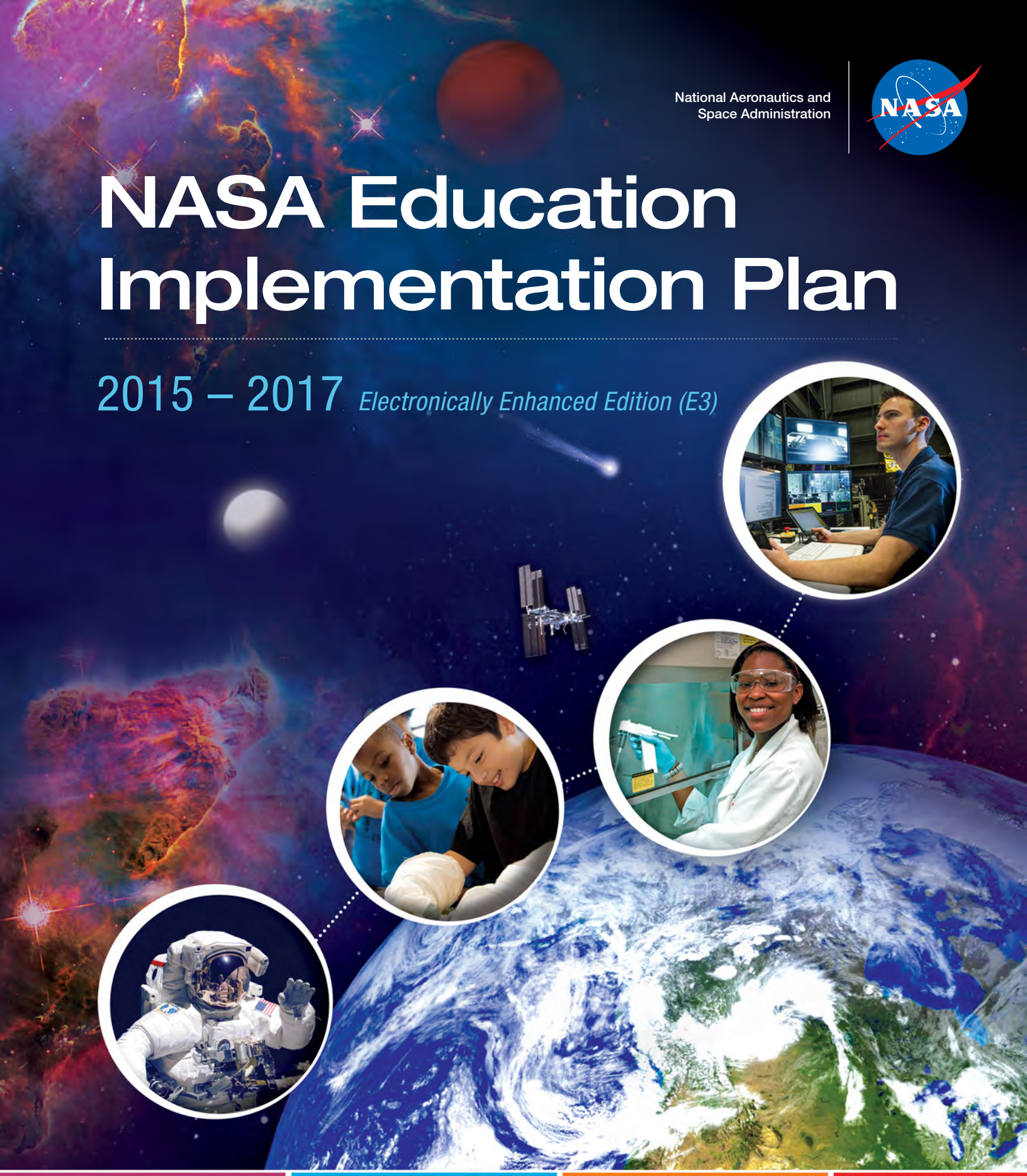
National Aeronautics and
Space Administration

NASA Education Implementation Plan

2015 – 2017 *Electronically Enhanced Edition (E3)*



Inspire Engage, Educate, Employ.

E=mc²

NASA Vision

We reach for new heights and reveal the unknown for the benefit of humankind.

NASA Mission

Drive advances in science, technology, aeronautics, and space exploration to enhance knowledge, education, innovation, economic vitality, and stewardship of Earth.

NASA Education Mission

Advance high-quality STEM education using NASA's unique capabilities.

Message From The Associate Administrator For Education

Exploration is at the very core of NASA's work, and is the key driver in learning and innovation. Since NASA's inception in 1958, our missions have vastly expanded human understanding of the Earth, the solar system, and the universe. Our technological developments have helped drive innovation in fields ranging from health care, to telecommunications, to the airplanes that we fly. This legacy of innovation and discovery has inspired generations of Americans with a passion for space to pursue careers in science and engineering.

NASA Education has played a vital role in cultivating that passion and providing opportunities for all Americans to be a part of NASA's mission to "drive advances in science, technology, aeronautics and space exploration to enhance knowledge, education, innovation, economic vitality, and stewardship of Earth."

This 2015-2017 NASA Education Implementation Plan represents an important step in defining what NASA Education does, why we do it, and how we measure our performance. NASA Education's mission is to "advance high-quality science, technology, engineering and mathematics (STEM) education using NASA's unique capabilities."

To carry out that mission, our activities are now organized into four lines of business that connect learners, educators, and institutions with NASA's unique missions and programs: STEM Engagement, Educator Professional Development, NASA Internships, Fellowships and Scholarships, and Institutional Engagement. These lines of business provide clarity and focus that help our customers and stakeholders understand how we organize and prioritize our resources.

This streamlined approach also reflects our emphasis on national priorities. NASA Education's fundamental responsibility is to execute the agency's strategy, set by the President's goals and objectives for the agency. This implementation plan outlines significant steps to align all NASA Education activities with the 2014 NASA Strategic Plan and the Office of Science and Technology Policy's Committee on STEM (CoSTEM) Education's Federal STEM Education 5-Year Strategic Plan. These documents serve as the overarching framework that guides NASA Education's efforts to ignite a new era of innovation.

As we pursue our work with refined focus, our efforts to gauge progress will look closely at the outcomes as well as the outputs of our educational investments. Are investments achieving their intended objectives? Are they scaled appropriately? These measures can provide insights about the practices that drive results, allowing us to continue refining our decision-making about future investments.

This plan represents an ambitious, yet attainable, effort to help achieve NASA's mission of driving advances in science, technology, aeronautics, and space exploration. I look forward to working with you to apply these efforts that help us educate the next generation and prepare our nation's workforce to reach new heights, reveal the unknown, and benefit all humankind.

Donald G. James
Associate Administrator for Education

Acknowledgments

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1 Why NASA Education?

Introduction

NASA Education leverages the agency's unique mission of research and discovery as a powerful context for inspiration and student learning. Since its creation as an agency in 1958, NASA remains committed to advancing and promoting science, technology, engineering and mathematics (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 to and 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.

The NASA Education Implementation Plan (NEIP) provides an understanding of the role of NASA in advancing the nation's STEM education and workforce pipeline. The document outlines the roles and responsibilities that NASA Education has in approaching and achieving the agency's and administration's strategic goals in STEM Education.

The specific purpose of the 2015-2017 NASA Education Implementation Plan is to present and describe the following:

- The alignment of NASA Education with national priorities and the 2014 NASA Strategic Plan;
- The framework for specific and measurable outcomes to guide and monitor performance within the education portfolio;
- The roles, responsibilities and management of the Associate Administrator for Education, the Office of Education, Mission Directorate Leads, and Education Offices;
- The key agency stakeholders responsible for strategic coordination and requirements development; and,
- The monitoring and control structure for determining the outcomes of NASA's education portfolio across the agency.

In addition, this document describes the processes and principles of strategic planning and management for all of NASA's education efforts. It also explains how NASA Education is governed and managed and what internal and external requirements drive this strategy.

"Education is the cornerstone to developing the workforce that will help us reach Mars in the 2030s, and to inspiring American leadership in innovation and exploration today."

– NASA Deputy Administrator Dava Newman

Background

Bolstering American advances in science and innovation is central to the administration's strategy for strengthening the economy and increasing opportunities for Americans to secure high-paying jobs. As a result, the administration has placed a high priority on STEM education and has made significant commitments to improve the quality of STEM education at all levels of engagement.

In an effort to help maintain the United States' global competitiveness, NASA's education programs are structured to support the growth of NASA's and the nation's diverse STEM workforce, help develop STEM educators, engage and establish partnerships with institutions, and inspire and educate the public. NASA will continue the agency's tradition of investing in the nation's education programs and supporting the country's educators who play a key role in preparing, inspiring, engaging and motivating the next generation.

Why NASA Education?

NASA Education's mission is to advance high quality STEM education using NASA's unique capabilities. NASA contributes to national efforts for achieving excellence in STEM education through an integrated education portfolio implemented by NASA Education, which is comprised of the Office of Education, the Mission Directorates, and NASA Centers and Facilities. Furthermore, NASA Education's governing body, the Education Coordinating Council, has representatives from all Centers, the Jet Propulsion Laboratory (JPL), the four Mission Directorates, and nine Functional Offices.

In addition to advancing and contributing to excellence in STEM education, it is very important that NASA Education plays a leadership role in inspiring the next generation to join us in our journey of exploration. Robert Lightfoot, the Associate Administrator of NASA, responded to the question "What do you hope today's STEM students will think of when they think of the word NASA?" His response included, "I hope they think they want to come here and help us explore… We still lead the world in exploration. The world looks to us to be that leader. They want to join us in that journey. So, it is our job to be that leader. It's very important for us to take that role. Part of the leadership role is making sure the next generation is right there coming with us. So all of the Mission Directorates and Centers need to do their part to get them excited – "get them excited about where we are going."

To strengthen NASA Education's alignment with national priorities, the 2014 NASA Strategic Plan set an objective:

> NASA Strategic Objective 2.4
>
> *Advance the Nation's STEM education and workforce pipeline by working collaboratively with other agencies to engage students, teachers, and faculty in NASA's missions and unique assets.*

As part of performance planning, NASA Education has established next steps for Strategic Objective 2.4 with near-term milestones that set the foundation for achievement of this objective. These milestones include, but are not limited to:

- Create a portfolio of projects consistent with the Federal 5-Year STEM Education Strategic Plan issued by the Office of Science and Technology Policy Committee on STEM Education;
- Ensure that NASA Education efforts are anchored to evidence-based strategies in their design and implementation; and,
- Enhance reporting capabilities for NASA Education's data collection applications.

In order to accomplish Strategic Objective 2.4, NASA Education uses evidence to guide implementation and program design, and employs performance management strategies. We identify evidence of effective practices in STEM education through program evaluation. Evidence is a key criterion in NASA's competitive processes for allocating resources, ensuring that the most effective STEM education

activities are supported. NASA's unique STEM expertise, as well as the agency's mission and assets, contribute to the nation's STEM education portfolio. In addition, NASA Education's Performance Goals and Annual Performance Indicators (APIs) are linked to Strategic Objective 2.4, and provide demonstrable results from the agency's education investments.

We will continue to engage the public and other key stakeholders in our activities, and work to build an open, transparent and participatory organization. In addition, we are engaged in current NASA missions, including the Journey to Mars, and participate in early conversations regarding upcoming missions to ensure that learners, educators, and institutions are actively involved in mission stages from brainstorm to launch. Through strategic use of NASA assets in our STEM education offerings, we are able to share NASA's inspirational activities with a broader audience.

Through our educational partnerships with teachers, students and schools, we are committed to inspiring the next generation of scientists and explorers who will keep America in the forefront of technology, innovation and space exploration.

– NASA Administrator Charles Bolden

Alignment with National Education Priorities

NASA Education programs provide opportunities for learners, educators, and institutions that are consistent with the goals, objectives, and strategies of the Federal STEM Education 5-Year Federal Strategic Plan from the Committee on STEM (CoSTEM). NASA Education also works closely with other federal agencies in the priority areas identified by CoSTEM.

The CoSTEM Strategic Plan identifies five priority investment areas, each with a corresponding national goal toward which federal agencies, and their partners in state and local entities and the private sector, should aspire:

- *Improve STEM Instruction:* Prepare 100,000 excellent new K-12 STEM teachers by 2020, and support the existing STEM teacher workforce;
- *Increase and Sustain Youth and Public Engagement in STEM:* Support a 50 percent increase in the number of U.S. youth who have an authentic STEM experience each year, prior to completing high school;

- *Enhance STEM Experience of Undergraduate Students:* Graduate one million additional students with degrees in STEM fields over the next ten years;
- *Better Serve Groups Historically Underrepresented in STEM Fields:* Increase the number of students from groups that have been underrepresented in STEM fields that graduate with STEM degrees in the next ten years and improve women's participation in areas of STEM where they are significantly underrepresented; and,
- *Design Graduate Education for Tomorrow's STEM Workforce:* Provide graduate-trained STEM professionals with basic and applied research expertise, options to acquire specialized skills in areas of national importance, mission-critical workforce needs for the agency, and ancillary skills needed for success in a broad range of careers.

The CoSTEM Strategic Plan includes two coordination approaches that span the priority areas above:

- *Build New Models for Leveraging Assets and Expertise:* Implement a strategy of lead and collaborating agencies to leverage capabilities across agencies to achieve the most significant impact of federal STEM education investments.
- *Build and Use Evidence-Based Approaches:* Conduct STEM education research and evaluation to build evidence about promising practices and program effectiveness, to be used across agencies and share with the public to improve the impact of the federal STEM education investment.

The 5-year CoSTEM Strategic Plan helps guides the NASA Education approach to implementing our strategic objective and aligning with federal STEM efforts through 2017.

Philosophy and Principles

The NASA Education portfolio is aligned with the strategic objective of the agency. Integral to all NASA Education activities is an overarching philosophy and operating principles that help ensure program excellence.

Overarching Philosophy: Cultivate Inclusion and Excellence

NASA's ability to promote effective inclusion practices is instrumental in fulfilling our mission. Being inclusive in our approach ensures that we collectively utilize the unique talents and perspectives from the diverse array of individuals that constitute our current and future workforce.

Diversity of the skills, disciplines, experience, and talents needed in our future workforce is critical to our success. Potential at both the individual and organizational levels will be maximized by fostering awareness, understanding, and respect for individual differences. The knowledge, expertise, and unique background and life experiences—including ethnicity, gender, race, geography, religion, and cultural identity—of each individual strengthen the agency and drive creativity and innovation.

"Excellence is achieved when we value and leverage the unique abilities and experiences that every employee brings to the organization, when we realize the benefits that result from a diversity of perspectives, and when we encourage and celebrate innovation."

