2024 REPORT ON THE COMMITTEE ON SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS (CoSTEM) AND CoSTEM-RELATED AGENCY ACTIONS

A Report by the

WHITE HOUSE OFFICE OF
SCIENCE AND TECHNOLOGY POLICY

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About The White House Office of Science and Technology Policy

The Office of Science and Technology Policy (OSTP) was established by the National Science and Technology Policy, Organization, and Priorities Act of 1976 to provide the President and others within the Executive Office of the President with advice on the scientific, engineering, and technological aspects of the economy, national security, homeland security, health, foreign relations, the environment, and the technological recovery and use of resources, among other topics. OSTP leads interagency science and technology policy coordination efforts, assists the Office of Management and Budget with an annual review and analysis of federal research and development in budgets, and serves as a source of scientific and technological analysis and judgment for the President with respect to major policies, plans, and programs of the federal government. More information is available at http://www.whitehouse.gov/ostp.

About this Document

This document was developed in consultation with the National Science and Technology Council (NSTC), the Committee on STEM (CoSTEM), and federal departments and agencies. It aims to fulfill a number of legislative mandates and executive actions:

- an annual report on CoSTEM as mandated by the America COMPETES Reauthorization Act of 2010,
- federal guidelines as mandated by the CHIPS and Science Act of 2022, Section 10522,
- a report of measures taken and resources allocated in support of Executive Order 14081 on Advancing Biotechnology and Biomanufacturing Innovation for a Sustainable, Safe, and Secure American Bioeconomy, Section 7 on Biotechnology and Biomanufacturing Workforce,
- progress towards federal guidelines as mandated by the CHIPS and Science Act of 2022, Section 10502, and
- updates on actions in support of the American Innovation and Competitiveness Act of 2017 and Sections 10501, 10505, 10522, 10524, and 10536 by the CHIPS and Science Act of 2022.

The National Science and Technology Council (NSTC) is the principal means by which the Executive Branch coordinates science and technology policy across the diverse entities that make up the federal research and development enterprise. A primary objective of the NSTC is to ensure science and technology policy decisions and programs are consistent with the President's stated goals. The NSTC prepares research and development strategies that are coordinated across federal agencies aimed at accomplishing multiple national goals. The work of the NSTC is organized under committees that oversee subcommittees and working groups focused on different aspects of science and technology. More information is available at http://www.whitehouse.gov/ostp/nstc.

The Committee on Science, Technology, Engineering, and Mathematics (CoSTEM) was first established in 2011 as the Committee on Science, Technology, Engineering, and Mathematics (STEM) Education pursuant to the requirements of Section 101 of the America COMPETES Reauthorization Act of 2010 (COMPETES Act) (Pub.L.111–358). In 2023, it was renamed the Committee on STEM. The Committee reviews STEM education, workforce development, and research capacity investments; coordinates investments with the Office of Management and Budget and with other offices of the Executive Office of the President throughout the federal government; and develops and implements through federal agencies a five-year strategic plan to be updated every five years.

The following executive offices, departments, and agencies were consulted to inform the report:

- Domestic Policy Council (DPC)
- Office of Management and Budget (OMB)
- Office of the National Cyber Director (ONCD)
- Office of Science and Technology Policy (OSTP)
- AmeriCorps
- U.S. Agency for International Development (USAID)
- U.S. Department of Agriculture (USDA)
- U.S. Department of Commerce (DOC)
- U.S. Department of Defense (DOD)
- U.S. Department of Education (ED)
- U.S. Department of Energy (DOE)
- U.S. Department of Health and Human Services (HHS)
- U.S. Department of Homeland Security (DHS)
- U.S. Department of the Interior (DOI)
- U.S. Department of Justice (DOJ)
- U.S. Department of Labor (DOL)
- U.S. Department of State (DOS)
- U.S. Department of Transportation (DOT)
- U.S. Department of Veterans Affairs (VA)
- U.S. Environmental Protection Agency (EPA)
- Institute of Museum and Library Sciences (IMLS)
- Office of the Director of National Intelligence (ODNI)
- U.S. Office of Personnel Management (OPM)
- National Aeronautics and Space Administration (NASA)
- U.S. National Science Foundation (NSF)
- U.S. Nuclear Regulatory Commission (NRC)
- Smithsonian Institution (SI)
- U.S. Social Security Administration
- U.S. Postal Service

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Abbreviations and Acronyms[1]

AEOP	DOD Army Educational Outreach Program
AFRI	USDA Agriculture and Food Research Initiative
AFRL	DOD Air Force Research Laboratory
AI	Artificial Intelligence
APHIS	USDA Animal and Plant Health Inspection Service
ARDAP	DOE SC Accelerator R&D and Production
ASCR	DOE SC Advanced Scientific Computing Research
ASPR	HHS Administration for Strategic Preparedness and Response
BARDA	HHS/ASPR Biomedical Advanced Research and Development Authority
BER	DOE SC Biological and Environmental Research
BES	DOE SC Basic Energy Sciences
BIO	NSF Directorate for Biological Sciences
CESER	DOE Office of Cybersecurity, Energy Security, & Emergency Response
CHIPS	Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act of 2022
CISA	Cybersecurity and Infrastructure Security Agency
CISE	NSF Directorate for Computing and Information Science and Engineering
COMPETES	America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Reauthorization Act of 2010
CoSTEM	Committee on STEM (formerly the Committee on STEM Education)
CWMD	DHS Countering Weapons of Mass Destruction
DHS	U.S. Department of Homeland Security
DOC	U.S. Department of Commerce
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOL	U.S. Department of Labor
DOS	U.S. Department of State
DOT	U.S. Department of Transportation
DSEC	Defense Science, Technology, Engineering, and Mathematics Education Consortium
DTRA	DOD Defense Threat Reduction Agency
ECR	NSF EDU Core Research
ED	U.S. Department of Education
EDA	DOC Economic Development Administration
EDMAP	DOI USGS Educational Mapping Program
EDU	NSF Directorate for STEM Education
EERE	DOE Office of Energy Efficiency and Renewable Energy
EJE	DOE Office of Energy Justice and Equity
EM	DOE Office of Environmental Management

[1] See the list of CoSTEM agencies for the acronyms of federal agency names.

