STEM fields and dubbed these role models "Modern Figures." The site includes biographical information and education and media resources along with video content highlighting NASA women including astronaut Jeanette Epps, who is assigned to an International Space Station expedition beginning in May 2018. For students in grades K-12, the agency created the Modern Figures Toolkit (<https://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/NASA-Modern-Figures-Toolkit.html>) a collection of resources and educational activities. Each educational activity and resource includes a brief description, as well as information about how the activities and lessons align to education standards. Resources highlighted include videos, historical references and STEM materials. NASA field centers also conducted local engagement events.

2.4 Activities Involving the Current STEM Workforce

NASA's overall portfolio of activities provides ample opportunities to reach the demographic targeted by the INSPIRE Women Act. A diverse set of events and activities sponsored by NASA's functional offices, mission directorates and their programs and projects, and NASA centers, all have the capacity to effectively inspire, engage and educate girls and young women in STEM.

NASA designs outreach opportunities around mission content, such as astronaut Peggy Whitson aboard the International Space Station. NASA also uses Women's History Month in March to focus on a variety of events targeting women and girls across all field centers. Some examples of 2017 activities across the agency are listed here.

Agency-level and Social Media — National

- March 6, Hidden Figures screening and panel discussion at *South by Southwest* being organized by Fox Home Entertainment. NASA Chief Historian Bill Barry and NASA Modern Figures participated in the panel discussion.
- NASA website focused on women, Women@NASA, the Agency accesses their official Twitter and Facebook accounts to communicate from @WomenNASA or facebook.com/WomenatNASA. Random and diverse Women@NASA videos are promoted on social media.

Headquarters (HQ) — Washington, DC

- March 28, USDA-NASA STEM Program at the USDA National Agricultural Library. High school students interacted with scientists and researchers from both USDA and NASA and learn about science fields relating to both space and agriculture and discover STEM careers within USDA and NASA. Students observed and performed experiments alongside, interacted with, and engaged in mentorship with the research scientists/technicians. The target audience was school students enrolled in STEM programs and interested in pursuing possible STEM college and career paths. Note: The student participants are from Prince George's School District with the majority being girls.

Goddard Space Flight Center (GSFC) — Greenbelt, MD

- The GSFC Office of Education implemented a digital learning education program that engages Women of Goddard with K-12 students.

Jet Propulsion Lab (JPL) — Pasadena, CA

- Feb 22, Engaging Girls and Women in STEM "Town Hall Event" provided information on careers at NASA and JPL. Sponsored by the LA County Office of Education, California Department of Education, California Commission on the Status of Women and Girls.
<http://www.cde.ca.gov/pd/ca/sc/engaginggirlsinstem.asp>
- March 11, JPL Women in STEM. In collaboration with LAUSD at Poly High School in Sun Valley. 2000 high school girls attended and about 50 JPL speakers/volunteers.

- March, Promotion of [STEM in 30: The Women Paving the Way to Mars](#) live interactive webcast.
- March, Promotion of Museum Alliance resources
 - Archived 2016 telecon, [Effectively Engaging Girls and other Underserved Communities](#): National Girls Collaborative founder Karen Peterson shares key strategies effective when working with girls in science, technology, engineering and mathematics (STEM), as well as youth from other underserved groups.

Johnson Space Center (JSC) — Houston, TX

- March 8 – female astronaut photo release, included Peggy Whitson

Langley Research Center (LaRC) — Hampton, VA

- March 7, LaRC Colloquium Speaker and Sigma Lectures: Margot Lee Shetterly, author of *Hidden Figures*. Daytime event for employees and streamed online to other NASA Centers. Evening event at the Virginia Air and Space Center for the public as part of the Sigma Series Lecture.
- March 18, LaRC: Supporting “Women in STEM” public event at Virginia Air and Space Center. Providing training to local high school girls and NASA Subject Matter Experts to lead a hands-on NASA Aeronautics activity at the event.

Marshall Space Flight Center (MSFC) —Huntsville, AL

- March 21 and 22 – Outreach Activity at Girls, Inc., in collaboration with Academic Affairs. A lesson plan based on the book *Hidden Figures* was the focus. Women in various professions across the Center participated in this event.
- March 30 meet and greet for Modern Figures highlighted at MSFC

Stennis Space Center (SSC) — MS

- March 10 –HEO Education Event at MLK High School in Chalmette, La. Stennis Space Center (SSC) Office of Education participated in Martin Luther King, Jr. High School’s recognition of the important accomplishments of women around the world, NASA will promote and display the accomplishments of important women in NASA’s history. NASA presented hands-on STEM activities from the NASA Modern Figures toolkit.
- March 30 – Girls Excited about Math and Science Event. Stennis Space Center hosted its annual Girls Excited about Math and Science (GEMS) Event, conducting activities from the Modern Figures Toolkit with more than 200 high school girls attending from local high schools in the Stennis outreach region. In addition, there was a video presentation highlighting NASA’s female heroes, from *Hidden Figures* to *Modern Figures*.