– NASA Administrator Charles Bolden

Operating Principles

Utilize Evidence-Based Strategies

Education programs, projects, and activities utilize evidence-based strategies in their design and implementation. These evidence-based strategies rely on verifiable data and information that has been gathered using the standards of professional research and evaluation organizations. Such data can be both qualitative and quantitative, and must pass tests of reliability and validity.

Promote Diversity

Education programs, projects, and activities strive to promote and ensure that underrepresented and underserved students participate in NASA Education, with the aim of encouraging more of these students to pursue STEM careers. Programs, projects, and activities are representative of the communities we serve across the nation. They engage underrepresented and underserved minorities, women, and persons with disabilities, and reflect an atmosphere of equity, balance, and inclusiveness. NASA will continue to focus on enhancing the capabilities of minority serving institutions to contribute to the research and education needs of the agency.

Facilitate Collaborations

Education programs, projects, and activities collaborate among internal NASA organizations and with external partners and other federal agencies to maintain an integrated education portfolio in a distributed system. Through the establishment of strong, mutually-beneficial relationships, collaborations leverage the core capabilities of each entity and facilitate reasonable, feasible, and measurable outcomes.

Ensure Alignment

Education programs, projects, and activities are designed and implemented to align with NASA missions, utilizing the unique strengths and capabilities of NASA's content, people and facilities.

Conduct Evaluation

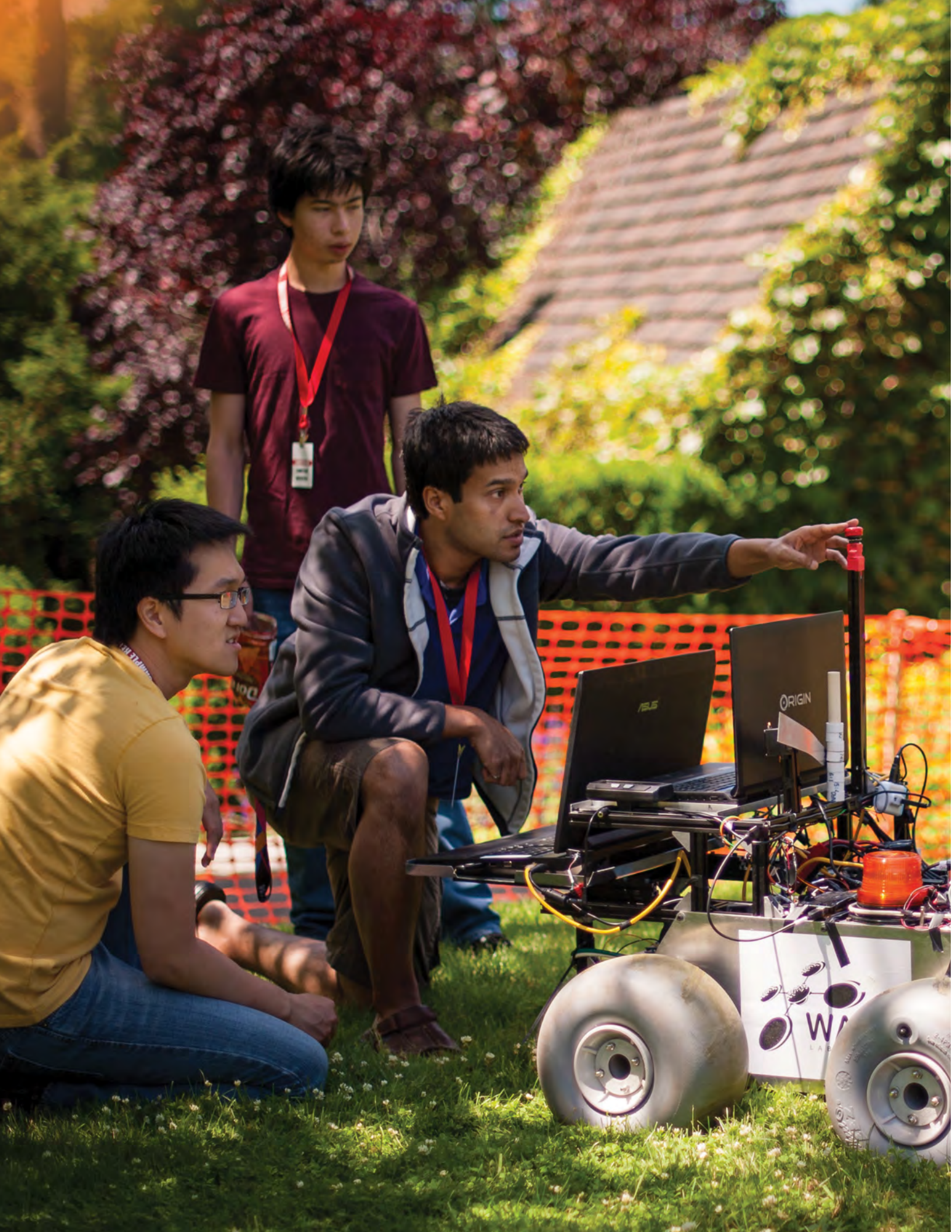
Education programs, projects, and activities document intended outcomes and use metrics to demonstrate progress toward, and achievement of, these outcomes and contribution to annual performance goals.

Videos

Astronaut Suni Williams on Value of Education

High School Students Learn About Air Traffic Control Careers

NASA Joins White House, from Ground and Space, to Discuss State of STEM Education in America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ORIGIN

2 Who And How Do We Serve?

NASA Education reaches learners, educators, and institutions through a framework structured upon four individual lines of business. In addition, NASA Education partners strategically with a wide range of entities, such as other federal agencies and youth serving organizations, to achieve mutually beneficial outcomes.

Lines of Business (LOB)

NASA Education manages educations activities through our lines of business: science, technology, engineering and mathematics (STEM) Engagement, Educator Professional Development, NASA Internships, Fellowships and Scholarships, and Institutional Engagement. These LOB reflect a transformative, scalable education portfolio that efficiently leverages resources and partners from all sectors to enhance STEM education, and inspire and captivate learners, educators, and institutions. These lines of business will enable us to ensure our education investments are unique and non-duplicative of other federal agencies also involved in STEM education.

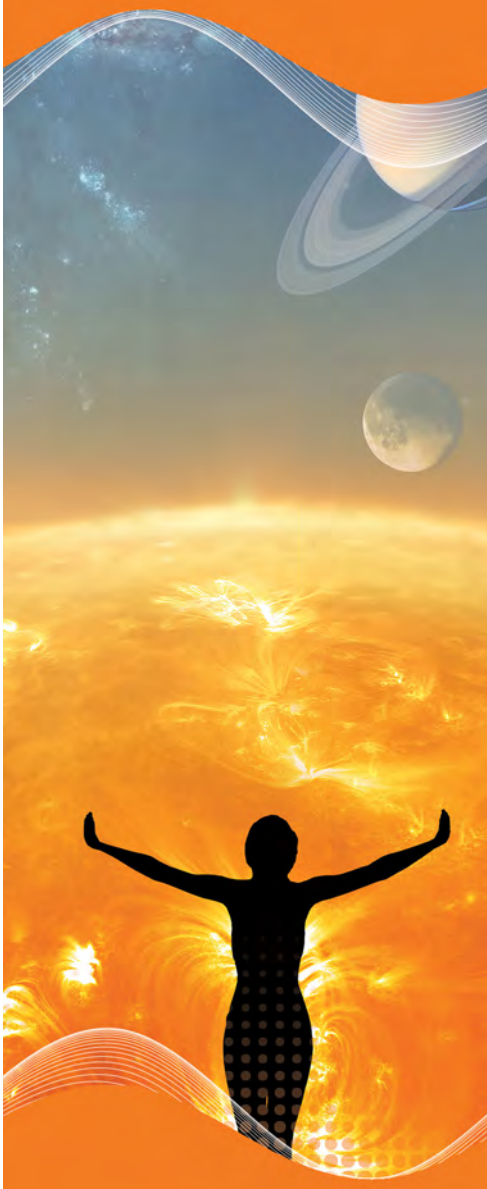
The LOB are used to refer to a set of one or more intended audiences and deliverable activity types provided by NASA Education. The directors of the four LOB work collaboratively with Office of Education program managers and Center and Missions Directorate leads to define guidelines, review funding sources, and describe accomplishments.

STEM Engagement

STEM Engagement (SE) activities are designed to provide opportunities for participatory and experiential learning activities that connect learners to NASA-unique resources. STEM Engagement activities are based on best practices in motivation, engagement, and learning in formal and informal settings such as Public Education Activities, Experiential Learning Opportunities, and STEM Challenges.

Public Education Activities foster interactions with learners of all ages to spark an interest in STEM disciplines using NASA-unique materials and resources. These may be part of a larger public event and are often shorter in duration than Experiential Learning Opportunities and STEM Challenges. Public Education Activities often require close coordination with the NASA Office of Communications.

Experiential Learning Opportunities enable learners to acquire knowledge, understand what they have learned, and apply that knowledge through inquiry-based and project-based activities. NASA opportunities include participatory activities designed to increase involvement, knowledge, understanding/comprehension, and application of learning in one or more STEM disciplines using NASA's resources.



STEM Challenges provide creative applications of NASA-related science, technology, engineering, mathematics, and cross-cutting concepts. They challenge existing assumptions and encourage learners to demonstrate their knowledge of STEM subjects while enhancing innovation, critical thinking, and problem-solving skills. The agency actively communicates with learners at all levels of the learning complexity scale through these STEM Challenges.

Educator Professional Development

Educator Professional Development (EPD) uses NASA's missions, education resources, and unique facilities to provide high-quality STEM content and hands-on learning experiences to in-service, pre- service and informal educators. EPD provides educators with the knowledge, skills, and ability to deliver unique STEM content to learners who will ensure the economic growth and competitiveness of our nation.

In-service educators include those currently practicing in a formal school system. EPD opportunities for in-service educators are high-quality, sustained, intensive, and classroom-focused to have a positive and lasting impact on classroom instruction and understanding of NASA-related STEM content. Our efforts aim to increase the use of NASA-related materials in classroom instruction, increase the comfort level of elementary-level educators in teaching STEM subjects, and increase proficiency in NASA- related STEM subjects for middle and high school educators.

Pre-service educators have declared an education major or are graduates who have not yet completed training and certification to teach in a formal setting. EPD opportunities for pre-service educators provide face-to-face activities at Centers/JPL and remote locations, in concert with partners, and offer NASA-unique online educator professional development content. NASA also engages with higher education institutions to infuse NASA content into teaching materials and curricula. This provides them with exciting resources and exposes future educators to NASA content and missions.

Informal educators provide organized educational activities outside of the established formal school system. NASA engages informal educators to increase their understanding of NASA-related STEM subjects and motivates them to use NASA materials in their education environments. Our efforts help establish linkages between formal and informal education, and encourage informal educators who teach STEM subjects through exposure to and knowledge of NASA-related content.

To reach the educators described, NASA's EPD activities incorporate four integrated delivery mechanisms:

- *Face to Face (F2F) Institute:* F2F interaction at a NASA facility conducted through a single delivery model implemented uniformly across all NASA Centers/Facilities while leveraging content specific to each Center/facility, at grade-appropriate levels based on specific audiences, for a minimum of 40 contact hours.
- *Partner-Delivered EPD:* Partner-Delivered EPD provides a uniform set of standards for partners to adhere to when developing or offering EPD in concert with NASA. The purpose of Partner-Delivered EPD is to increase the number of geographically dispersed participants engaged in NASA Educator EPD offerings through strategic partners. Partner-Delivered EPD can be developed along a continuum of formal agreements based upon the STEM focus, scope and intended outcome.
- *Online EPD:* Online EPD provides a uniform set of standards for designing, planning and implementing online learning opportunities for educators that encompass a wide range of technologies and approaches that allow participants to go beyond limitations imposed by real-time, in-person EPD. Online EPD is synchronous and asynchronous virtual learning opportunities that enhance and extend the breadth, depth, and reach of NASA's EPD training, content, and resources, utilizing a variety of electronic delivery tools.

- *Community-Requested EPD:* Community-Requested EPD provides NASA Centers/JPL appropriate levels of flexibility to meet and respond to the educator professional development needs of their surrounding communities on a case-by-case basis throughout the year, utilizing to the greatest extent possible a set of uniform guidelines. These opportunities enable NASA Centers/JPL to assist educators on a regional level (e.g., local schools/districts, state Departments of Education, universities, museums, etc.)

NASA Internships, Fellowships, and Scholarships

NASA Internships, Fellowships, and Scholarships (NIFS) leverage NASA's unique missions and programs to enhance and increase the capability, diversity, and size of the Nation's future STEM workforce. NASA continues to invest in the nation's STEM learners by providing opportunities that will launch a new era of learning, innovation, and achievement.

NASA Internships are competitive awards to support educational work opportunities that provide unique NASA-related experiences for educators and high school, undergraduate, and graduate students. These opportunities engage students with real-world experiences while contributing to the operation of a NASA facility or the advancement of NASA's missions.

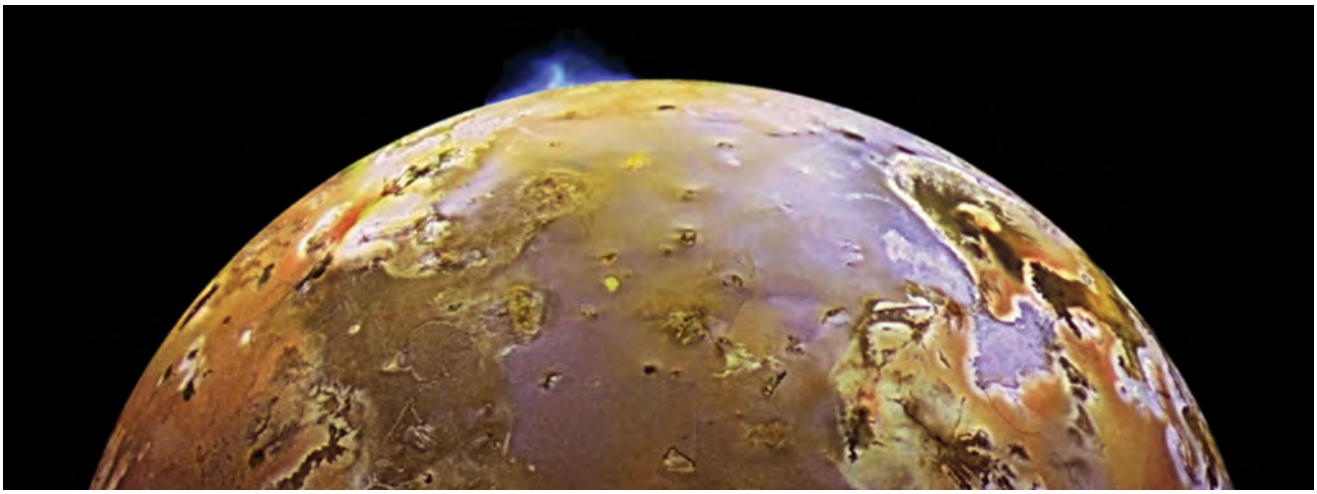
NASA Fellowships are designed to support independently conceived or designed research, or senior design projects by highly qualified faculty, undergraduate, and graduate students, in disciplines needed to help advance NASA's missions, thus affording them the opportunity to directly contribute to advancements in STEM-related areas of study. Our fellowship opportunities are focused on innovation and generate measurable research results that contribute to NASA's current and future science and technology goals.