ENG	NSF Directorate for Engineering
EPA	U.S. Environmental Protection Agency
EPSCoR	Established Program to Stimulate Competitive Research
ERIs	Emerging Research Institutions
ETA	DOL Employment and Training Administration
FAA	DOT Federal Aviation Administration
FC-STEM	Federal Coordination in STEM Education Subcommittee
FDA	HHS Food and Drug Administration
FECM	DOE Fossil Energy and Carbon Management
FEMP	DOE Federal Energy Management Program
FES	DOE SC Fusion Energy Sciences
FHWA	DOT Federal Highway Administration
GEO	NSF Directorate for Geosciences
HBCUs	Historically Black Colleges and Universities
HBCU-UP	NSF Historically Black Colleges and Universities – Undergraduate Program
HEP	DOE SC High Energy Physics
HHS	Department of Health and Human Services
HSIs	Hispanic-Serving Institutions
IE	DOE Office of Indian Energy Policy and Programs
IES	ED Institute of Education Sciences
IMLS	Institute of Museum and Library Services
IP	Intellectual Property
IT	Information Technology
IWG	Interagency Working Group
MESC	DOE Office of Manufacturing and Energy Supply Chains
MDA	DOD Missile Defense Agency
MPS	NSF Directorate for Mathematical and Physical Sciences
MSIs	Minority-Serving Institutions
MUREP	NASA Minority University Research and Education Project
NASA	National Aeronautics and Space Administration
NCSES	NSF National Center for Science and Engineering Statistics
NE	DOE Office of Nuclear Energy
NIFA	USDA National Institute of Food and Agriculture
NIH	HHS National Institutes of Health
NIST	DOC National Institute of Standards and Technology
NNSA	DOE National Nuclear Security Administration
NOAA	DOC National Oceanic and Atmospheric Administration
NP	DOE SC Nuclear Physics
NRC	U.S. Nuclear Regulatory Commission
NSA	DOD National Security Agency
NSF	U.S. National Science Foundation

NSF INCLUDES	NSF's Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science Initiative (Renamed Eddie Bernice Johnson INCLUDES Initiative, Fall 2022)
NSTC	National Science and Technology Council
OE	DOE Office of Electricity
OESE	ED Office of Elementary and Secondary Education
OIA	NSF Office of Integrative Activities
OISE	NSF Office of International Science and Engineering
OMB	Office of Management and Budget
ONCD	Office of the National Cyber Director
ONR	DOD Office of Naval Research
OPE	ED Office of Postsecondary Education
OPM	U.S. Office of Personnel Management
ORD	EPA Office of Research and Development
OSTEM	NASA Office of STEM Engagement
OSTP	White House Office of Science and Technology Policy
OTT	DOE Office of Technology Transitions
OUSD(R&E)	DOD Office of the Under Secretary of Defense for Research and Engineering
OW	EPA Office of Water
R&D	Research and Development
RES	NRC Office of Nuclear Regulatory Research
RFI	Request for Information
S&T	DHS Science and Technology
SBCR	NRC Small Business and Civil Rights Office
SC	DOE Office of Science
SI	Smithsonian Institution
SMD	NASA Science Mission Directorate
STEM	Science, Technology, Engineering, and Mathematics
STMD	NASA Space Technology Mission Directorate
TCUP	NSF Tribal Colleges and Universities Program
TCUs	Tribal Colleges and Universities
USD P&R/M&RA	DOD Under Secretary of Defense for Personnel & Readiness/Manpower & Reserve Affairs
USDA	U.S. Department of Agriculture
USGS	DOI U.S. Geological Survey
USPTO	DOC U.S. Patent and Trademark Office
VA	U.S. Department of Veterans Affairs
VBA	Veterans Benefits Administration
WDTS	DOE SC Office of Workforce Development for Teachers and Scientists

Introduction

Nurturing STEM abilities in all individuals, regardless of their career paths, is essential. STEM skills and STEM literacy are increasingly vital to everyday life, as they support informed personal and community decision making on matters ranging from health and finances to privacy and environmental stewardship. Ending disparities in educational outcomes, by striving for all students to meet or exceed grade-level achievement outcomes, requires tapping into and preparing talent from all across the nation. Ensuring the science and technologies of the future aim to benefit all of society in ways that are safe, secure, ethical, and responsible will further attract talent. Developing and engaging our nation's STEM talent is key to creating more effective solutions for a sustainable future.[2,3,4,5,6,7,8,9,10]

In November 2024, the National Science and Technology Council (NSTC) Committee on STEM (CoSTEM) released[11] its five-year Federal Strategic Plan for Advancing STEM Education and Cultivating STEM Talent,[12] hereafter referred to as CoSTEM's federal STEM strategic plan or simply the strategic plan. Federal agencies engaged in STEM education, workforce development, and research programming are to implement the strategic plan, under the guidance of CoSTEM. This annual report, the first report for this strategic plan, describes current and initial efforts and anticipated implementation practices across the federal government as agencies explore how to fully execute on the strategic plan.

