National Aeronautics and Space Administration

INSPIRE - ENGAGE - EDUCATE - EMPLOY
The Next Generation of Explorers

NASA Office of STEM Engagement Update

Mike Kincaid
Associate Administrator for STEM Engagement
NASA STEM ENGAGEMENT UPDATE

Transition and Fiscal Climate

BSA Update

Significant Milestones

Summary and Q&A
Vision:
We immerse the public in NASA’s work, enhance STEM literacy, and inspire the next generation to explore.

Mission:
We engage the nation in NASA’s mission

FOCUS AREAS

Create unique opportunities for students and the public to contribute to NASA’s work in exploration and discovery.

Build a diverse future STEM workforce by engaging students in authentic learning experiences with NASA’s people, content and facilities.

Strengthen public understanding by enabling powerful connections to NASA’s mission and work.
NASA’s Contributions to the STEM Ecosystem

- U.S. PISA scores 26th internationally
- Projected STEM R&D job growth 8.9% through 2024
- Women in S&E occupations <33%
- Underrepresented minorities in S&E <11% below their share of the population (27%)

- NASA workforce average age: 48.9
- Diverse pipeline

**U.S. STEM Challenges**

**NASA & Aerospace Industry Workforce Needs**

**NASA STEM Engagement**

**Students and Educational Institutions**

**NASA Mission Needs**

- Authentic STEM learning experiences
- Research opportunities

- Research
- Technology development

**Contributions to national economy**
Our STEM Engagement Roadmap

Establish an agency STEM Engagement strategy and an operational model

- An agency vision, mission and strategy, to frame and align the agency’s STEM engagement portfolio will:
  - Focus on students as beneficiaries and structured model
  - Be mission-driven architecture for scope and approach
  - Focus on evidence-based NASA-unique learning experiences enabling student contributions to NASA’s work in action
- Effective, integrated governance via STEM Engagement Council
- Re-invigorated agency function and HQ functional office
- Rigorous planning process
- Integrated operational model and agency STEM Engagement portfolio
- Effective program and fiscal management
- Capabilities driven approach for agency roles and responsibilities
- New approach and tools for performance measurement and assessment
- Scalability and magnified impact through strategic partnerships
New Architecture Enabling Student Opportunities & Contributions

STEM and Public Engagement Focus Areas

- Creating unique opportunities for students to contribute to NASA's workforce.
- Building a diverse future STEM workforce by engaging students in authentic learning experiences.
- Strengthening public understanding by enabling powerful connections to NASA's mission and work.
- Strategic, balanced portfolio
- NASA-unique learning experiences
- Student contributions to NASA's work in action

Evidence-based strategies
Rigorous planning
Integrated operational model

Scalability to magnify NASA's reach and impact
## Fiscal Climate

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NASA STEM ENGAGEMENT UPDATE

Transition and Fiscal Climate

BSA Update

Significant Milestones

Q&A
# STEM Engagement
## BSA Implementation Phase FY2018 Milestones

<table>
<thead>
<tr>
<th>90 Days January – March 2018</th>
<th>180 Days April – June 2018</th>
<th>270 Days July – September 2018</th>
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<tr>
<td><strong>Governance</strong></td>
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<tr>
<td>✓ Gain approval for STEM Engagement Council (SEC)</td>
<td>✓ Initiate and conduct SEC operations</td>
<td>• Complete transition to new Office of STEM Engagement</td>
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<tr>
<td>✓ Define charter and establish SEC</td>
<td>✓ Establish STEM Engagement NPD</td>
<td>• Joint SEC-CCC efforts to ensure alignment and progress on BSA implementation</td>
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<td>✓ Develop STEM Engagement NPD</td>
<td>✓ Establish STEM Engagement function</td>
<td>• Develop an approach to strategic partnerships</td>
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<td>✓ Develop STEM Engagement scope and definitions</td>
<td>✓ Establish Office of STEM Engagement</td>
<td>• Establish annual planning cycle</td>
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<td>✓ Define STEM Engagement functional elements</td>
<td>✓ Initiate efforts to build STEM Engagement Community of Practice</td>
<td>• Establish dedicated grants website</td>
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<td>✓ Define Office of STEM Engagement structure</td>
<td>✓ Establish SEC functional working groups</td>
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<tr>
<td>✓ Conduct analysis of existing infrastructure, tools &amp; systems</td>
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| **Program Management**        |                           |                               |
| ✓ Conduct stakeholder discussions |                           | • Put processes in place for oversight and integration |
| ✓ Research agency metrics approach |                           | • Establish and implement agency metrics approach |
| ✓ Develop integrated master schedule |                           | • Establish annual planning cycle |
| ✓ Research and initiate capabilities assessment |                           |                               |
| ✓ Perform programmatic baseline assessment |                           |                               |
| ✓ Initiate communications approach |                           |                               |
| ✓ Develop and establish agency Strategic Implementation Plan, including goals and strategies |                           |                               |
| ✓ Develop agency metrics approach |                           |                               |
| • Develop annual planning cycle |                           |                               |
| • Complete capabilities assessment |                           |                               |
| • Conduct integrated program assessment |                           |                               |
| • Develop communications strategy |                           |                               |
| • Establish STEM engagement implementation teams |                           |                               |

| **Grants Management**         |                           |                               |
| ✓ Conduct assessment of grants management fiscal performance and practices. | ✓ Develop financial performance metrics and accountability measures |                               |
| ✓ Put in place initial changes in fiscal practices and operational approach. |                           |                               |
NASA STEM Engagement Update