NASA Scholarships provide financial support to undergraduate and graduate students for studies in STEM disciplines to inspire and support the next generation of STEM professionals.

Institutional Engagement

Institutional Engagement (IE) increases STEM capabilities at formal and informal educational institutions and organizations by incorporating content based on NASA's missions.

NASA Institutional Engagement builds the capacity of formal and informal education institutions to participate in NASA's mission. IE improves their capabilities to gain support from external sources; fosters interactions between NASA Centers/JPL, academic institutions, and industry; and expands the diversity and geographic representation of institutions nationwide. The institutions and organizations that fit in the IE model cover a diverse spectrum, from academic institutions of higher learning to



museums with a STEM focus to national organizations dedicated to improving and enhancing STEM education. Consequently, both formal and informal education entities are significant stakeholders in and collaborators with NASA Education.

NASA Institutional Engagement supports colleges and universities by helping them gain access to cutting-edge engineering and science facilities and personnel. IE also enables informal institutions, such as museums, planetaria, and science centers, to engage their visitors through exhibits and displays that showcase NASA's dynamic content.

NASA Institutional Engagement supports the advancement and development of STEM personnel, programs, and infrastructure to enable formal and informal institutions to conduct NASA-related research and/or deliver NASA-related STEM content. The opportunities IE provides capitalize on the strengths and resources of the agency, including its scientists, engineers, other technical staff, and world-class facilities.

Institutional Engagement seeks to:

- *Build Capacity:* Support interactions between NASA Centers/JPL, educational institutions and organizations to enhance their competitiveness to perform STEM research and development, enable their ability to deliver and participate in NASA-based activities, and expand their participation in STEM education reform at the federal, state and local levels.
- *Deliver Content:* Increase the STEM capacity of institutions and organizations to contribute to the NASA mission through research, curriculum development and instruction, delivery of content, and/or enabling capabilities.
- *Ensure Institutional Diversity:* Promote diverse representation of institutions and organizations affiliated with NASA.
- *Sustain Capacity:* Improve the ability of NASA-supported institutions and organizations to sustain their developed capacity in STEM personnel, programs, and infrastructure beyond NASA funding.
- *Encourage Networks and Communities:* Facilitate a process where like-minded educational institutions and organizations can utilize the NASA networks of grantees, collaborators, and alliances with the intent of building a community of practice to help sustain their STEM capacity.

Strategic Partnerships

Within the lines of business, NASA partners with governmental, academic, industrial, entrepreneurial, nonprofit, and international organizations to leverage resources, reach wider and more diverse audiences, and achieve mutually beneficial objectives. Partnerships leverage the core capabilities of each organization and facilitate reasonable, feasible, and measurable outcomes.

NASA continually strives to increase its impact in areas of greatest national need by casting a wider geographic net and increasing services to groups underrepresented in STEM, including, but not limited to, minorities, women and girls, persons from disadvantaged socioeconomic backgrounds, persons with disabilities, and persons in underserved rural areas.

NASA most frequently establishes the following:

- *Partnerships with other federal agencies:* NASA collaborates with other federal agencies to leverage assets and expertise in STEM education. To ensure the most significant impact of federal STEM education investments, federal agencies aim to establish a coordinated, strategic portfolio of STEM education investments across the government.
- *Partnerships with Youth Serving Organizations (YSOs):* YSOs often have large geographic networks, which offer pathways for engaging and exciting youth in NASA-themed STEM education experiences. NASA and its partners seek to engage learners by connecting existing community-based networks with NASA-themed STEM content.

- *Partnerships that engage groups in NASA-themed STEM Challenges:* STEM challenges actively engage students in their own learning. NASA welcomes partnership activities that will engage measurable numbers of students in challenges that creatively apply NASA-themed STEM concepts.
- *Partnerships for digital learning:* NASA is interested in digital learning tools and applications that expand geographic reach, particularly into rural and underserved communities. Digital learning is any instructional practice that effectively uses technology to strengthen students' learning experiences. NASA and its partners foster the development and/or use of digital learning tools that use NASA content to reach, engage, and inspire the digital native youth of today.

Building Education Requirements into NASA Missions

NASA Education professionals work collaboratively to create meaningful education plans within agency space flight programs and projects. By discussing education plans early – in the concept phase – and continuing through the operations phase, NASA Education works with select mission program and project managers to share the complexity and excitement of NASA missions from development to launch to flight, with learners, educators, and other stakeholders. Education helps to identify activities that engage audiences in the STEM content of the mission's goals and objectives. The intended outcome of this coordinated education approach is to leverage the impact of NASA's advances and discoveries to create a framework that proactively engages key partners in STEM education.

A good education can open the door to opportunity, and it should be within the reach of all who yearn for the chance to develop their minds and talents.

– President Barack Obama

Videos

2015 Student Launch Part 1 at Marshall Space flight Center

AERO Institute Hosts World of Pressure Teacher Workshop

NASA High School Aerospace Scholars Program

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3 Who Is NASA Education?

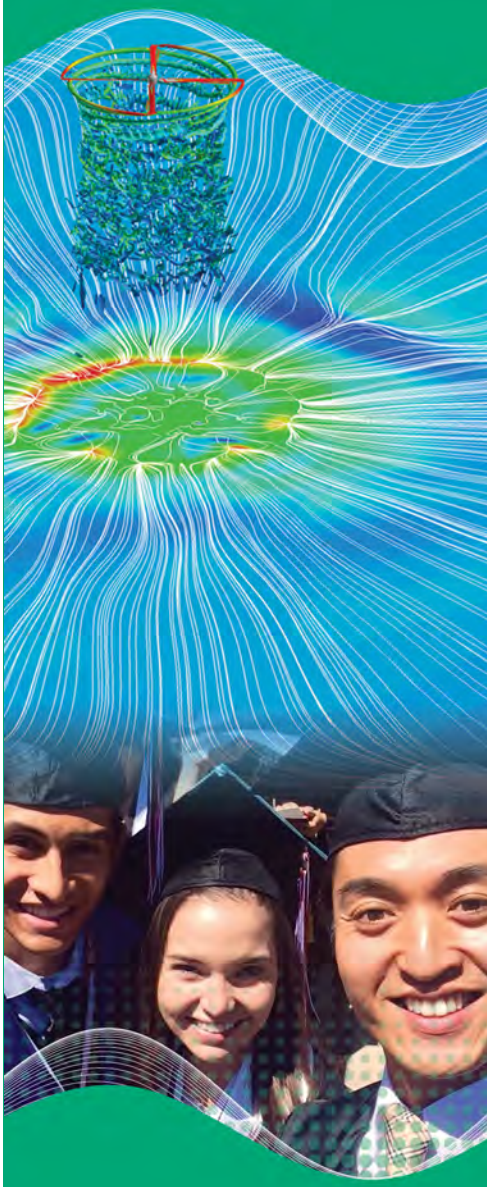
NASA Education supports the agency's objective to advance the science, technology, engineering and mathematics (STEM) education and workforce pipeline by working collaboratively with other agencies to engage students, teachers, and faculty in NASA's missions and unique assets. NASA Offices, Mission Directorates, Centers, and Facilities work together to offer unique educational experiences to learners, educators, and institutions.

NASA HQ Organizations

The Office of Education (OE) administers national education efforts that draw on content from across the agency. As an institutional management office, the OE is responsible for ensuring compliance with external requirements and laws, and NASA-wide processes, procedures, standards, audits, and accounting (NASA Policy Directive 1000.0). It also provides the leadership for coordinating and integrating NASA Education's investments, implementation approach, and policies. The OE provides national partnership networks and infrastructure to disseminate NASA Education content and activities developed by the Mission Directorates, Centers/JPL, and education partners. It solicits external advice and represents the agency externally, especially in interactions with Congress, the Office of Management and Budget, and other federal agencies. The OE refers external inquiries to specific managers within its own office or any of the Mission Directorate or Education Offices, as appropriate.

The OE provides integration and evaluation support to the Education Coordinating Council (ECC), which is the governing body for the integrated education portfolio for the agency. The OE also offers key support services in communications, events, information and educational technology, information management, performance measurement, and evaluation. For example, the OE maintains a centralized database of all NASA Education activities and investments and coordinates the evaluation and assessment of the agency's education portfolio. The integration and evaluation results are aggregated to demonstrate the total impact of NASA Education efforts and assessed to provide data to the ECC to improve the effectiveness of the overall agency education framework. The OE also supports a NASA-wide system for the recruitment, application, and selection of undergraduate and graduate students for internships, fellowships, and scholarships, primarily in the STEM disciplines, in addition to online performance measurement and reporting tools.

The OE articulates strategies for constructive engagement in conjunction with the ECC and key stakeholders, such as professional associations, other federal agencies, STEM education industry leaders, and state and local representatives, as well as Mission Directorate and Education Offices.



Office of Education Programs and Projects

The OE implements a strategically integrated education portfolio, which consists of two programs and four underlying projects. The Aerospace Research and Career Development (ARCD) Program includes the National Space Grant College and Fellowship Program (Space Grant) and the Experimental Program to Stimulate Competitive Research (EPSCoR). The STEM Education and Accountability (SEA) Program includes STEM Education and Accountability Projects (SEAP) and the Minority University Research and Education Project (MUREP). These four projects (Space Grant, EPSCoR, SEAP, and MUREP) align their activities in accordance with the NASA Education lines of business. Space Grant, SEAP, and MUREP invest funds in all four lines of business, while EPSCoR focuses solely on Institutional Engagement.

Aerospace Research and Career Development

The Aerospace Research and Career Development program strengthens the research capabilities of the nation's colleges and universities, and provides opportunities to attract and prepare students for NASA-related careers. Through two projects (Space Grant and EPSCoR), institutions of higher education conduct research that contributes to NASA's Mission Directorate research needs and furthers the nation's scientific and technology innovation agendas. The student programs serve as a major link in the pipeline for addressing NASA's human capital strategies. ARCD is intended to build, sustain, and effectively deploy the skilled, knowledgeable, diverse, and high-performing workforce needed to meet the current and emerging needs of NASA and the nation.

Space Grant supports competitive grants that enable the active involvement of 52 consortia in 50 states, the District of Columbia, and the Commonwealth of Puerto Rico. Space Grant supports and enhances science and engineering education and research efforts by leveraging the resource capabilities and technologies of over 900 affiliates from universities, colleges, industry, museums, science centers, and state and local agencies. Training grants with each consortium align their work with the nation's STEM education priorities and the annual performance goals of the agency.

Space Grant enables NASA to provide opportunities for students to gain research and hands-on engineering experience on a variety of authentic flight platforms, including high-altitude balloons, sounding rockets, aircraft, and space satellites. Space Grant leverages agency investments in STEM education through collaborations with other NASA projects, including those conducted by NASA Mission, Directorates, Centers, and Facilities. Space Grant also supports student participation in internship experiences at NASA Centers and Facilities.

EPSCoR provides competitive grants that establish partnerships among government, higher education, and industry, and promotes lasting improvements in the research and development capacity of an eligible state. The intent is to improve a jurisdiction's research infrastructure, which in turn has the potential to contribute to its research and development competitiveness and economy. EPSCoR supports academic research projects to establish long-term, self-sustaining, and nationally competitive activities in jurisdictions with modest research infrastructure so that they become more competitive in attracting non-EPSCoR funding. EPSCoR funds states and jurisdictions that have not historically participated equitably in federal competitive aerospace and aerospace-related research activities. EPSCoR supports competitively funded awards in eligible states (as identified by the National Science Foundation) and provides research and technology development opportunities for faculty and research teams. NASA actively seeks to integrate the research conducted by EPSCoR jurisdictions with the scientific and technical priorities pursued by the agency.

STEM Education and Accountability

STEM Education and Accountability Projects fund competitive grants to, and cooperative agreements with, formal and informal education institutions, such as science museums. In addition, SEAP funds contribute to professional development activities at NASA Centers and Facilities, including internships, fellowships, and scholarships for high school and college students, K-12 educators, and higher education faculty.

SEAP also connects NASA's partners, including youth-serving organizations, higher education institutions, minority serving institutions, community colleges, NASA Visitor Centers, museums, and planetaria to the broad scientific discoveries, aeronautics research, and exploration missions of the agency.

SEAP investments reflect the following portfolio priorities: focus on NASA-unique STEM engagement experiences and activities; represent all NASA mission directorates; engage with underserved and underrepresented communities/institutions; and support key NASA infrastructure components to enable portfolio coordination approaches.

Through the Minority University Research and Education Project, NASA provides financial assistance via competitive awards to Minority Serving Institutions (MSI), including Historically Black Colleges and Universities, Hispanic Serving Institutions, Asian American and Native American Pacific Islander Serving Institutions, Tribal Colleges and Universities, other minority serving institutions, and eligible community colleges, as required by the four MSI-focused Executive Orders. These institutions recruit and retain underrepresented and underserved students, including women and girls, and persons with disabilities, into STEM fields.

MUREP investments enhance the research, academic, and technology capabilities of MSIs through multi-year grants. Awards assist faculty and students in research and provide authentic STEM engagement experiences related to NASA missions. These competitive awards provide NASA-specific knowledge and skills to learners who have historically been underrepresented and underserved in STEM. MUREP investments assist NASA in meeting the goal of a diverse workforce through student participation in internships, fellowships, and scholarships at NASA Centers and JPL.

Mission Directorates (MD) and other Headquarters Funding Organizations

The Mission Directorates of Aeronautics Research (ARMD), Human Exploration and Operations (HEOMD), Science (SMD), and Space Technology (STMD), as well as other Headquarters organizations, are encouraged to integrate education components into their research and development programs and flight missions to stimulate meaningful strategic partnerships between the NASA science/engineering community and the education community. The Mission Directorates may provide discipline-specific content and/or human resources toward selected educational projects with the primary objective of stimulating innovation in a manner that has potential to advance NASA's mission through the collaboration with educational institutions and students.