Additionally, this report also aims to fulfill a number of legislative mandates and executive actions: updates on actions in support of the American Innovation and Competitiveness Act of 2017 and CHIPS and Science Act of 2022 Sections 10501, 10505, 10522, 10524, and 10536; federal guidelines as mandated by the CHIPS and Science Act of 2022, Section 10522; progress towards federal guidelines as mandated by the CHIPS and Science Act of 2022, Section 10502; and an update on the measures taken and resources allocated in support of Executive Order 14081 on Advancing Biotechnology and Biomanufacturing Innovation for a Sustainable, Safe, and Secure American Bioeconomy, Section 7 on Biotechnology and Biomanufacturing Workforce.

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[2] AI Talent: https://www.whitehouse.gov/ostp/news-updates/2024/01/29/a-call-to-service-for-ai-talent-in-the-federal-government/

[3] National Security Talent: https://www.whitehouse.gov/briefing-room/statements-releases/2024/02/06/fact-sheet-marking-the-three-year-anniversary-of-the-national-security-memorandum-on-revitalizing-americas-foreign-policy-and-national-security-workforce-institutions-and-partnerships/

[4] Cyber Talent: https://www.whitehouse.gov/briefing-room/statements-releases/2023/07/31/fact-sheet-biden-%e2%81%a0harris-administration-announces-national-cyber-workforce-and-education-strategy-unleashing-americas-cyber-talent/

[5] Bioworkforce Talent: https://www.whitehouse.gov/ostp/news-updates/2023/06/27/fact-sheet-biden-harris-administration-announces-new-action-plan-to-bolster-expand-and-diversify-americas-biotechnology-and-biomanufacturing-workforce/

[6] Workforce Talent: https://www.whitehouse.gov/omb/briefing-room/2025/01/08/fact-sheet-delivering-results-for-the-american-people-through-the-biden-harris-presidents-management-agenda/

[7] Expanding STEM Talent in the Federal Workforce. https://www.whitehouse.gov/pcast/briefing-room/2024/10/23/pcast-releases-letter-on-expanding-federal-stem-talent/

[8] Talent Is the Treasure. https://www.nsf.gov/nsb/publications/2024/2024_policy_brief.pdf

[9] Talent: U.S. and Global STEM Education and Labor Force, The State of U.S. Science and Engineering 2024, https://ncses.nsf.gov/pubs/nsb20243/talent-u-s-and-global-stem-education-and-labor-force

[10] The Skilled Technical Workforce: Crafting America's Science & Engineering Enterprise https://www.nsf.gov/nsb/publications/2024/STW-1-pager-2024.pdf

[11] https://www.whitehouse.gov/ostp/news-updates/2024/11/26/2024fedstemplan/

[12] Federal Strategic Plan for Advancing STEM Education and Cultivating STEM Talent. https://www.whitehouse.gov/wp-content/uploads/2024/11/2024fedSTEMplan.pdf

Section 1: Actions Taken by Agencies within CoSTEM and Progress on CoSTEM's Five-Year Federal STEM Strategic Plan

Fostering the capabilities of learners, workers, educators, researchers, mentors, innovators, and community members—or STEM talent—across the country is critical both to enable all individuals to achieve their own aspirations in STEM fields and careers and to ready the nation to pursue new opportunities. Individuals, families, communities, educational and academic institutions, industry, nonprofit and philanthropic organizations, and government must all work together to advance STEM education and to engage and expand the nation's STEM talent.

Through the latest federal STEM strategic plan, CoSTEM and its constituent federal research and science agencies, released a vision and a framework for how the federal STEM community can advance STEM education and grow and develop STEM talent throughout the nation.

A Vision for STEM in America

The United States will inspire, educate, train, and innovate in STEM fields and STEM careers, so that through unparalleled access and opportunity, the nation can leverage the full potential of its STEM talent and ensure the country's national security, economic prosperity, and global competitiveness.

A Federal Strategy for the Next Five Years

CoSTEM's federal STEM strategic plan, **Federal Strategic Plan for Advancing STEM Education and Cultivating STEM Talent,** has three cross-cutting principles and five interdependent pillars that serve as a framework for the national STEM community to contribute to the strategy's success.

The three cross-cutting principles recognize that:

- **Access and opportunity** for all can only be achieved if the country acknowledges and takes action in ways that are consistent with the values of serving each and every individual, from every community, all across the nation.
- The federal government alone cannot produce the STEM talent needed for the entire country. Multi-agency and multi-sector **partnerships and ecosystem development**, including with international counterparts, are necessary to achieve a vision for STEM in America.
- Collaboration, coordination, and advancement of federal efforts require **transparency and accountability**. Being transparent about federal actions and progress, promoting accountability within the federal government, and sharing knowledge and resources enable the nation to achieve more collectively.

In tandem with these principles, the plan pursues progress on five interdependent pillars to advance STEM education and cultivate STEM talent across the nation:

- **STEM Engagement:** Addresses the need to engage learners of all ages, their families and communities, and the entire STEM ecosystem. Objectives aim to foster youth, community, and public engagement that support inspiration and belonging, connect research and practice, and build STEM skills and STEM literacy for lifelong learning.
- **STEM Teaching and Learning:** Addresses the need to end disparities in educational outcomes by effectively preparing learners of all ages and developing a STEM teacher workforce at all

educational levels. Objectives aim to improve the opportunities and outcomes for learners and educators in and across all STEM disciplines.