Transition and Fiscal Climate

BSA Update

Significant Milestones

Q&A
National Space Grant and Fellowship Program (Space Grant)

At A Glance
- 52 state-based consortia
- 850 Affiliate members
- Incorporates State priorities, needs, and goals

Impact
- Contribute to solving Mission Directorate challenges
- Increase collaboration and engagement with Space Grant and NASA Centers
- Increase NASA related skills and diversity in the Nations STEM workforce
- Publicize and Promote NASA's accomplishments and missions across the Nation

Elements of the Approach
- Mission Directorate Collaborations
- Strategic Partnership with NASA Centers
- Education, Research, and Informal Education Opportunities
- State-based Consortia Partnerships

NASA Mission Directorate Drivers & Requirements

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Space Grant Update

- 225 intern placements in 2018 across 52 consortia
- Southern Regional Education Board 2018 (10/25-28)
  - Office of STEM Engagement will sponsor 10 students
- Participating in NASA’s collaboration with various industry and academic partners to celebrate NASA’s 60th Anniversary in Space
New Minority University Research and Education Project (MUREP) Engagement

At A Glance
- Limited to Minority-Serving Institutions
- Responsive to Presidential Executive Orders
- Portfolio includes 7 funded activities

Elements of the Approach
- Student Opportunities
- MSI Partnerships and Sustainability
- Mission Directorate Collaborations
- K-12 Engagement

Impact
- Contribute to solving Mission Directorate problems
- Increased STEM Awareness
- Increase retention of Underserved and Underrepresented groups in STEM
- Enhance MSI infrastructure
- Enable MSI sustainability

NASA Mission Directorate Drivers & Requirements

The Next Generation of Explorers
Recent MUREP Awards

MUREP Innovations in Space Technology Curriculum (MISTC)
*Help schools establish new courses that contribute to preparation, training and development of NASA’s future workforce.*
- Bronx Community College (Bronx, New York)
- College of the Desert (Palm Desert, California)
- Los Angeles Pierce College (Woodland Hills, California)
- Passaic County Community College, Patterson, New Jersey
- Prince George’s Community College, Upper Marlboro, Maryland

$1.4M

MUREP Aerospace Academy (MAA)
*Build interest, skills and knowledge necessary for K-12 students to pursue STEM careers*
- Albany State University (Albany, Georgia)
- California State University (Fresno, California)
- Elizabeth City State University (Elizabeth City, North Carolina)
- Navajo Technical College (Crownpoint, New Mexico)
- Tennessee State University (Nashville, Tennessee)
- Texas State University (San Marcos, Texas)
- The University of Texas (El Paso, Texas)

$2.3M

MUREP for Sustainability and Innovation Collaborative (MUSIC)
*Communicate and encourage best practices, capabilities and opportunities amongst Minority Serving Institutions enabling MSI fiscal sustainability*
- Alabama A&M University (Huntsville, AL)
- The Quality Education for Minorities (QEM) Network (Washington, DC)
- University of Hawai’i at Manoa (Hawaii)

$1.12M
Established Program to Stimulate Competitive Research (EPSCoR)

At A Glance

- 27 Eligible States and Territories
- Incorporates State priorities, needs, and goals

Elements of the Approach

- NASA Aligned University Research Opportunities
- ISS Flight Opportunities
- State Research Infrastructure Development

Impact

- Expand universities’ NASA unique knowledge base
- Enhance state’s NASA specific research capabilities
- Promote NASA associated innovations
- Publicize NASA EPSCoR exclusive research results and activities
- Produce NASA qualified STEM workforce

NASA Mission Directorate Drivers & Requirements

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EPSCoR 2018 Activities

- Conducting ISS Flight Opportunity Solicitation
- Conducting a Research Infrastructure Development (RID) Solicitation
- Conducting a Basic Research Solicitation
- Conducting Rapid Response Research (R3) Solicitation
- Held All-Agency (EICC) EPSCoR Director’s Meeting in DC
- Held 2018 EPSCoR Director’s National Meeting in Greenbelt, MD
- Held Technical Interchange Meeting with GSFC
- Implemented an EPSCoR/MIRO Collaboration Project