Additionally, Mission Directorates and other Headquarters organizations may develop educational partnerships and collaborations specific to their disciplines and needs, including discipline-specific interactions with other federal agencies. Each Mission Directorate identifies an Education Lead, who works for the Mission Directorate and represents its Associate Administrator to the Office of Education and serves on the Education Coordinating Council (ECC) with the authority to commit resources. Education Leads are responsible for coordinating with the Office of Education and the Centers/JPL, facilitating evaluation of proposed activities using ECC-approved criteria, and facilitating data submission to the agency education data collection system.

NASA's Science Mission Directorate (SMD) recently restructured its approach to science education based on inputs from National Research Council's Decadal Surveys, internal and external stakeholders, and education leaders from around the U.S. SMD's overall desired outcome is to enable NASA scientists and engineers to engage more effectively with learners of all ages. To help achieve this outcome, four objectives have been established:

- Enable STEM education
- Improve U.S. scientific literacy
- Advance national education goals
- Leverage efforts through partnerships

SMD supports an education portfolio based on science-discipline themes. SMD has developed an education model, the foundation of which is the recognition that SMD brings unique assets to the national education environment. These assets, which are managed through SMD's divisions (Heliophysics, Earth Science, Astrophysics and Planetary Science), include, but are not limited to:

- Exciting science and engineering content that engages audiences and motivates them to learn more,
- Subject matter experts (SMEs), including scientists and engineers, who ask compelling scientific questions and then find ways to answer them within the environment of space,
- Educational professionals to "translate" SMD content through mechanisms for target audiences to learn and understand, and
- Real-life participatory and experiential opportunities (includes student collaborations, e.g., suborbital balloon and sounding rocket experiments and other student launch opportunities).

NASA Education Offices

Education Offices are responsible for coordinating NASA Education activities for the agency including Mission Directorates, Functional Offices, and the Office of Education, as well as coordinating the planning and implementation of education activities that are unique to their facilities. Many Education Offices provide expertise in areas including national standards and requirements for K–12 education, and provide valuable, field-based input into education program planning. Education Offices work closely with their regional customer base in support of systemic NASA STEM-related initiatives in formal, informal, and higher education; support the science and technical mission of the Center related to the generation and communication of knowledge by involving colleges and universities across the country; and establish links with informal education networks in support of agency national STEM education initiatives. Education Offices maintain cognizance of all NASA-funded education initiatives that take place in their geographic region and/or programmatic areas of responsibility, regardless of funding source, and coordinate the gathering of agency data requirements through the agency education data collection system.

Education Directors report administratively to their management and functionally to the Associate Administrator for Education. Center Education Directors also receive programmatic guidance from the Headquarters organizations that provide education funding to their Center. Center Education Directors are functionally responsible for all Center education initiatives. Center Education Offices participate in an internal-Request for Information (i-RFI), and an internal-to-NASA prioritization process for the NASA assets involved or proposed to be involved, using common agency-developed criteria to establish priorities.

The responsibilities of each Center's Education Director include engaging with state Departments of Education and their region's education leaders for formal K-12 education. Center Education offices engage at a national level with informal and higher education entities with their unique Center expertise.

Ames Research Center (ARC)

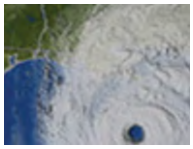
Ames specializes in research geared towards creating new knowledge and new technologies that span the spectrum of NASA interests.

Armstrong Flight Research Center (AFRC)

As the lead for flight research, Armstrong continues to innovate in aeronautics and space technology.

Glenn Research Center (GRC)

Glenn Research Center develops and transfers critical technologies and systems for safe and reliable aeronautics, aerospace, and space applications.

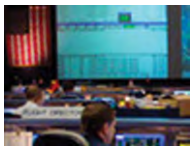


Goddard Space Flight Center (GSFC)

The mission of the Goddard Space Flight Center is to expand knowledge on the Earth and its environment, the solar system, and the universe through observations from space.

Jet Propulsion Laboratory (JPL)

The Jet Propulsion Laboratory, managed by the California Institute of Technology, is NASA's lead facility for robotic exploration of the solar system.



Johnson Space Center (JSC)

From the early Gemini, Apollo, Skylab and Shuttle Projects to today's International Space Station program, Johnson Space Center continues to lead NASA's effort in Human Space Exploration.

Kennedy Space Center (KSC)

Kennedy Space Center leads the world in preparing and launching missions around the Earth and beyond.

Langley Research Center (LRC)

Langley continues to forge new frontiers in aviation and space research for aerospace, atmospheric sciences, and technology commercialization.

Marshall Space Flight Center (MSFC)

Marshall Space Flight Center is world leader in the access to space and use of space for research and development to benefit humanity.

Stennis Space Center (SSC)

Stennis is responsible for NASA's rocket propulsion testing and for partnering with industry to develop and implement remote sensing technology.

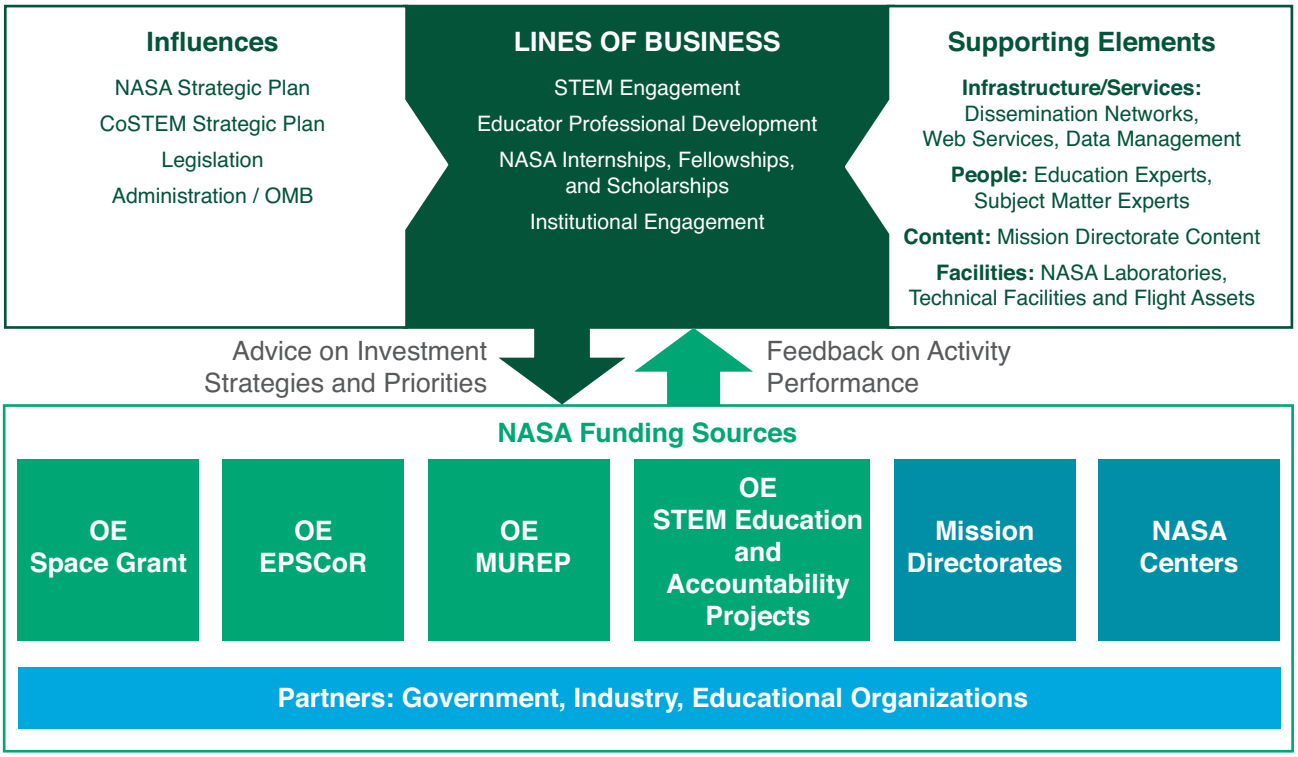
NASA Funding Sources

The Mission Directorates, the Office of Education and NASA Centers invest monetary and non-monetary agency resources in support of STEM education. Investment decisions are guided by programmatic needs, funding source constraints, and in concert with the four lines of business (STEM Engagement, Educator Professional Development, NASA Internships, Fellowships, and Scholarships, and Institutional Engagement).

Coordination

NASA delivers a comprehensive agency education portfolio that ensures scalability and flexibility, and enables NASA Education to focus its efforts in the areas of greatest national need. NASA has developed a portfolio management approach that provides a single, coordinated programmatic tool that enables examination of the NASA Education portfolio in its entirety. Figure 1 provides a model of how NASA examines, guides, and coordinates the education portfolio.

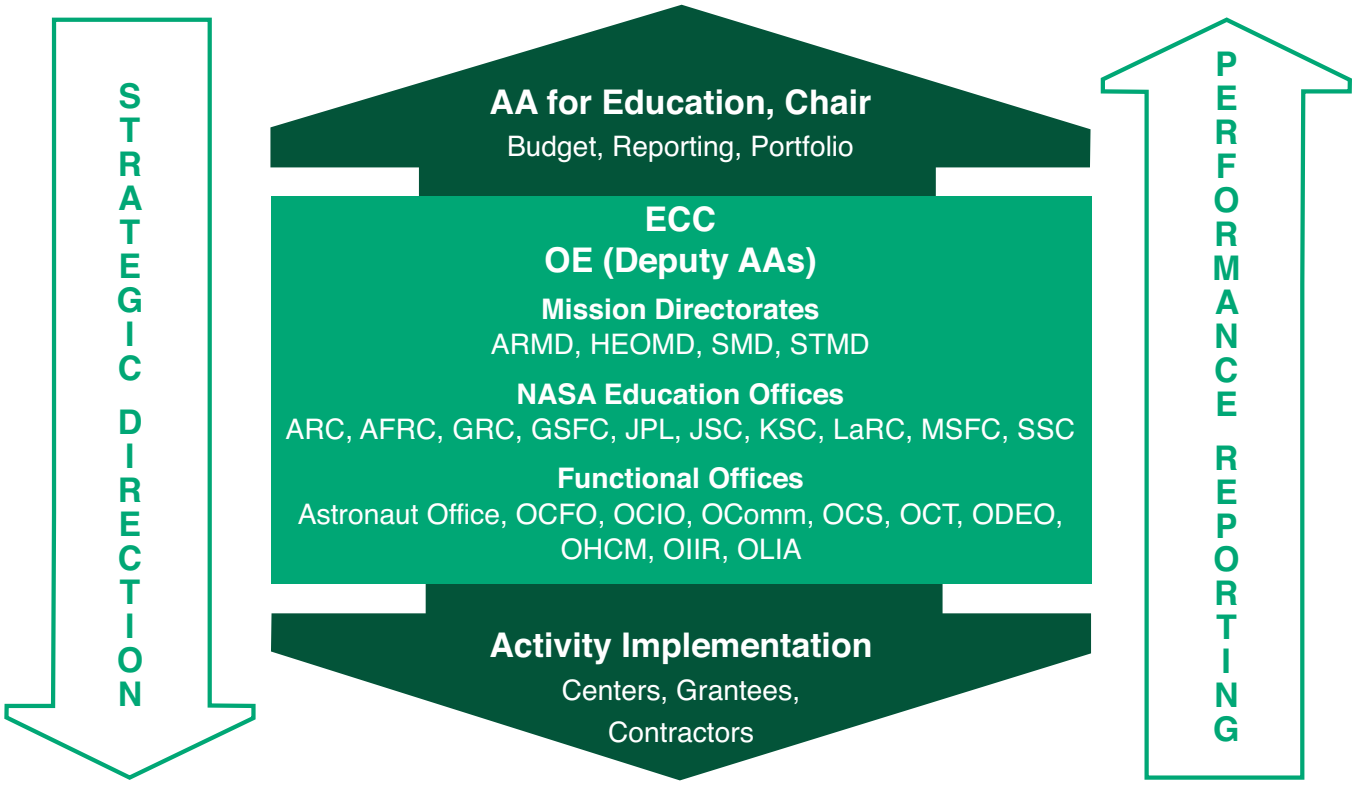
Figure 1: NASA Education Architecture



Portfolio Management

NASA's Offices, Mission Directorates, and Centers/JPL collaborate to implement a single agency-wide approach to STEM education resulting in a strategically integrated education portfolio. This extensive participation provides broad education engagement with NASA content, people, and facilities. Close and effective consultation, coordination, and cognizance among all entities are critical to the optimal fulfillment of NASA's objective for its education investment. This approach provides unique NASA experiences to learners, educators, and institutions, and streamlined access to our content, websites, people, resources, and facilities.

Figure 2: Education Coordinating Council



Governance

The Education Coordinating Council (ECC), established in 2012, serves as the agency's senior decision-making body for strategic direction and planning of NASA's education efforts. The ECC determines NASA's strategic education direction and assesses agency progress toward achieving NASA Education's mission. The ECC is guided by the ECC Governance Charter, which is reviewed every four years. The ECC Charter applies to NASA Headquarters, NASA Centers, including component Facilities, JPL, and all educational activities funded by these entities. The next full review for the ECC charter will be in 2016. There is an interim review of the charter being conducted in FY 2015 with a focus on several specific sections, including the Governance section and the portion of the charter that refers to education's role with regard to early involvement in the project life cycle.

The ECC is responsible for maintaining an integrated agency education portfolio. Ongoing responsibilities include the performance assessment of all NASA Education programs and projects to ensure an efficient use of agency resources in support of the achievement of NASA Strategic Objective 2.4. Mission Directorates, Centers, and other funding organizations maintain authority over their funds.

The NASA Associate Administrator for Education serves as the ECC Chair and holds the ultimate decision-making authority for the ECC. The scope of the ECC encompasses all educational activities conducted by NASA. Governance by the council is appropriate when decisions require high degrees of integration, visibility, and approval. Regardless of position within NASA's organizational structure, senior managers are accountable to the ECC Chair with respect to topics addressed by the Council.

ECC responsibilities include:

- Setting NASA strategic direction for education, measurable education goals, education architecture, and policies related to education for the agency.
- Serving as the senior leadership forum for making decisions on all strategic agency-level education issues.