- **STEM Workforce:** Addresses the need to build an agile federal and national workforce with the STEM skills and expertise to meet critical and emerging scientific and technological needs facing the nation, which includes tackling global challenges with consideration of international talent needs. Objectives aim to support the training and recruitment of the nation's federal and national STEM workforce while cultivating global talent mobility and opportunity.
- **STEM Research and Innovation Capacity:** Addresses the need to advance research related to teaching and learning in STEM fields and expand research and innovation capacity to individuals, communities, and institutions. Objectives aim to drive cutting-edge STEM education research and innovation, build and advance STEM research capacity, and cultivate innovation and entrepreneurial talent development.
- **STEM Environments:** Addresses the need to remove barriers that prevent STEM learners, researchers, and workers from remaining in STEM fields and careers. Objectives aim to remove barriers to participation and retention by supporting research career trajectories in STEM learning environments, enhancing career flexibilities in STEM working environments, and promoting safe STEM research environments.

Figure 1: The five major pillars of the strategic plan are connected by the foundational principles of access and opportunity, partnerships and ecosystem development, and transparency and accountability.

Federal Programs that Exemplify CoSTEM's New Federal STEM Strategic Plan

On the following pages, interagency, multiagency, and agency programs/actions are highlighted that exemplify CoSTEM's new strategic plan, supporting learners, workers, and researchers across the entire STEM talent continuum.

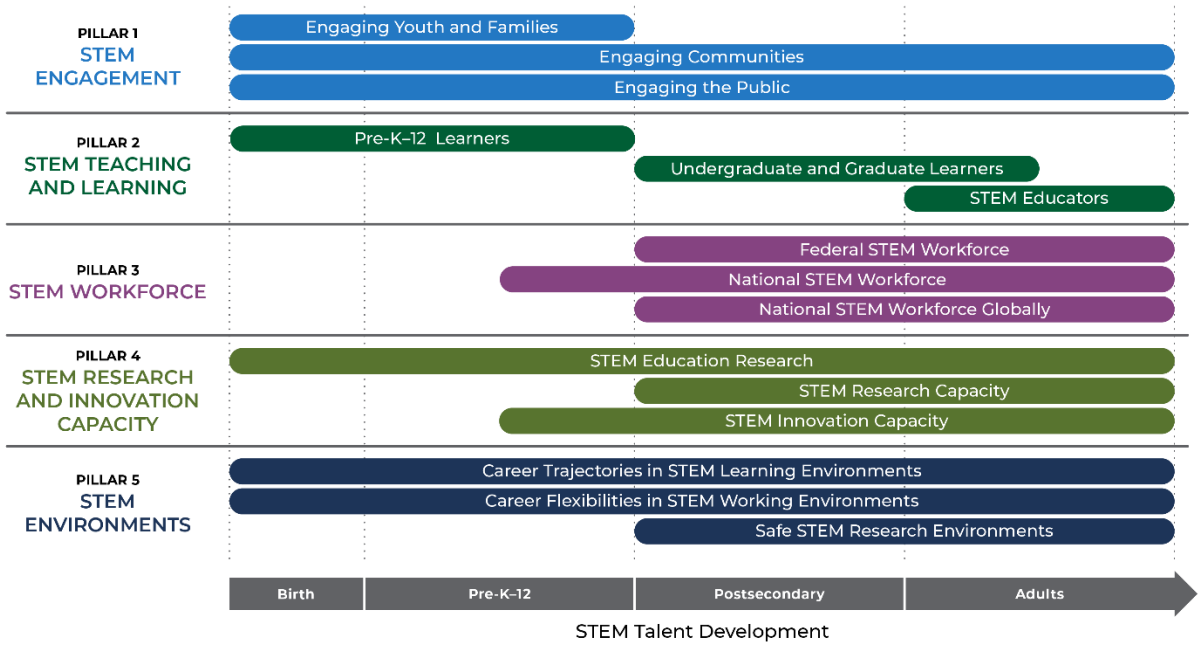


Figure 2: Each pillar of the strategic plan advances three objectives that address challenges and opportunities across the continuum of STEM talent development, from birth, pre-K–12 education, postsecondary education, through adulthood.

By organizing federal efforts around five major interdependent pillars and three cross-cutting principles, the strategic plan provides a framework for cultivating the full continuum of STEM education and talent development as a national priority. Innovative and inclusive agency programs and policies, multi-agency initiatives, and new partnerships will be required to make meaningful progress toward the plan's objectives. The five-year strategic plan on STEM guides how the government, in coordination with multi-sector partners throughout the STEM ecosystem, aims to prepare the nation to be inspired, to teach and to learn, to be trained and recruited, to discover and innovate, and to remove barriers to retention within and across STEM learning, working, and research settings.