EPSCoR funded research assistant analyzes impact of 9 years of space radiation on light fixture materials from the ISS for the EPSCoR Rapid Response Research Project
At A Glance

- Investments in formal and informal education communities
- Expanded ability to provide richer, more comprehensive STEM engagement opportunities

Elements of the Approach

- Mission Directorate Collaborations
- NASA-unique Student Projects and Challenges
- Educator Engagement
- Evidence-based Audience Needs
- Strategic Partnerships

Impact

- Contribute to solving Mission Directorate challenges
- Leverage Center skills and capabilities
- Increase STEM Skills and Identity
- Enabling scalable Partnerships to increase NASA’s reach

NASA Mission Directorate Drivers & Requirements

STEM Education and Accountability Projects (SEAP) / NextGen STEM Project

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How Does Next Gen STEM Enable Agency Success?

- Funds mission-driven initiatives with informal educational institutions and sustains NASA’s Museum Alliance.
- Pilots new and unique opportunities to stimulate STEM engagement and learning experiences.
- Provides capacity to balance our agency STEM engagement portfolio – fills gaps.
- Target and engage with appropriate strategic partners (federal, non-profit, industry) to scale opportunities.
- Sustains capabilities and human resources at NASA Centers that provide students direct access to NASA’s STEM domain experts, facilities and unique experiences.
TEAM II / CP4SMPVC*
AWARDS
2008-2018

85 Grants and Cooperative Agreements

Over $56.6M awarded

*Competitive Program for Science Museums, Planetariums, and Visitors Centers
Teams Engaging Affiliated Museums and Informal Institutions (TEAM II)

Three selected in 2018

“Small Steps to Giant Leaps” 50th Apollo 11 Landing Anniversary theme
Kansas Cosmosphere
Apollo Redux: Inspiring Next Generations of Engineers and Scientists through use of Historic Mission Operation Control Room Consoles and Simfault Interactive Programs

Arizona Science Center
The Moon and Beyond: An Immersive Game for STEM Learning in Museums and Planetariums.

“Beyond Low-Earth Orbit” theme
Fairchild Tropical Garden
Growing Beyond Earth Innovation Studio.
Year of Education on Station (YES!)

- 58 DOWNLINKS reaching 162,000 STUDENTS
- And 38,000 TEACHERS
- 65 TOTAL PLANNED by Oct 3 (end of YES)

Driven a **30.2% increase** in traffic to STEM on Station website

- 53,071 views per month
- 40,749 in the same period before YES
Social Engagement with YES

NASA Students

Home
Posts
Photos
About
Community
Info and Ads
Create a Page

Posts

NASA Students

Space to Ground episode (Christa’s Lost Lessons)
Over 3,000 views on Youtube
1800 mentions on Twitter

#TeacheronBoard
Used over 13,000 times during YES
Total reach of 748m viewers

#STEMonStation
Used 8,600 times
Total Reach of 532m viewers

Teacher appreciation week:
NASA’s #thankateacher was mentioned on social media in 2,800 times in one week.
Newton's Second Law

Objective

Following this procedure, students will learn:

- How forces change an object's acceleration and velocity.
- The relationship between force, mass, and acceleration.
- How Newton's Second Law can be used to design and test a rocket car to ensure it will meet the design requirements.
- The importance of proper tool usage and safety when conducting experiments.

Background

Newton's Second Law states that the net force acting on an object is equal to the object's mass times its acceleration: F = ma. This law is fundamental in understanding motion and is used in various fields, including engineering and physics. In this activity, students will apply this law to design and build a rocket car that adheres to specific requirements.
Christa’s Lost Lessons
Honoring Christa and teachers everywhere in partnership with The Challenger Center
www.challenger.org/christa
NASA STEM ENGAGEMENT UPDATE

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Significant Milestones:

Summary and Q&A
Summary

• STEM Engagement – What’s NEW??
  • Agency strategy and portfolio aligned with mission focus areas and strategic objectives and outcomes
  • Mission-driven investments and activities
  • Focus on students as beneficiaries:
    – Evidence-based, authentic learning experiences
    – Contributions to NASA’s work and mission
  • Scalability via strategic partnerships
  • Sustainable approach to performance measurement

• Solicitations awarded across all Major Programs
• Upcoming Space STEM Forum, Sept. 19
Space STEM Forum

Space STEM Forum:
NASA HQ on Sept. 19, 2018, 9:00 am-4:30 pm

Forum Theme:
Small Steps to Giant Leaps, Looking Forward to the Future of Space Exploration

Purpose:
Identify opportunities to collaborate and leverage our individual STEM engagement activities and efforts with industry and professional organizations

Abstracts:
Approximately 22 abstracts will be selected, with about 16 involving national efforts/projects and about 6 on resources and capabilities

Website:
Collaborative work website and public website will be created to facilitate implementation of outcomes
National Aeronautics and Space Administration

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QUESTIONS?
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THANK YOU!