- Approving Mission Directorate educational portfolios, Center educational portfolios, the Office of Education portfolio, educational activities at other agency entities, and the integrated agency educational portfolio and the associated risk.
- Providing guidance for the formulation of NASA Education plans.
- Establishing the highest level metrics against which to measure agency education performance.
- Establishing education mission and budget priorities for the agency. Mission Directorates, Centers, or other funding organizations maintain authority over their funds.
- Approving major new education initiatives and educational partnerships.
- Approving communications strategies related to education.
- Ensuring that NASA is meeting the commitments specified in the relevant management documents for program/project performance and mission assurance related to education.
- Ensuring implementation and compliance with NASA program and project management processes and requirements as modified and applicable to education.
- Approving major education programs/projects to progress into subsequent life-cycle phases.
- Reviewing education programs routinely, including institutional ability to support program/project commitments and reviewing special and out-of-cycle assessments as required.

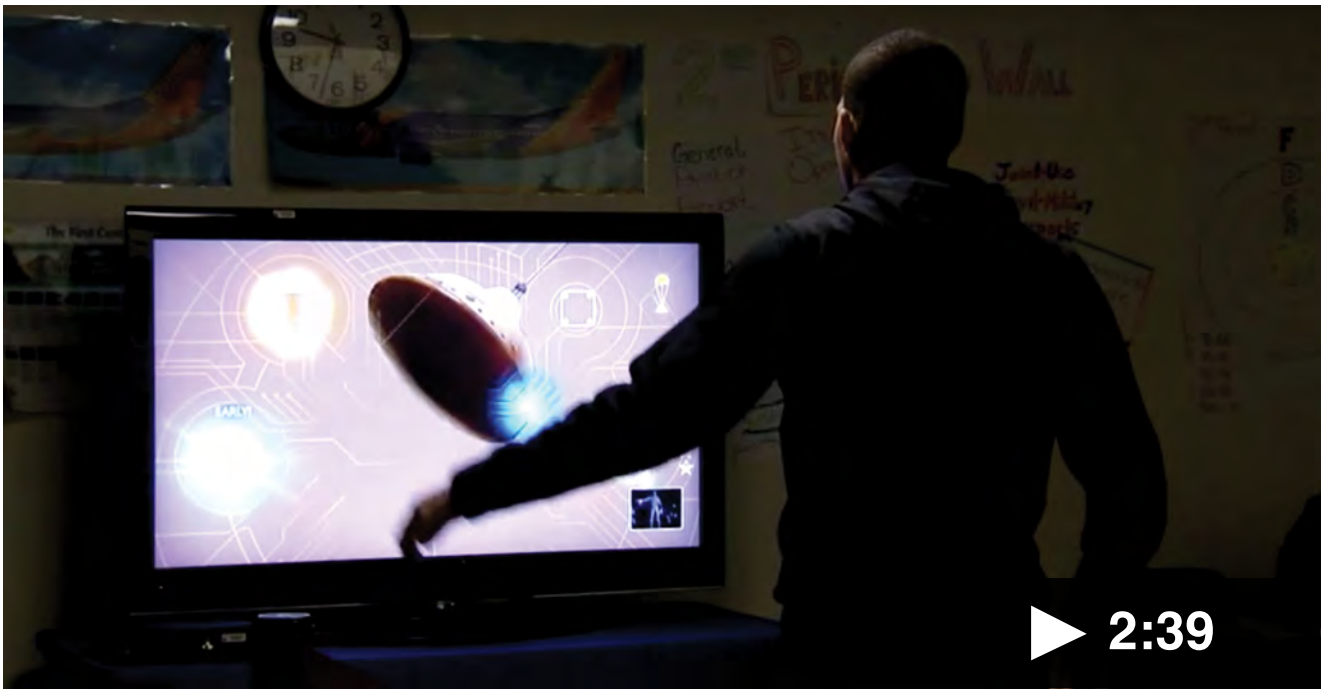
The ECC meets regularly throughout the year, utilizing a combination of teleconferences and face-to-face meetings. The Associate Administrator for Education appoints an Executive Secretary to manage the activities of the ECC. Membership in the ECC is by appointment and consists of internal NASA Education stakeholders. Members (or their proxies) represent their respective offices. Adjunct Members participate in the meetings and conduct of Council business at the request of the Chair.

ECC membership includes all Education Directors, Mission Directorate Education Leads, representatives from NASA Functional Offices, and senior leaders from the Office of Education.

Videos

How Math is Used on the ISS

Introduction to Goddard's Office of Education

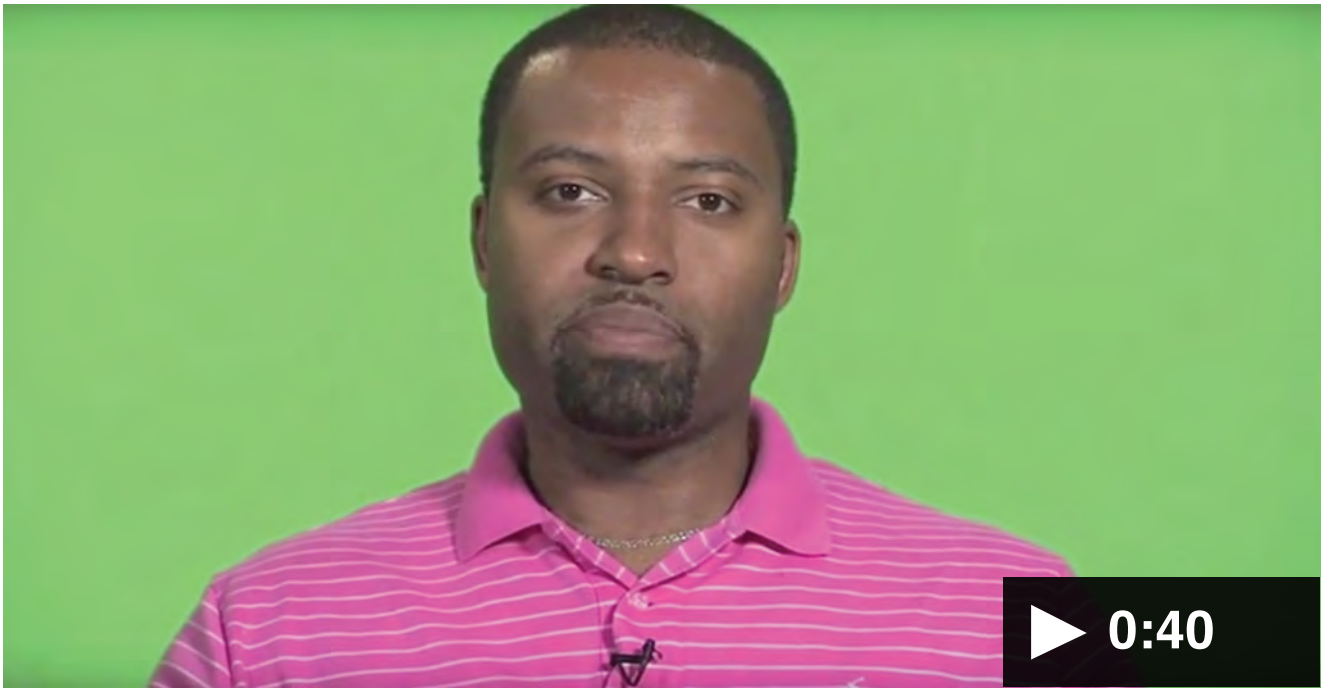


ISS Astronauts 'Visit' Virginia Classrooms via NASA Downlink

NASA Human Exploration Rover Challenge

NASA Student Launch Marshall Space flight Center

Space Station Live: Science for Students



The Pathways Program

4 What Is The Plan?

General Strategy

NASA's mission, including plans for the Journey to Mars, starts with a STEM-qualified and prepared workforce. The Administration continues to place a high priority on STEM education, making significant commitments to the CoSTEM Strategic Plan to improve the quality of STEM education at all levels. NASA is committed to funding competitive, evidence-based programs in STEM education that will benefit aspiring learners, educators, and institutions, and contribute to these national goals. To support this effort, NASA Education has developed a plan through 2017 that will support the strategy for strengthening the economy and increasing opportunities for Americans to secure critical STEM jobs.

NASA actively contributes to federal-wide efforts to advance collaboration among government agencies to deliver compelling STEM content. In addition to membership on CoSTEM, NASA is a co-chair of the Federal Coordination in STEM Education Task Force (FC-STEM) along with the National Science Foundation. FC-STEM is tasked with overseeing the implementation of the 5-Year Strategic Plan through five Interagency Working Groups (IWGs) aligned to the five priority investment areas of the strategic plan. In addition to active participation in all of the IWGs, NASA was named co-chair with the Smithsonian Institution for the STEM Engagement IWG. In FY 2016, the Office of Education (OE) will continue its dedication to the IWG-created infrastructure, policies and practices. NASA will continue to leverage its missions and unique assets, such as the International Space Station, to accelerate and expand engagement of students, learners, and educators in STEM. The agency aims to increase both the use of NASA missions and assets while expanding the availability of opportunities for a diverse audience of educators and students, including women and girls, minorities, and persons with disabilities, in alignment with significant administration initiatives.

NASA Education will use competitive processes to identify and support the most effective STEM education activities. NASA will seek strategic opportunities to collaborate with other federal agencies to enhance the effectiveness of STEM education programs government-wide. OE will continue evidence collection to conduct performance measurement, analysis, evaluation, and accurate reporting of NASA's contributions to STEM education.

NASA Education Priorities and Critical Investments Requirements Through 2017

The four lines of business and accompanying programs and projects are described in Sections 2 and 3. This section provides additional detail on the priorities and planned critical investments for these NASA Education activities planned through 2017. Specific requirements for the Centers and JPL will be determined during the year of execution.

STEM Engagement (SE)

Using NASA's unique mission and resources, STEM Engagement activities are designed to provide opportunities for participatory and experiential learning activities that connect learners to NASA-unique resources. As described in Section 2, the STEM Engagement line of business consists of Public Education Activities (PEA), Experiential Learning Opportunities (ELO) and STEM Challenges (SC).

SE Priorities	• **Facilitate strategic planning and communication among funding sources, other lines of business, partners, stakeholders and decision makers to enable increased efficiency and coherence throughout NASA Education.** • **Inventory and review of SE activities and resources for gaps and synergies, duplication of efforts, resource leverage, scalability, and future activity planning.** • **Analyze reported performance and outcomes annually for API contributions, innovation, continual improvement, and accomplishment of objectives.** • **Continue to participate in the CoSTEM Interagency Working Group on STEM Engagement.** • **Implement strategies to ensure participation of traditionally underserved and underrepresented learners.** • **Proactively cultivate and maintain internal and external partnerships and collaborations in the design and delivery of activities to expand the reach and impact of the SE portfolio.** • **Coordinate with the Office of Communications regarding PEAs.**
SE Criteria for Investment	• **Well-defined and measurable participant outcomes that support national education or workforce needs;** • **Grounded in good practice or research where available;** • **Designed to be inclusive of traditionally underserved and underrepresented audiences; and** • **Utilization of NASA-unique resources (e.g. mission-related content, technology, data, facilities, technical workforce, research labs at universities, university personnel, etc.) as a context for activities.**

Educator Professional Development (EPD)

NASA's attention to professional development for educators spans more than 50 years as various related models, projects, and activities have been implemented to introduce and integrate the agency's unique educational STEM resources into formal and informal learning environments locally and nationally. The NASA Educator Professional Development LOB has been established to consolidate these diverse components into a focused effort to ensure operational efficiency while optimizing strategies, methods, and technologies that promote and foster educators' use of NASA-related content in their instructional activities. Pre-service, in-service, and informal educators working with grades K-20 and higher education faculty are considered customers and clients who derive benefits from EPD opportunities. As described in Section 2, the EPD line of business consists of four integrated delivery mechanisms: NASA Facility Face-to-Face (F2F) Institute, Partner-Delivered EPD, Online EPD, and Community-Requested EPD.

EPD Priorities	• **NASA Face-to-Face Institutes for pre-service teachers and new teachers entering the profession from another career field, supporting the Co-STEM priority of effective K-12 STEM education and the White House focus on 100,000 new teachers in 10 years.** • **Online EPD to reach diverse geographical, gender, and socioeconomic audiences to increase educator participation serving underserved/underrepresented populations** • **Community-requested EPD to support local regions with an emphasis on application of STEM, Common Core Standards, and Next Generation Science Standards (NGSS).** • **Build partnerships to increase the reach of NASA EPD.** • **Continue to participate in the CoSTEM Interagency Working Groups (IWGs). Specifically represent NASA in education policy discussions that support improving STEM instruction and better serving groups historically underrepresented in STEM fields.** • **All EPD efforts will support teacher preparation efforts that encourage use of evidence-based STEM learning opportunities.** • **Efforts will also seek to increase and improve authentic STEM experiences for teachers.**
EPD Criteria for Investment	• **EPD should be delivered through one of the four described mechanisms.** • **EPD should use NASA resources, materials, and curriculum guides.** • **NASA-delivered EPD should make use of NASA-unique assets.**

NASA Internships, Fellowships and Scholarships (NIFS)

The NIFS LOB provides educational opportunities for students to engage in scientific or engineering research, development, and operations activities. Through these opportunities, NIFS leverages NASA's unique mission activities to enhance and increase the capabilities, diversity and size of the nation's next generation workforce. As described in Section 2, the NIFS line of business consists of internships, fellowships and scholarships.

NIFS Priorities	• Continue to participate in the CoSTEM Interagency Working Groups (IWGs). Specifically, represent NASA in education policy discussions that support progress in three of the priority investment areas: improve undergraduate STEM Education, design graduate education for today's STEM workforce, and better serve groups historically underrepresented in STEM fields. • Identify strategic opportunities that can be used for collaborative efforts, such as cross agency webinars and virtual symposiums to begin actionable and relevant activities. • Implicit in the IWG work is alignment with national standards in STEM subjects, and to ensure coordination and sharing of best practices across federal STEM agencies to avoid duplication, overlap, or fragmentation by participating in STEM education advisory boards, STEM-related committees, or other events or activities related to CoSTEM education policy. • Establish and enhance process and personnel efficiencies. • Provide consistent, high quality experiences to participants. • Assure bridging to and from each NASA Education line of business and Pathways programs. • Develop strategic approach to identifying partners. • Provide significant merit-based direct awards to qualified students in higher education with special attention to: (1) racially or ethnically underrepresented students in STEM, (2) females, (3) persons with disabilities, and (4) veterans at percentages that meet or exceed the national enrollment percentages for these populations by academic disciplines, as determined by the most recent, publicly available data from the U.S. Department of Education's National Center for Education Statistics. • Improve retention rates of students in NASA-relevant disciplines by (1) increasing persistence in degree pursuit through scholarship and academic mentoring support, (2) increasing competencies through degree-relevant experience in applying classroom knowledge and skills, and (3) increasing motivation through building professional self-confidence and clarifying career opportunities. • Generate useful, degree-relevant productivity furthering NASA's mission and directly benefiting mentors. • Communicate strategic story in such a way that leverages participant experiences and enthusiasm to raise public awareness of NASA activities, as well as inform educators and students of ways they can connect with NASA, and inspire younger students to consider science and mathematics pursuits.
NIFS Criteria for Investment	• Adhere to federal regulations, executive orders, federal reports and/or guidelines on advancing the state of STEM education and diversity initiatives. • Broaden participation in NIFS by attracting underrepresented and underserved populations.