Pillar 1. STEM Engagement

Engaging Youth Through Robotics

The Department of Defense (DOD) supports education and outreach programs that engage over 1 million youth across the United States each year. This expansive reach is made possible through collaboration with a network of dedicated program-delivery partners. One such partner for DOD is For Inspiration and Recognition of Science and Technology (FIRST®), a global robotics community that provides mentor-based STEM programs for K–12 students. Each year, the DOD sponsors over 1,300 FIRST teams and class packs via season grants, supporting participation of military-connected, DoDEA (DOD Education Activity), Title 1, and rural students and schools in programs such as FIRST® LEGO® League, FIRST® Tech Challenge, and FIRST® Robotics Competition. All DOD-sponsored teams and class packs are required to have a DOD mentor or coach, enabling the DOD workforce (i.e., scientists and engineers) to sustainably engage with students, parents, teachers, and the public in STEM education and outreach initiatives.[13]

Using Earth System Science to Build Local Resilience

The Department of Commerce's National Ocean and Atmospheric Administration (NOAA) understands the importance of inspiring scientific exploration and understanding in all people, including youth, adult learners, and communities. As part of the Environmental Literacy Program (ELP), NOAA provides support for informal education programs designed to build local resilience to hazardous weather, changes in the climate, and other environmental threats. In 2023, ELP engaged over 12,000 people in projects that grow participants' abilities to support their communities in preparing for, responding to, and recovering from future climate hazards.[14]

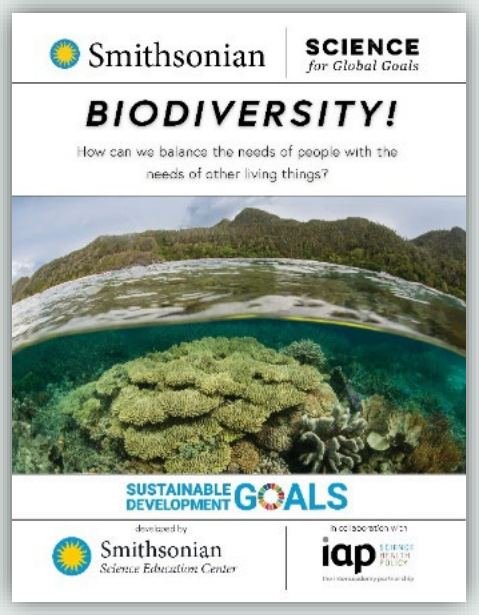
[13] DoD STEM Programs: https://dodstem.us/participate/opportunities/
[14] NOAA Environmental Literacy Program: https://www.noaa.gov/office-education/elp

Investing in Digital Literacy and Access to Broadband

Efforts that advance digital literacy are critical for ensuring the equitable participation of all individuals in the society, economy, and STEM ecosystem of the United States. The Department of Commerce's National Telecommunications and Information Administration (NTIA) will invest over $1 billion to ensure U.S. states and territories can implement their Digital Equity Plans. NTIA will also fund approximately $900 million in digital equity projects under the Digital Equity Competitive Grant Program, which may also include efforts to increase the availability and affordability of access to broadband technology and consumer devices, promote accessibility and inclusivity of public resources, advance digital literacy, and increase awareness of online privacy and cybersecurity.[15]

Pillar 2. STEM Teaching and Learning

Transforming Education Through Science

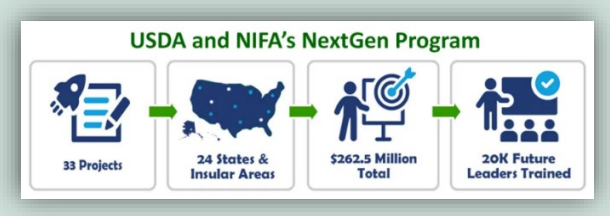


The Smithsonian Science and Education Center (SSEC) aims to transform K–12 education and advance sustainable development by engaging students where disciplines converge. The Smithsonian Science for Global Goals Project currently offers 13 freely available community research guides for youth ages 11–18, which can be used by educators in classrooms or in out-of-school education settings. These guides help youth develop sustainability mindsets by inviting them to take action on topics such as biodiversity, biotechnology, energy, and the future of our oceans.[16]

[15] NTIA State Digital Equity Capacity Grant Program: https://www.ntia.gov/program/state-digital-equity-capacity-grant-program

[16] Education Components of Life on a Sustainable Planet: https://ssec.si.edu/global-goals

Educating the Next Generation of Food and Agriculture Professionals



USDA is committed to supporting and preparing students from diverse communities for future careers in food and agriculture. USDA developed the From Learning to Leading: Cultivating the Next Generation of Diverse Food and Agriculture Professionals (NextGen) program to support the education and career development of students enrolled at HBCUs (1890 Land-grants), Tribal colleges and institutions (TCIs) (1994 Land-grants), HSIs, Alaska Native-Serving and Native Hawaiian-Serving Institutions (ANNH), institutions of higher education located in Insular Areas, and other MSIs. NextGen enables these institutions, and their partners, to recruit, retain train, and train retain undergraduate and graduate students through scholarships, experiential learning, and career outreach. So far, USDA has invested $262.5 million in NextGen projects that will reach 20,000 students.[17]

EPA's People, Prosperity and the Planet (P3) Student Design Competition

Since 1994, EPA's People, Prosperity and the Planet (P3) Program has supported over 4,000 students from over 200 institutions across all 50 states and Puerto Rico. Through P3, teams of college / university students gain hands-on experience as they apply their classroom or experiential STEM learning to develop innovative solutions to environmental challenges. P3 Program funding has helped launch new careers and led to the discovery of new technologies and the establishment of new organizations and small businesses — resulting in significant advances in the areas of sustainability, environmental justice, and public health. Notable small businesses include the LeapFrog Design, Atrius Building Insights (formerly Lucid Design Group, Inc.), and SImpleLab Inc. (formerly Simplewater). [18]

[17] USDA NextGen: www.nifa.usda.gov/nextgen

[18] EPA's People, Prosperity and the Planet (P3) Student Design Competition: https://www.epa.gov/P3/learn-about-p3-program