Current members of NASA’s STEM workforce support engagement activities through various pathways, including virtual connections with educators and students, subject matter expert presentations during educator professional development events and activities, as well as supported STEM engagement events such as Take Your Child to Work Day. NASA scientists, engineers and technologists also actively engage serving

as mentors to student interns. Similarly, employees in STEM fields actively participate in engagement activities such as volunteering to serve as members of the Speakers Bureau, speaking at schools and student events, as well as participating in outreach and learning opportunities with students and their families at public engagement events.

In addition, women career groups and committees associated with NASA's diversity and equal opportunity organizations at NASA centers provide mechanisms to further foster engagement of young women and girls. For example, the Office of Diversity and Equal Opportunity at the Marshall Space Flight Center engages at the community level with other employers, schools and universities and other public and private groups in cooperative action to improve employment opportunities and community conditions that affect employability. The Johnson Space Center's External Relations Office also works with employee resource groups, including a women's group, to promote volunteer opportunities for engagement, education and Speakers Bureau appearances.

These activities are bolstered by NASA's use of social media, engaging young people through a variety of platforms including Twitter, Facebook, Instagram, Snapchat, Flickr, UStream and Tumblr. NASA has an extensive footprint with the ability to reach a diverse audience, especially young people.

These examples provide a snapshot of the diverse spectrum of activities in which NASA reaches young people, which can be leveraged to more effectively reach young women and girls.

2.5 Activities Involving NASA Retirees

NASA also facilitates engagement activities by retired employees thus augmenting the participation of the current STEM workforce. NASA retirees volunteer their time at NASA visitor centers, and NASA organizations reach out to retired astronauts periodically to fill speaking engagements or participate in STEM engagement events when active astronauts are not available.

Some examples of retirees devoting their talents and time to engaging the public, students and young people include:

1. Marshall Space Flight Center's retired workforce often participate as docents at the US Space & Rocket Center. In addition, if a specific public speaker request best suits a retiree instead of a current employee, the Speakers Bureau team works with the Marshall Retirees Association to secure the appropriate speaker. Also, the Marshall Office of Diversity and Equal Opportunity reaches out to retired workers to participate in special emphasis programs, such as for Women's History Month.
2. Retired Space Technology Mission Directorate STEM workers routinely are invited to speak at sessions of the National Community College Aerospace Scholars, an interactive online learning opportunity highlighted by a three-day experience at a NASA center.

3. Langley Research Center stays in touch with NASA alumni through several avenues including an employee who serves as liaison to retirees. The center Speakers Bureau frequently augments its cadre of speakers with retirees. The Virginia Aerospace Science & Technology Scholars (VASTS) and High School Students United with NASA to Create Hardware (HUNCH), frequently call upon retired astronauts for appearance support.

4. The Johnson Space Center External Relations Office also offers education and engagement opportunities to members of the NASA Alumni Association.

3.0 Existing Authorities

The 1958 National Aeronautics and Space Act states that NASA shall “provide for the widest practical and appropriate dissemination of information concerning its activities and the results thereof.” The widespread dissemination of information regarding NASA missions has and will continue to inspire the public, including women and girls. Additionally, NASA policy permits employees to participate in mission-related engagement activities while on the job. NASA Policy Directive (NPD) 1388.1, “Employee Participation in NASA Education and Communications Activities,” states [that supervisors may]: “Authorize a reasonable amount of official duty time for employees to participate in optional mission-related education and communications activities.” However, centers’ local procedures apply. Policies, procedures and guidelines are in place for the development and implementation of engagement and education activities across the spectrum of stakeholders, including students, their families and the public.

4.0 Plan for Future Engagement

The President’s FY18 Budget proposes to terminate NASA’s Office of Education but maintains support for agency engagement activities, internships, and fellowships funded outside the Office of Education. Activities proposed for continuation include STEM activities and fellowships funded by NASA Science.

The spectrum of NASA’s activities provides excellent opportunities to reach young women and girls. NASA will pull from various knowledgeable resources within the Agency to help expand the plan for future engagement.

Over the next several months, NASA will formulate and recommend strategies to enhance the Agency’s ability to reach and engage girls and young women.

Areas of focus will include but not be limited to the following:

- Equipping employees for interaction
- Developing and distributing content
- Enhancing mentoring opportunities
- Leveraging and developing partnerships

- Creating a community of support through networking and mentorship
- Designing relevant engagement strategies and activities

It is anticipated that NASA will complete an initial plan for moving ahead by the end of this calendar year, with the intent to begin engaging several strategies in calendar year 2018.