Institutional Engagement (IE)

Institutional Engagement supports efforts that build and develop capacity of formal and informal institutions, including minority serving institutions, and youth serving organizations and youth serving activities created and managed by other federal agencies, for sustained STEM capabilities in topical areas of interest to NASA. As described in Section 2, the IE line of business seeks to build capacity, deliver content, ensure institutional diversity, sustain capacity, and encourage networks and communities.

IE Priorities	• **Aerospace-related engineering, technology and sciences capacity at community colleges and youth serving organizations to increase and enable the engineering, technology and physical science pipeline allied to NASA.** • **Science centers, museums and planetariums to extend NASA's reach in STEM informal education, particularly with respect to geographic diversity and underserved populations.** • **Align with CoSTEM priority areas on youth and public STEM Engagement, improving undergraduate STEM education, and better serving groups historically underrepresented in STEM fields.**
IE Criteria for Investment	• **Apply all congressionally-directed language related to funding institutions.** • **Address IE capacity-building goal and at least one other IE goal.** • **Funding leads to sustained institutional capacity, such that when NASA funding ends the invested STEM effort continues.** • **Priorities funded with depth in mind, not breadth; e.g., provide more funding to a single institution to assure capacity rather than numerous institutions for shorter periods of time.** • **Broaden participation in NASA IE by attracting institutions with minimal or no prior NASA relationship.**

NASA Education Programs and Projects

As described in Section 3, the Aerospace Research & Career Development and STEM Education and Accountability programs, which include National Space Grant College and Fellowship Project (Space Grant), Experimental Program to Stimulate Competitive Research (EPSCoR) project, STEM Education and Accountability Projects (SEAP), and Minority University Research and Education Project (MUREP), will provide a strategically integrated portfolio to better leverage their resources within the Mission Directorates and Functional Offices.

Aerospace Research and Career Development (ARCD) Program Requirements

The Aerospace Research and Career Development projects, Space Grant and EPSCoR, will focus on attracting and preparing students in STEM disciplines, and support their undergraduate and graduate studies with the ultimate goal of providing access to careers in the scientific and technical workforce. In addition, the projects will support higher education institutions to strengthen their scientific and technical capabilities while contributing to the needs of NASA's missions and spurring NASA-related innovation and new technologies.

Center/JPL Requirements	
	• **Serve as the entry point for Aerospace Research and Career Development projects.** • **Maintain knowledge of Center research and technology development priorities.** • **Serve as a conduit to connect faculty and researchers to Center scientists and engineers.** • **Utilize One Stop Shopping Initiative (OSSI) for ARCD-funded NASA Center/JPL internships.**

National Space Grant College and Fellowship (Space Grant) Project Requirements

Space Grant enables the active involvement of the entire country in NASA activities through its national network composed of 52 consortia in 50 states, the District of Columbia, and the Commonwealth of Puerto Rico. Space Grant supports and enhances science and engineering education and research efforts for educators and learners by leveraging the resource capabilities and technologies of over 900 affiliates from universities, colleges, industry, museums, science centers, and state and local agencies. Grants with each consortium align their work with the education priorities and the annual performance goals of the agency.

Space Grant enables NASA to provide flight opportunities for students to access space to gain research and hands-on engineering experiences on a variety of authentic flight platforms, including high-altitude balloons, sounding rockets, aircraft, and space satellites. Space Grant leverages agency investments in STEM education through collaborations with other national NASA Education activities, including those conducted by NASA Mission Directorates and Centers/JPL. Space Grant also supports student participation in internship experiences at NASA Centers and JPL.

Plans for FY 2017	**The Space Grant Program Office at NASA Headquarters will incorporate results from the external evaluation into the FY 2017 Space Grant Solicitation. The Program Office will begin a new multi-year award cycle of competitive grants to 52 Space Grant consortia in each state, the District of Columbia, and the Commonwealth of Puerto Rico.**
Center/JPL Requirements	• **Support Space Grant by building stronger linkages with Space Grant consortia that have particular interests in the Center-specific research and technology development goals and objectives.** • **Provide on-site internship opportunities including, but not limited to, faculty and student interns on-boarding assistance (i.e., submit internship opportunities through the OSSI system).** • **Centers receiving Space Grant funding provide at least three civil servants and/or contract staff to serve as reviewers and panelists for the Space Grant solicitations without additional compensation.** • **Selected Centers may receive additional Space Grant travel funds to support site visits and participation in Space Grant consortia regional and national meetings.**

Experimental Program to Stimulate Competitive Research (EPSCoR) Requirements

EPSCoR provides grants that establish partnerships between government, higher education, and industry, and promote lasting improvements in the research and development (R&D) capacity of that state or jurisdiction. By improving research infrastructure, a state or jurisdiction will improve its national R&D competitiveness and economy. EPSCoR develops academic research projects to establish long-term, self-sustaining and nationally competitive activities in states with modest research infrastructure so that they become more competitive in attracting non-EPSCoR funding.

EPSCoR funds states and jurisdictions that have not historically participated equitably in federal competitive aerospace and aerospace-related research activities. EPSCoR supports competitively funded awards in eligible states (as identified by the National Science Foundation) and provides research technology development opportunities for faculty and research teams. NASA actively seeks to integrate the research conducted by EPSCoR jurisdictions with the scientific and technical priorities pursued by the agency.

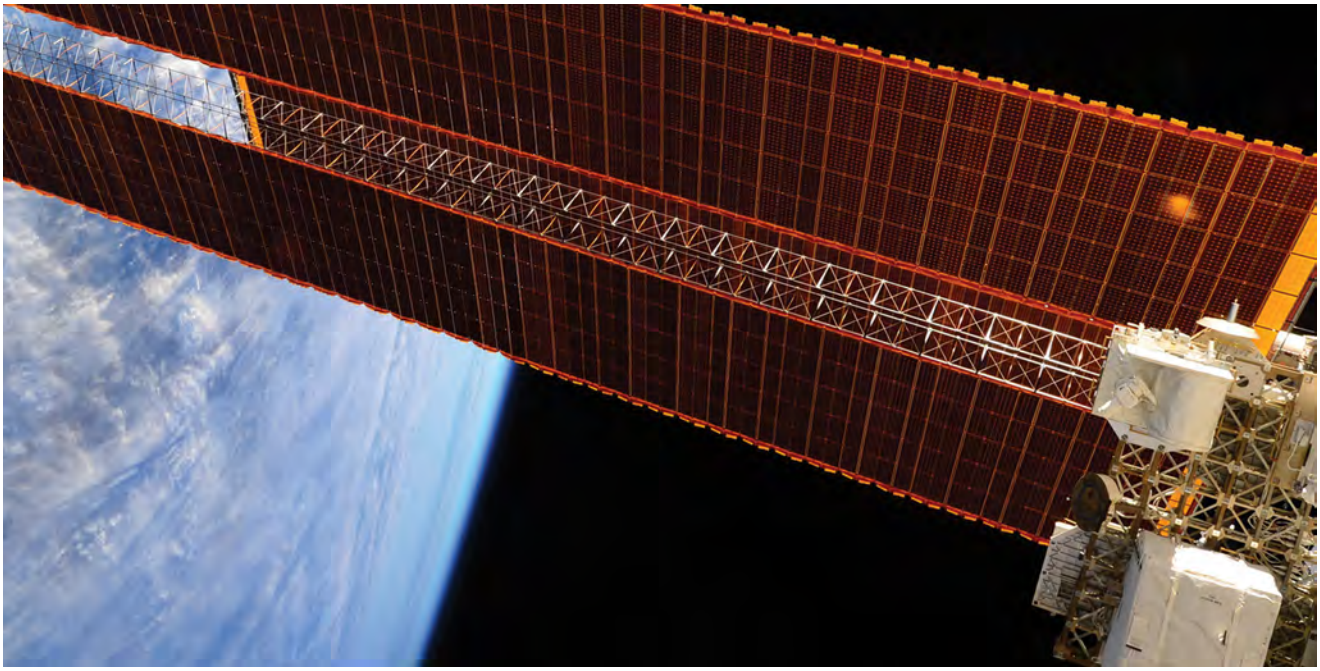
Plans for FY 2017	**FY 2017 will begin a new multi-year award cycle of Research Infrastructure Development awards. The EPSCoR Project Office also anticipates issuing a new solicitation for Research awards.**
Center/JPL Requirements	• **Support EPSCoR by continuing efforts to build stronger linkages with EPSCoR jurisdictions that have particular interests in the Center-specific research and technology development goals and objectives.** • **Depending upon the specific technical content and proposal selection, it is anticipated that Centers may receive EPSCoR funds to support technical personnel or tasks associated with a selected Research proposal. These are typically of minimal dollar amounts and will be directly aligned to a specific award.** • **Center technical personnel may be invited to serve as a Technical Monitor for selected EPSCoR research awards. Center education offices will be informed of the acceptance of a Technical Monitor assignment by an individual at their Center. No specific involvement is required by Center Education staff in the Technical Monitor responsibilities.**

STEM Education and Accountability (SEA) Program Requirements

The STEM Education and Accountability Program provides funding for competitive NASA-unique STEM education opportunities. These opportunities, based in all four lines of business, include student internships at NASA Centers, launch initiatives, hands-on payload development, and competitive grants to diverse institutions and organizations, including higher education institutions, minority serving institutions, community colleges, and youth serving organizations as well as NASA Visitor Centers, museums, and planetaria.

Through MUREP, NASA will support Historically Black Colleges and Universities, Hispanic Serving Institutions, Asian American and Native American Pacific Islander Serving Institutions, Tribal Colleges and Universities, and other minority serving institutions, through multi-year research grants. Additionally, MUREP provides internships, fellowships, scholarships, mentoring, and tutoring for underserved and underrepresented learners in K-12, informal, and higher education settings, including community colleges, particularly those serving a high proportion of minority and underserved students, including persons with disabilities and women.

Plans for FY 2017	• Focus resources, including content, facilities, and personnel, to improve the impact of NASA's STEM education efforts on areas of greatest national need, and ensure that NASA-unique assets are leveraged when conducting direct-service student activities. • Continue to provide opportunities for learners to engage in STEM education through NASA content provided to NASA Visitor Centers and other informal education institutions. • Continue NASA's participation in the CoSTEM Interagency Working Groups (IWGs) through education policy discussions to improve K-12 instruction, youth and public engagement in STEM, undergraduate and graduate reform, and broadening participation by individuals underrepresented and underserved in STEM. Implicit in the IWG work is alignment with national standards in STEM subjects, and to ensure coordination and sharing of best practices across federal STEM agencies to avoid duplication, overlap, or fragmentation by participating in STEM education advisory boards, STEM-related committees, or other events or activities related to CoSTEM education policy.
Center/JPL Requirements	• Serve as the agreement manager, technical officer or contracting officer for new awards or Space Act Agreements made under the SEA program and any prior year awards. • Service inquiries from learners, educators and institutions. • Serve as a conduit to connect learners and educators to Center scientists and engineers. • Communicate quarterly (or more frequently, if appropriate) with the Mission Directorate Education representatives at Headquarters to assure Center Education alignment with Mission priorities. • Participate in joint meetings and activities for NASA-wide events determined by the Office of Communications or designated by the Communications Coordinating Council (CCC). • Collaborate on educational outreach upon request of Headquarters or Center Offices for Small Business and Diversity and Equal Opportunity.



Minority University Research and Education (MUREP) Project Requirements

MUREP was established to increase the agency's responsiveness to Federal mandates related to Minority Serving Institutions (MSIs). MUREP's activities seek to administer NASA-related research and education awards that advance educational excellence and are responsive to all Federal mandates. Multi-year grants are awarded to MSIs to assist faculty and students in research and authentic STEM engagement pertinent to NASA missions. These institutions recruit and retain underrepresented and underserved students, including women and girls, and persons with disabilities into STEM fields. MUREP investments are designed to enhance the academic and research infrastructure at MSIs through partnerships and activities that strengthen research and educational outcomes in NASA-related fields. MUREP strives to ensure faculty and students are informed about NASA competitive research and education opportunities with the focus of increasing retention rates and degree completion at each educational level at MSIs in NASA-related fields. In addition, these awards also provide opportunities for MSIs to improve educator's professional development and thereby better serve groups historically underrepresented and underserved in STEM.

Plans for FY 2017	**MUREP will facilitate activities through competitive NASA Research Announcements (NRA), Cooperative Agreement Notices (CAN), and other procurement vehicles to award multi-year grants to MSIs, faculty, and students in agency-relevant research. According to the Science and Engineering Indicators 2014, the proportion of students planning to major in science and engineering are lower for women in every racial and ethnic underrepresented group in STEM. The White House Executive Order 13506 states women and girls, including women of color and those with disabilities, are still significantly underrepresented in the STEM fields. MUREP can focus strategic efforts to increase retention and graduation rates for women of color in STEM fields. Likewise, in February 2014, the administration launched the "My Brother's Keeper Initiative" to build ladders of opportunity for boys and young men of color. MUREP can focus strategic efforts to reach boys and young men of color with opportunities in STEM.** **All MUREP activities will be mapped to the annual performance indicators. MUREP investments assist NASA in meeting the goal of a diverse future workforce through student participation in NASA-related internships, fellowships, and scholarships at NASA Centers. MUREP contributes to the diversity of activities in NASA Education. NASA targets recruitment and retention of underrepresented and underserved students, including women and girls, and persons with disabilities, into the STEM fields in all education programs.**
Center/JPL Requirements	• **Each Center's MUREP team members (e.g. leaders, managers, etc.) have primary responsibility to promote education accountability. MUREP team members require a dual competency in (1) program and policy analysis, and (2) traditional NASA project management. Additionally, the Headquarters-funded MUREP team members are skilled communicators and negotiators, who will (1) identify who the non-Office of Education educators are at their Center, and (2) be cognizant of what these colleagues are doing.** • **Individual MUREP team members are expected to work closely with and beyond their own Center's Education Office. A cohesive and collaborative approach is necessary to ensure that: multi-center support occurs; awareness of tasks and responsibilities that are directed to centers are reasonable; and shared decision-making occurs in managing fiscal challenges and improvements to MUREP's portfolio.**

Center/JPL Requirements	• **Funded efforts are expected, at a minimum, to contribute to FY 2017 outcomes and efficiency measures. The MUREP project will implement a systemic restructuring of budgets to realize efficiencies, cost savings and reallocation. A business model that includes cost-sharing, sunrise-sunset provisions to funded Center activities, and insertion of standard processes, tools, and reporting will be implemented.**

STEM Education and Accountability (SEAP) Project Requirements

STEM Education and Accountability Projects (SEAP) provide competitive opportunities to support innovative education efforts at NASA Centers and by grantees. NASA Activities use evidence to guide program design and implementation and improve measurement of outcomes. SEAP Activities enhance coordination with other agencies and will focus on those areas of STEM education where the federal government can have maximum impact. These areas include engaging youth in STEM, preparing effective STEM teachers, improving undergraduate STEM success, and support for individuals and institutions serving historically underrepresented or underserved groups.