Recruiting, Preparing, and Retaining the STEM Teacher Workforce

NSF has supported the training of science and mathematics teachers for over 20 years. Through grants primarily to higher education institutions, the Robert Noyce Teacher Scholarship Program (NOYCE) provides scholarship support for talented STEM undergraduate majors and professionals to become effective K–12 STEM teachers in high-need school districts. To support exemplary, experienced K–12 teachers in their professional development, the program offers financial support for these individuals to become teacher leaders in high-need school districts. The NOYCE program also supports research on the effectiveness and retention of K–12 STEM teachers in high-need school districts and provides support for pre-service and in-service STEM teachers to participate in STEM research in STEM settings, including laboratories and field research.[19]

Pillar 3. STEM Workforce

Improving Paths into the Federal Workforce

As part of a plan to ensure that the federal government has an inclusive workforce of the future, the U.S. Office of Personnel Management (OPM) is focused on increasing opportunities and removing barriers to hiring early career workers, including STEM talent. OPM made updates to the Pathways Programs in 2024 that will help agencies boost their talent pipelines by growing opportunities for interns, recent graduates, and apprentices. The updates include expanding eligibility to individuals who have completed qualifying career or technical education programs, reducing the number of internship hours required to convert an intern into a permanent position, and increasing starting salaries for recent graduates.[20]

[19] https://new.nsf.gov/news/noyce-scholars-learn-classroom-survival-skills#image-caption-credit-block
[20] https://www.opm.gov/policy-data-oversight/hiring-information/students-recent-graduates/

Preparing the Skilled Workforce

The Department of Labor's (DOL's) Employment and Training Administration offers several skills training grant programs to increase participation in the workforce. For example, the H-1B Skills Training Grants programs provide funding for projects that train American workers to get the skills they need to obtain or upgrade employment, particularly in rapidly-growing industries or sectors. Current H1-B Skills Training Grant Programs invest in job training and apprenticeships for workers in areas such as infrastructure, nursing, health care, information technology, cybersecurity, advanced manufacturing, and transportation.[21]

Expanding STEM-Based Exchanges

The Department of State (DOS) recognizes the critical role of international exchange in strengthening the U.S. STEM workforce and ensuring global competitiveness. Through the BridgeUSA program, DOS launched two key STEM exchange initiatives in collaboration with the White House Office of Science and Technology Policy (OSTP) in 2022. The Early Career STEM Research Initiative allows U.S.-based STEM research institutions and businesses to host J-1 exchange visitors as interns, trainees, and researchers, providing them with valuable training and research opportunities. Additionally, the STEM Academic Training initiative enables J-1 undergraduate and pre-doctoral exchange visitors to extend their training at U.S. academic institutions for up to 36 months, fostering skill development and innovation in critical STEM fields. Through the International Visitor Leadership Program (IVLP) current and emerging foreign leaders in a variety of fields travel to the United States to engage with their American counterparts on a wide range of topics including several STEM-focused programs. These programs range from exploring clean energy technologies to cybersecurity, AI, 5G, space diplomacy, and supporting STEM entrepreneurship and education among many others. In 2024, approximately 450 IVLP participants took part in STEM-focused projects including the IVLP's signature STEM initiative, "Hidden No More: Empowering Women Leaders in STEM."[22]

[21] H1-B Skills Training Grants: https://www.dol.gov/agencies/eta/skills-grants/h1-b-skills-training
[22] BridgeUSA :https://j1visa.state.gov/

Pillar 4. STEM Research and Innovation Capacity

Conducting Rigorous Research in Education

The Department of Education's Institute for Education Sciences (IES) makes substantial investments in education research and development. IES currently supports high-quality STEM education research through a number of discretionary research grants programs, including but not limited to, the Education Research Grants program, the National Education Research and Development Centers (R&D Centers), and the Accelerate, Transform, Scale (ATS) Initiative. These programs produce and disseminate rigorous research to improve the quality of education and thereby increase student academic achievement, reduce the opportunity and achievement gaps between students, and increase access to and completion of postsecondary education.[23]

Building Capacity at Research-Active Institutions

The Department of Health and Human Services' National Institutes of Health (NIH) understands that equipping a broad range of institutions with the skills they need to succeed in federally funded research projects is essential for advancing biomedical research and improving health outcomes. NIH launched the Engagement and Access for Research-Active Institutions (EARA) initiative in 2024, which enhances outreach and connections between NIH Institutes and Centers and Research-Active Institutions (RAIs). These are defined as institutions that: (1) have a historical mission to serve populations underrepresented in biomedical and behavioral research, (2) award degrees in the health professions or the sciences related to health, or in STEM fields including social and behavioral sciences, and (3) have received an average of no more than $25 million (total costs) of NIH Research Project Grant (RPG) support for the past three fiscal years. In addition to a web portal and newsletter to inform RAIs of NIH opportunities, NIH piloted an intensive engagement initiative. Fifty-two institutions, including rural institutions in Institutional Development Award (IDeA)[24] states, HBCUs, TCUs, and other MSIs (in keeping with the CHIPS and Science Act) will participate in the EARA pilot through 2025. These institutions will increase their awareness of NIH resources and opportunities and thus build their capacities to participate in NIH-funded research.[25]

[23] IES NCER R&D Centers https://ies.ed.gov/ncer/research/randdCenters.asp
[24] https://www.nigms.nih.gov/Research/DRCB/IDeA/Pages/default.aspx
[25] NIH EARA: https://diversity.nih.gov/build/engagement-and-access-research-active-institutions-eara

Accelerating Innovation Across the STEM Talent Continuum

The Department of Commerce's U.S. Patent and Trademark Office (USPTO) is committed to growing skills in innovation, invention, and entrepreneurship among all STEM students and educators. Through the National Summer Teacher Institute (NSTI), USPTO provides a free, multi-day professional development training opportunity for K–12 teachers. Teachers that participate in NSTI build knowledge of concepts in invention and intellectual property and learn how to inspire their students to be innovators and entrepreneurs. Since 2014, NSTI has engaged over 500 educators. Additionally, USPTO conducts outreach to faculty and students at institutions across the country—including minority-serving institutions such as Howard University, Texas Southern University, Alabama A&M University, Arizona State University, and University of Puerto Rico—in order to build intellectual property awareness and increase participation in the innovation ecosystem.[26,27]

Pillar 5. STEM Environments

Removing Barriers by Promoting Inclusive and Equitable Research in Energy Sciences

U.S. Department of ENERGY | Office of Science

The Department of Energy (DOE) Office of Science recognizes the importance of cultivating inclusive and respectful work and research environments across its awardee institutions. In FY 2023, DOE began requiring all applicants to Office of Science funding opportunities to submit plans for Promoting Inclusive and Equitable Research (PIER). PIER Plans are designed to have applicants strategically plan how they will create equitable, inclusive, accessible, and encouraging professional environments for the students and early career researchers involved in their research projects. PIER Plans must be tailored to the research project. The DOE offers resources for applicants to prepare their PIER plans, including general guidance language, a list of factors to consider, and answers to frequently asked questions.[28]

[26] USPTO National Summer Teacher Institute https://www.uspto.gov/learning-and-resources/kids-educators/nsti
[27] USPTO Outreach to MSIs https://www.uspto.gov/learning-and-resources/kids-educators/outreach-minority-serving-institutions
[28] PIER Plans - https://science.osti.gov/grants/Applicant-and-Awardee-Resources/PIER-Plans/

Supporting Career Re-entry, Reintegration, and Retraining

As part of its commitment to supporting biomedical and health researchers, NIH offers research supplements for researchers who wish to return to the workforce or expand their skillsets. The Reentry Supplements Program was established in 1992 and provides mentored research training opportunities for individuals who have had interruptions to their careers for family responsibilities, such as childrearing. The Reintegration Program helps predoctoral and postdoctoral scientists who have been impacted by harassment or discriminatory environments transition into more supportive research environments. The Retraining/Retooling Program provides mentored research experiences for early and mid-career scientists to acquire new skills.[29]

Empowering Geoscientists to Transform Workplace Climates

The National Science Foundation (NSF) is dedicated to stopping discrimination, sexual harassment, and assault across NSF-funded research and learning environments. In addition to continuously improving NSF's harassment prevention and response policies, NSF also funds awards designed to improve culture across STEM environments. For example, NSF has supported the AdvanceGeo Partnership since 2017. AdvanceGeo is dedicated to reducing harassment, bullying, and discrimination in the geosciences by developing and testing a workplace climate intervention program for academic departments and faculty training programs.[30]

[29] NIH Reentry Supplements, Reintegration Program, Retraining/Retooling Program: https://orwh.od.nih.gov/career-development-education/research-supplements-promote-reentry-and-reintegration-health-related

[30] NSF-funded ADVANCEGeo https://serc.carleton.edu/advancegeo/about.html or https://www.nsf.gov/awardsearch/showAward?AWD_ID=2204361

Interagency Actions Supporting CoSTEM's Strategic Plan Pillars

As conveyed in the federal STEM strategic plan, CoSTEM will work with agencies to increase agency participation in pillar and objective approaches. Examples of agency participation include membership on various CoSTEM subcomponents such as existing interagency working groups, any new interagency working groups formed, and short-term task teams. In support of accountability, CoSTEM and its member agencies will track progress toward achieving the objectives outlined in this plan. To facilitate this endeavor, CoSTEM will work to identify and confirm coordinated approaches and metrics to measure progress toward plan objectives. Throughout the plan's implementation period, CoSTEM will aim to provide progress on approaches, metrics, and other supportive actions in its annual progress reports. To demonstrate how CoSTEM investments align and contribute to plan objectives, CoSTEM will aim to include updates on agency programming that contributes to progress toward plan objectives.

Strategic Plan Atlas

(Reflecting Pillars and Objective Foci)

STEM Engagement	STEM Learning and Teaching	STEM Workforce	STEM Research and Innovation Capacity	STEM Environments
Engaging **Youth and Families** and Increasing Inspiration in STEM *(with a focus on informal STEM)*	Educating **Pre-K–12 Learners** *(with a focus on formal STEM)*	Training and Recruiting a **Federal STEM Workforce** *(with a focus on work-based learning)*	Advancing **STEM Education Research**	Removing Barriers and Supporting **Career Trajectories in STEM Learning Environments** *(with a focus on research careers)*
Engaging **Communities** and Increasing Participation in STEM	Educating **Undergraduate and Graduate Learners**	Training and Recruiting a **National STEM Workforce** *(with a focus on career and technical education and the skilled technical workforce)*	Advancing **STEM Research Capacity** *(with a focus on HBCUs, TCUs, other MSIs, and ERIs)*	Removing Barriers and Supporting **Career Flexibilities in STEM Working Environments**
Engaging **the Public** and Building STEM Literacy	Training **STEM Educators** *(with a focus on pre-K–12)*	Cultivating a **Global Workforce Nationally** and a **National Workforce Globally**	Building **STEM Innovation Capacity**	Removing Barriers and Promoting **Safe STEM Research Environments**