SEAP supports performance monitoring, evaluation, and both formal and informal education. Through collaborations with key stakeholders and strategic partners, SEAP funds NASA Centers and formal and informal education institutions, such as Boys and Girls Clubs and Challenger Centers. As required by NASA's Authorization Act of 2005, NASA Visitor Centers, science museums, and planetaria may compete for funds limited to their NASA-related STEM exhibits and education programs focused on space exploration, aeronautics, space science, Earth science, or microgravity. NASA's Mission Directorates and the Offices of Chief Technologist and Scientist collaborate with NASA Education experts to work on national STEM education policy.

Plans for FY 2017	**SEAP will continue its commitment to CoSTEM priorities such as exemplified under the priority to improve STEM Instruction by being one of three federal partners in the 100Kin10 movement. This supports the creative and strategic efforts with partner organizations to expand the nation's STEM teaching force. NASA will leverage its facilities, missions, data, images, and people to support training and development of educators by providing access to research opportunities, science and engineering activities, and innovations and technologies applicable to the classroom.**
Center/JPL Requirements	• **Each Center's team members (e.g. leaders, managers, etc.) have primary responsibility to promote education and accountability. Team members require a dual competency in (1) program and policy analysis and (2) traditional NASA project management.** • **Because the Centers may have other individuals doing education and outreach embedded outside a Center's Education Office, the Headquarters-funded team members are skilled communicators and negotiators who will (1) identify who the non-Office of Education educators are at their Center, and (2) be cognizant of what these colleagues are doing.**

Office of Education Infrastructure Requirements

To address the impacts of NASA Education programs on performance outcomes and evidence-based policy making, the Office of Education will focus on three main areas through FY 2017: (1) continue to refine the technology infrastructure that provides support tools applicable to evidence-based program management and policy-making, (2) conduct broad data collection and statistical analysis that reflect patterns, relationships, and anomalies in administrative and performance data sets, and (3) perform internal and external program evaluation that assess and compare effectiveness of policy choices.

Priorities

The Office of Education will provide a unified systematic and standardized approach to data collection and performance assessment within NASA Education. Objective and verifiable performance metrics, internal and external review processes, valid and reliable data collection instruments, and evaluation studies are used to assess progress and performance across the portfolio, including lines of business, programs, projects, and activities. To effectively monitor educational investments across the agency, the Office of Education collects and reports performance data on all NASA Education investments using the Office of Education Performance Measurement (OEPM) system. In addition to collecting data on activity outputs, such as counts of participants, the OE is also developing and testing new data collection instruments intended to assess the short-term outcomes of NASA's educational investments. NASA is also an active participant in CoSTEM discussions on common metrics and instruments that could be used across the federal government to monitor and assess the impact of federal STEM investments.

Strong efforts that address on-going enhancements of the OE's information technology (IT) system will continue in compliance with federal and agency requirements and the OE's IT strategic plan. The IT system is composed of, but not limited to, two major components:

- **The OEPM system provides a centralized collection point for performance measurement and program monitoring data, a means to collect the same data consistently across all like projects, and quarterly reporting on all relevant education activities and investments.**
- **The One Stop Shopping Initiative (OSSI) for NASA Internship, Fellowship, and Scholarship opportunities strategic model, which is designed to support the matching of NASA intern opportunities with interested highly qualified students and provide data for tracking students through the intern, fellow, and scholar pipeline into full time employment within the NASA workforce, including industry and academia. The initiative provides an agency-wide integrated recruitment, retention, application and placement system for student engagement in the STEM research, aerospace education and space exploration workforce pipeline. All opportunities are consolidated in one centralized location with a streamlined student application process.**

Third Party Evaluation

A robust, coordinated, and targeted evaluation function is essential to the ability of the OE to measure and monitor program performance, make decisions for programmatic adjustments and changes, document program impact, identify best practices and lessons learned, help assess return on investment, provide inputs for policy, planning and budget decisions, and assure accountability to the American people.

The Office of Education will provide third party program evaluation support through contractors with expertise in evaluation strategies that incorporate the most rigorous evaluation methodologies appropriate for the projects under study and research questions of interest. The project will work with the Education Coordinating Council (ECC) and NASA Education senior leadership to identify questions and program areas of strategic importance to NASA Education that can be supported by third party program evaluation. Evidence-based evaluation findings will be used to (1) manage, improve, and make decisions about NASA's programs and projects, and (2) provide reports to the Office of Management and Budget, Congress, the public and other stakeholders. To promote transparency, completed evaluations will be posted on the NASA Education website.

NASA/JPL and Mission Directorate Reporting Requirements

Specific reporting requirements for the centers, including the missions, will be determined during the year of execution. In addition, all investments are required to utilize the OE systems to collect and monitor performance of investments. Education Directors, Mission Directorate Education Leads, and Office of Education Program Directors, as representatives to the ECC, are accountable to education leadership for effectively managing personnel and resources under their sphere of influence to achieve performance goals.

Videos

2015 Rover Challenge Day One

Illinois and Ohio Educators Fly on NASA Astronomy Mission

NASA at the 2015 White House Science Fair

Salman Khan - Khan Academy: Education Reimagined

Students Test Experiments in Microgravity

Teachers Learn How to Use NASA in the Classroom

The Power of NASA Interns

Summer Interns Shine During NASA Marshall's 2015 Poster Expo

RIF
Reading is Fundamental
www.rif.org
Acadia

5 How Do We Measure Success?

Monitoring and Accountability

NASA Education sets concrete performance goals and is accountable to those goals through a framework that measures progress. Objective and verifiable performance metrics, internal and external review processes, valid and reliable data collection instruments, and evaluation studies are used to assess progress and performance across the portfolio, including lines of business, programs, projects, and activities. Through performance monitoring and assessment, NASA Education demonstrates its results-driven management approach that is focused on optimizing value to the American public.

NASA Advisory Council

NASA Education activities are reviewed frequently by external groups, including the "NASA Advisory Council (NAC)". The NAC serves as the principal source of advisory committee support for the NASA Administrator. Within the NAC, the Ad Hoc Task Force on Science, Technology, Engineering, and Mathematics (STEM) Education ("Task Force") supports the advisory needs of the NASA Administrator, NASA Office of Education (OE), NASA Mission Directorates, and other NASA organizations as required. The scope of the Task Force includes all NASA Education programs, projects, and activities. Members of the Task Force are leading authorities with relevant expertise drawn from industry, academia, independent researchers, and Government institutions.

The Task Force reports directly to the NAC. The Task Force Chair reports on the Task Force's findings and draft recommendations at the NAC public meetings for deliberation. This relationship with the NAC ensures that all NASA Education activities receive external review and are in line with the strategic goals of the agency.

Performance Measurement

NASA OE and the Education Coordinating Council (ECC) are focused on performance, managing towards specific, measurable goals derived from a defined mission and using performance data to monitor and continually improve operations. To effectively monitor educational investments across the agency, the Office of Education collects and reports performance data on all NASA Education investments using the Office of Education Performance Measurement (OEPM) system. In addition to collecting data on activity outputs, such as counts of participants, the OE is also developing and testing new data collection instruments intended to assess the short-term outcomes of NASA's educational investments. NASA is also an active participant in CoSTEM discussions on common metrics and instruments that could be used across government to monitor and assess the impact of federal STEM investments.

NASA Education plans, assesses, and evaluates its performance in a continuous cycle that spans fiscal years. Every fiscal year, NASA defines near-term and annual goals—the performance goals and annual performance indicators—in the agency's Annual Performance Plan. In the current NASA 2014 Strategic Plan, NASA Education has primary responsibility for Strategic Objective 2.4 and its associated performance goals and annual performance indicators. (See the section on NASA Education Performance Goals and Indicators in Figure 3.) NASA formulates its near-term and annual goals alongside the upcoming fiscal year budget request with accompanying explanations of purpose, accomplishments, and planned performance. In February 2015, NASA released to the public its completed Annual Performance Plan and Budget Estimates for progress of the Strategic Plan in the upcoming fiscal year and beyond.

At the same time that NASA is releasing the Annual Performance Plan for the upcoming fiscal year, it is assessing performance for the current fiscal year. NASA Education continuously measures its progress in pursuit of its strategic objective and performance measures using ongoing, periodic, and one-time assessments, through which managers identify issues, gauge programmatic and organizational health, and provide appropriate data and evidence to NASA decision-makers. NASA Education assessments include the following:

- Ongoing monthly and quarterly analysis and reviews of NASA Education activities;
- Annual program and project assessments in support of budget formulation;
- Annual reporting of performance, management issues, and financial position;
- Annual reviews of the NASA Education strategic objective;
- Periodic, in-depth program or special purpose assessments; and
- Recurring or special assessment reports to internal and external organizations.

Figure 3: FY15 & FY16 Performance Goals and Annual Performance Indicators, Associated with Strategic Objective 2.4*

Performance Goals (FY15)	Annual Performance Indicators (FY15)	Annual Performance Indicators (FY16)
2.4.1: Assure that students participating in NASA higher education projects are representative of the diversity of the Nation.	ED-15-1: Provide significant, direct student awards in higher education to (1) students across all institutional categories and levels (as defined by the U.S. Department of Education), (2) racially or ethnically underrepresented students, (3) women, and (4) persons with disabilities at percentages that meet or exceed the national enrolled percentages for these populations, as determined by the most recent, publicly available data from the U.S. Department of Education's National Center for Education Statistics for a minimum of two of the four categories.	ED-16-1: Provide significant, direct student awards in higher education to (1) students across all institutional categories and levels (as defined by the U.S. Department of Education), (2) racially or ethnically underrepresented students, (3) women, and (4) persons with disabilities at percentages that meet or exceed the national enrolled percentages for these populations, as determined by the most recent, publicly available data from the U.S. Department of Education's National Center for Education Statistics for a minimum of two of the four categories.
2.4.2: Continue to support STEM educators through the delivery of NASA Education content and engagement	ED-15-2: Engage with at least 80,000 educators in NASA-supported professional development, research, and internships that use NASA-unique STEM content.	ED-16-2: Engage with at least 80,000 educators in NASA-supported professional development, research, and internships that use NASA-unique STEM content.
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.	ED-15-4: Maintain the NASA Museum Alliance and/or other STEM education strategic partnerships in no fewer than 30 states, U.S. Territories and/or the District of Columbia.	ED-16-4: Maintain the NASA Museum Alliance and/or other STEM education strategic partnerships in no fewer than 30 states, U.S. Territories and/or the District of Columbia.
2.4.5: Continue to provide opportunities for learners to engage in STEM education engagement activities that capitalize on NASA unique assets and content.	ED-15-5: Engage with at least 600,000 elementary and secondary students in NASA STEM engagement activities.	ED-16-5: Engage with at least 750,000 elementary and secondary students in NASA STEM engagement activities.

*FY17 APIs were in the process of discussion at the time of writing.

Program Evaluation

A robust, coordinated and targeted evaluation function is essential for the ECC to measure and monitor program performance, make decisions for programmatic adjustments and changes, document program impact, identify best practices and lessons learned, help assess return on investment, provide inputs for policy, planning and budget decisions, and assure accountability. The ECC will reinstitute the review and approval of an evaluation plan on an annual basis, which will prioritize investments in the evaluation of lines of business, programs, projects and activities.

Program evaluations are systematic studies using research methods to collect and analyze data to assess how well a program/project is working and why. Evaluations answer specific questions about program/project performance and may focus on assessing program/project operations or results. With the passage of the Government Performance and Results Act (GPRA) of 1993 and the GPRA Modernization Act (GPRAMA) of 2010, Congress strengthened the mandate to evaluate programs and required agencies to include a discussion of program evaluations in their strategic plans and performance reports. NASA Education accomplishes this through evaluations related to Strategic Objective 2.4.

Education line of business, program, project, and activity evaluations are based on a common set of criteria, including performance alignment with the NASA Education overarching philosophy and operating principles (see Section 1) and the investment's theory of action, often articulated in a logic model and substantiated by STEM education research, which specifies anticipated outputs and outcomes. The evaluation of new projects and activities also follows the education project life cycle (Figure 4), which identifies key decision points, progress reviews, project reviews, and evaluation activities associated with each phase of the life cycle. The life cycle also provides criteria for project and activity decommissioning.

Mission Directorates, NASA Centers and the Office of Education regularly conduct formative, or process, evaluations on educational investments to assess the extent to which the investment is operating as intended. They typically assess program activities' conformance to statutory and regulatory requirements, program design, and professional standards or customer expectations with the intent to improve the project. Outcome evaluation plans measure intended impact and are scaled appropriately to the size and life cycle stage of the investment, whether a line of business, program, project, or activity.

Program evaluation conducted by NASA Education follows generally-accepted professional standards for evaluative research. Evaluations are evidence-based, meaning that they are based on verifiable data and information that have been gathered using the standards of professional research and evaluation organizations. Such data can be both qualitative and quantitative. A wide variety of evaluation designs may be utilized, such as case studies and quasi-experimental designs, as well as data collection methods, such as key informant interviews, surveys, direct observation, or focus group discussions. Regardless, such data must pass the tests of reliability and validity, which are different for qualitative and quantitative data.

To the extent possible, steps are taken to ensure that evaluators are free from any pressure and/or bureaucratic interference. Managers of the programs, projects or activities under evaluation should not be in a position to influence evaluation findings and recommendations. However, independence does not imply isolation from program and project managers. Active engagement of NASA Education staff and managers is necessary to conduct an evaluation as long as they are not in a position to improperly influence the outcome.

Evaluations are only meaningful if they are used. Properly designed evaluations will provide insights and evidence to inform real-world decision-making and contribute to learning. Program and project managers integrate evaluation findings into decision-making about strategies, program priorities, and project and activity design, as well as into planning and budget formulation processes. Evaluation reports are posted on the NASA Education Performance Assessment webpage (http://www.nasa.gov/offices/education/performance).

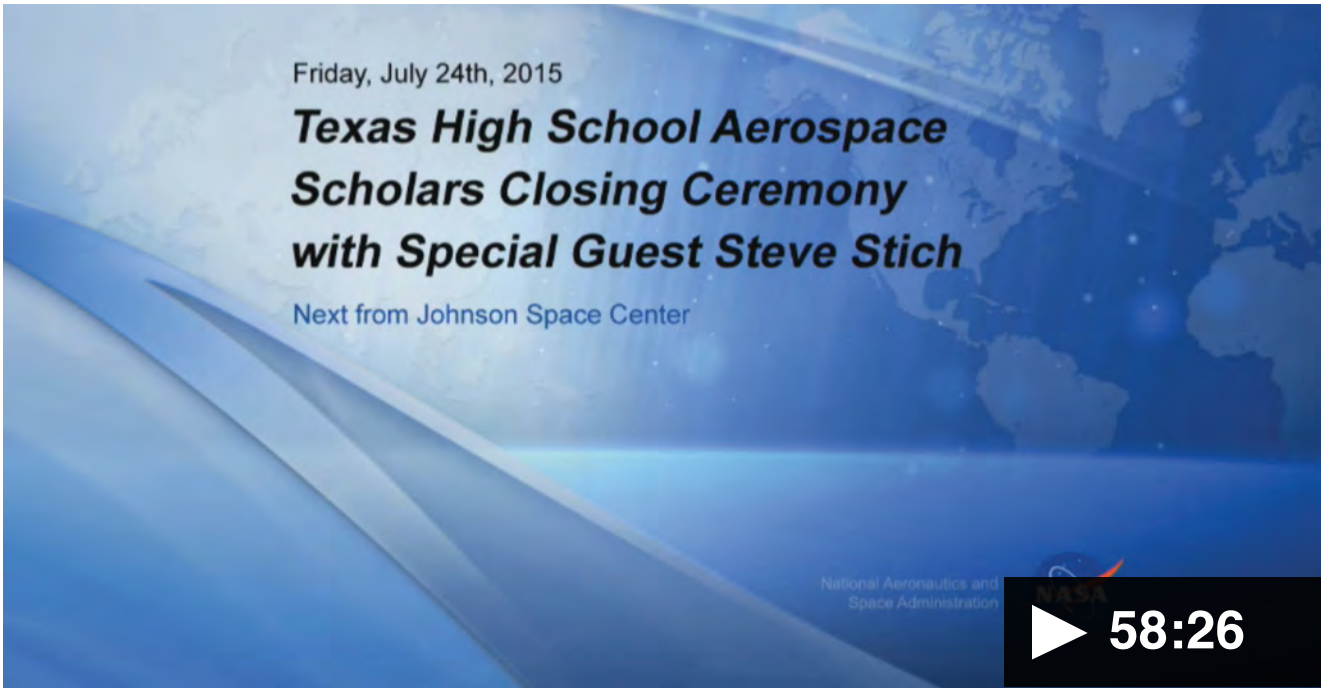
Program and Project Reviews

The Office of Education has started regular reviews of programs, projects and major activities that are scheduled between two to four times a quarter depending on the level of resources invested in the effort. A standard template is used to provide an update on the technical, cost, schedule, management and communications aspects of the effort. The template contains a color-coded stop light chart for each of these areas that indicate trends to show if the status of areas are improving or getting worse. These charts can be compiled over time and can show at a glance a quick visual summary of the status of all the key activities in NASA Education to allow for easy monitoring and tracking of progress and identify areas that may need assistance.

Figure 4: Program Evaluation and the Education Project Life Cycle

Agency Life Cycle	Formulation			Implementation		
Detailed Life Cycles Phases	**Phase A** Pre-Formulation	**Phase B** Program Planning	**Phase C** Pilot	**Phase D** Deployment	**Phase E** Sustained Operations	**Phase F** Decommis-sioning
Key Decision Points (KDP)	Proceed with Concept? KDP		Proceed with Development? KDP		Proceed with Decommission? KDP	
Performance Monitoring	Ongoing performance monitoring/measurement					
Evaluation	Strategic and Portfolio Alignment	Program Design Assessment	Pilot Evaluation	Implementation Evaluation	Outcome Evaluation	Lessons Learned

Videos



High School Aerospace Ceremony

NASA JSC Internship Awards Ceremony

SOFIA's Airborne Astronomy Ambassador Program Highlights

6 Summary And Conclusion

Education is a critical part of NASA's mission. Education activities both disseminate knowledge of the agency's advances in science, technology, aeronautics and space exploration, and support the creation of knowledge by learners, educators, and institutions. NASA Offices, Mission Directorates, Centers and Facilities collaborate to implement a single agency-wide approach to science, technology, engineering, and mathematics (STEM) education. This approach provides unique NASA experiences to learners, educators, and institutions, as well as streamlined access to our content, web sites, people, resources, and facilities.

The 2015-2017 NASA Education Implementation Plan describes significant changes in the approach to NASA's education portfolio. Over the last few years, updates to the NASA Strategic Plan in 2014 and the release of the Federal STEM Education 5-Year Strategic Plan led to organizational changes and shifts in responsibilities for STEM education across NASA and among other federal agencies. The NASA Advisory Council Ad Hoc Task Force on STEM Education, established in January 2015, will help to maximize the educational benefits that NASA brings to the nation.

NASA inspires people like few other organizations. Since its creation in 1958, NASA has built upon that inspiration to drive innovation in STEM education. The 2015-2017 NASA Education Implementation Plan describes the approach that NASA is taking to help ensure the agency remains a driving force for education innovation and continues to be a leader in STEM education. Continuous improvement toward those ends will be enhanced by the input and implementation of the ideas of our stakeholders and the education community. Implemented effectively, these changes will help contribute to a future NASA workforce capable of taking the world's preeminent aerospace and aeronautics organization to new heights, helping it reveal the unknown, and benefiting all humankind.

Videos

Heliophysics Work-Study Students

Mars in a Minute: How Do You Get to Mars?

ORION's First Flight! Educational Webcast with Nujoud Merancy

Mindbender Mansion

7 Appendices

Appendix A: References

- Asian American and Pacific Islander Community – Executive Order 13515
- Experimental Program to Stimulate Competitive Research — Public Law 102-588.
- Federal Science, Technology, Engineering, and Mathematics (STEM) Education 5-Year Strategic Plan: A Report from the Committee on STEM Education, National Science and Technology Council, May 2013.
- Government Performance and Results Act of 1993 — Provides a measurement for strategic planning and performance throughout the federal government.
- Government Performance and Results Modernization Act of 2010 — Provides enhanced performance planning, management, and reporting tools that can help inform congressional and executive branch decision-making to address significant challenges facing our nation.
- Improving American Indian and Alaska Native Educational Opportunities and Strengthening Tribal Colleges and Universities — Executive Order 13592.
- NASA Advisory Council Ad Hoc Task Force on Science, Technology, Engineering, and Mathematics Education: Terms of Reference.
- NASA's FY 2015 Complete Management and Performance Appendix.
- NASA Strategic Plan 2014
- National Aeronautics and Space Act — Pub. L. No. 85 568, 2 Stat. 426 438 (July 29, 1958), as amended.
- National Space Grant College and Fellowship Program — Public Law 100-147.
- Nondiscrimination on the Basis of Race, Sex, Color, National Origin, Disability, Religion, Age, Sexual Orientation, and Status as a Parent in Federally Conducted Education and Training Programs — Executive Order 13160.
- NPR 7120.5E — NASA's Program and Project Management Processes and Requirements. Agency policy governing management of programs and projects.
- Performance.gov — Provides links to Federal Agencies' Annual Performance Reports or their Performance and Accountability Reports.
- Progress Report on Coordinating Federal Science, Technology, Engineering, and Mathematics (STEM) Education, March 2014. Office of Science and Technology Policy.
- Promoting Excellence, Innovation, and Sustainability at Historically Black Colleges and Universities — Executive Order 13532. https://www.whitehouse.gov/the-press-office/promoting-excellence-innovation-and-sustainability-historically-black-colleges-and-
- White House Initiative on Educational Excellence for Hispanics — Executive Order 13555.

Appendix B: Glossary of Terms and Acronyms

- **ARCD –** Aerospace Research and Career Development Program includes the National Space Grant College and Fellowship Program (Space Grant) and the Experimental Program to Stimulate Competitive Research (EPSCoR).
- **CoSTEM –** Committee on STEM Education: The Committee on Science, Technology, Engineering, and Math Education (CoSTEM) was established in 2011 as called for by the America COMPETES Reauthorization Act of 2010. The purpose of the CoSTEM is to coordinate Federal programs and activities in support of STEM education.
- **CoSTEM Strategic Plan –** Federal STEM Education 5-Year Strategic Plan.
- **ECC –** Education Coordinating Council is the governing body for the integrated education portfolio for the agency.
- **EPD –** Educator Professional Development uses NASA's missions, education resources, and unique facilities to provide high-quality STEM content and hands-on learning experiences to in-service, pre-service, and informal educators.
- **EPSCoR –** Experimental Program to Stimulate Competitive Research (one of two projects under the ARCD Program) provides research funds to states and regions that have not historically participated equitably in federal competitive aerospace and aerospace-related research activities.
- **Executive Orders –** Presidential directives are considered a form of executive order issued by the President of the United States with the advice and consent of a major agency or department found within the executive branch of government.
- **FC-STEM Task Force –** CoSTEM chartered the Federal Coordination in STEM Education (FC-STEM) Task Force to develop the Federal STEM Education 5-Year Strategic Plan. NASA is one of 12 Federal agency members of the FC-STEM Task Force, along with the Smithsonian Institution.
- **Five Priority Investment Areas –** The CoSTEM Strategic Plan identifies five priority investment areas: improve STEM instruction, increase and sustain youth and public engagement in STEM, enhance STEM experience of undergraduate students, better serve groups historically underrepresented in STEM fields, and design graduate education for tomorrow's STEM workforce.
- **IE –** Institutional Engagement increases the STEM capabilities at formal and informal educational institutions and organizations by incorporating content based on NASA's missions.
- **LOB –** NASA Education is organized around four lines of business that connect learners, educators, and institutions with NASA's unique mission, people and facilities. The four lines of business are: STEM Engagement, Educator Professional Development, NASA Internships, Fellowships, and Scholarships, and Institutional Engagement.
- **MUREP –** Minority University Research and Education Project (one of two projects of the SEA Program) targets recruitment and retention of underrepresented and underserved students, including women and girls, and person with disabilities, in the STEM fields. MUREP enhances research, academic, and technological capabilities of Historically Black Colleges and Universities (HBCU), Hispanic-Serving Institutions (HSI), Tribal Colleges and Universities (TCI), Asian American and Native American Pacific Islander Serving Institutions (AANAPISI) and other Minority Serving Institutions (MSI).
- **NAC –** The NASA Advisory Council members are chosen by NASA and serve at the pleasure of the NASA Administrator. They provide advice and make recommendations to the NASA Administrator.
- **NAC Task Force –** Ad Hoc Task Force on Science, Technology, Engineering, and Mathematics Education supports the needs of the NASA Administrator, NASA Office of Education, NASA Mission Directorates, and other NASA organizations as required. The NAC Task Force reports to the NASA Advisory Council.
- **NASA Functional Offices –** There are ten NASA Functional Offices that are members of the Education Coordinating Council: Astronaut Office, Office of Chief Financial Officer (OCFO), Office of Chief Information Officer (OCIO), Office of Communications (Ocomm), Office of Diversity and Equal Opportunity (ODEO), Office of Chief Scientist (OCS), Office of Human Capital Management (OCHM), Office of the Chief Technologist (OCT), Office of International and Interagency Relations (OIIR), and Office of Legislative and Intergovernmental Affairs (OLIA).

- **NASA HQ OE –** NASA Headquarters' Office of Education (OE) administers national education efforts that draw content from across the agency.
- **NASA Mission Directorates –** There are four NASA Mission Directorates: Aeronautics Research Mission Directorate (ARMD), Human Exploration and Operations Mission Directorate (HEOMD), Science Mission Directorate (SMD), and Space Technology Mission Directorate (STMD).
- **NASA Strategic Objective 2.4 –** The 2014 NASA Strategic Plan set forth for Education, NASA Strategic Objective 2.4: Advance the Nation's STEM education and workforce pipeline by working collaboratively with other agencies to engage students, teachers, and faculty in NASA's missions and unique assets.
- **NASA's Unique Facilities –** There is an Education Office at each of the following NASA facilities: Ames Research Center (ARC), Armstrong Flight Research Center (AFRC), Glenn Research Center (GRC), Goddard Space Flight Center (GFRC), Jet Propulsion Laboratory (JPL), Johnson Space Center (JSC), Kennedy Space Center (KSC), Langley Research Center (LaRC), Marshall Space Flight Center (MSFC), Stennis Space Center (SSC).
- **NEIP –** NASA Education Implementation Plan 2015-2017
- **NIFS –** NASA Internships, Fellowships, and Scholarships leverage NASA's unique missions and programs to enhance and increase the capability, diversity, and size of the Nation's future STEM workforce.
- **NSTC –** National Science and Technology Council.
- **OMB –** The Office of Management and Budget is the largest office within the Executive Office of the President of the United States. The main function of the OMB is to assist the president in preparing the budget and policy development and execution.
- **OSSI –** NASA One Stop Shopping Initiative is a NASA-wide system for the recruitment, application, selection and career development of undergraduate and graduate students primarily in science, technology, engineering and mathematics disciplines. Opportunities for students in other disciplines are available.
- **SE –** STEM Engagement activities are designed to provide opportunities for participatory and experiential learning activities that connect learners to NASA-unique resources. The STEM Engagement line of business consists of Public Education Activities, Experiential Learning Opportunities and Challenges.
- **SEA –** STEM Education and Accountability Program includes STEM Education and Accountability Projects (SEAP) and the Minority University Research and Education Project (MUREP).
- **SEAP –** STEM Education and Accountability Projects (one of two projects under the SEA Program) provide competitive opportunities to support innovative education efforts at NASA centers, facilities, and other partners.
- **Space Grant –** National Space Grant College and Fellowship Program (one of two projects under the ARCD Program) is a grant opportunity that enables the active involvement of the entire country in NASA activities through its national network composed of 52 Space Grant consortia in 50 states, the District of Columbia, and the Commonwealth of Puerto Rico.
- **STEM –** Science, technology, engineering, and mathematics

Appendix C: Education Coordinating Council (ECC) Members

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