When asked, AmeriCorps, USDA, DOC/NOAA, NIST, DOC/USPTO, DOD, ED, DHS, DOI, DOJ, DOL, DOS, DOT, VA, EPA, IMLS, ODNI, OPM, NASA, NSF, NRC, and SI all expressed interest in future coordination and collaboration within and outside of CoSTEM. When asked if agencies might want to work with other agencies as part of an interagency group within CoSTEM, 53% of the 15 agencies that responded to this question, indicated they might be interested. When asked if agencies are already carrying out actions/ activities with other agencies through established initiative/ collaborative/ partnerships that align with CoSTEM's strategic plan, nine agencies, 64% of the 14 agencies that responded, indicated yes. When asked if agencies would like to start an initiative/ collaborative/ partnership with other agencies, five agencies, 42% of the 12 agencies that responded, indicated yes. When asked if agencies are already carrying out actions/ activities that align with the Plan, independently as a single agency, 12 agencies, 86% of the 14 agencies who responded, indicated yes. When asked if agencies will start new actions/ activities that align with the Plan, independently as a single agency, nine agencies, 75% of the 12 agencies who responded, indicated yes.

Interagency Action: STEM Education Communications Community of Practice

CoSTEM's STEM Education Communications Community of Practice (CoP) brings together communications experts from across the federal STEM community to coordinate and amplify STEM education communications efforts. The CoP meets monthly to enable: the sharing of tools and resources across the federal STEM community; the sharing of promising communications practices; and the development of coordinated communications resources, events, and campaigns. The team works together to explore new venues and formats to engage with educators, students, and other stakeholders in the STEM education environment.

The CoP coordinates federal presence at conferences such as the annual Association for Science Teacher Education conference and the biannual National Science Teaching Association conference, and is exploring opportunities to coordinate federal presence at other conferences and events. The CoP also maintains a flyer for use at conferences and events that summarizes the STEM education resources of 16 different agencies/sub-agencies. When one agency attends a conference, educator training, or other STEM event, that agency can distribute the flyer to inform members of the public of STEM education resources at other agencies, maximizing the reach and impact of the federal STEM efforts. The CoP additionally enables agencies to amplify and leverage each other's social media campaigns.

Interagency Action: Federal Internships Community of Practice

CoSTEM's Federal Internships Community of Practice (FICOP) was established in early 2020 to support agencies as they navigated internship opportunities during the COVID-19 pandemic. Since then, FICOP has continued to bring together professionals from nearly 20 agencies that lead and support federal internship opportunities. Through FICOP, internships staff share opportunities, promising practices, lessons learned, and other timely information to improve the experience of interns across the federal government. For example, coordination via FICOP enables agencies to offer their interns the opportunity to participate in professional development events hosted by other agencies and benefit from professional development resources developed by other agencies.

Interagency Action: Interagency Working Group for HBCU, TCU, and MSI STEM Achievement

The Interagency Working Group for Historically Black College and University (HBCU), Tribal College and University (TCU), and Minority-Serving Institution (MSI) STEM Achievement (IWG-HBCU, TCU, MSI) was

chartered in July 2023 to carry out the work outlined in Sections 10522 and 10524 of the CHIPS and Science Act. This group coordinates efforts to advance federally funded institutional capacity in STEM education, workforce development, and research. The focus of this group most closely aligns with Pillar 4 of the CoSTEM's federal STEM strategic plan, specifically Objective 4.2: Advancing STEM Research Capacity.

In 2024, IWG-HBCU, TCU, MSI produced a report that reviews the challenges high-research activity status HBCUs (or R2 HBCUs) face when applying for and securing federal research funding.[31] The report also provides recommendations for agencies to advance the research capacity of R2 HBCUs and highlights some practices currently implemented by some agencies to increase the participation of HBCUs in federal funding opportunities.

Since the report was released, DHS, DOC/NIST, DOC/NOAA, DOC/USPTO, DOD, DOI, DOJ, DOS, DOT, EPA, NASA, NSF, SI, and USDA have taken one or more of the following actions:

- reviewed the respective CoSTEM report with outlined recommendations and no further actions were currently taken
- reviewed the respective CoSTEM report and did not identify any recommendations that the agency could take action on
- reviewed the respective CoSTEM report and identified recommendations that the agency could take action on
- are reviewing current levels of participation of selected/impacted individuals and/or organizations
- have reviewed current levels of participation of selected/impacted individuals and/or organizations
- have policies and are maintaining those policies
- are developing new policies
- have developed new policies and are in the process of implementing policies
- have captured and reported agency actions to implement policies and practices to CoSTEM
- have captured and reported agency actions to implement policies and practices to OSTP
- have captured and reported agency actions to implement policies and practices to EOP (other than OSTP)
- are collecting data on the usage of policies
- have captured and reported usage of policies
- have broadly disseminated policies to potentially impacted individuals and/or organizations
- are collecting best practices
- have collected and reported best practices internal to government
- have collected and reported best practices external to government
- collecting evidence of impact of policies
- have evidence of the impact of existing policies
- have evidence of the impact of new policies

[31] NSTC: Advancing Research Capacity at High Research Activity Historically Black Colleges and Universities (HBCUs) https://www.whitehouse.gov/wp-content/uploads/2024/05/CoSTEM-HBCU-Report.pdf

Interagency Action: Interagency Working Group on Inclusion in STEM

The Interagency Working Group on Inclusion in STEM (IWG-IS) was chartered in 2018 in response to the mandates in the American Innovation and Competitiveness Act. IWG-IS has historically advised FC-STEM on coordination of activities involving inclusion in STEM fields across the federal government, focusing on identifying research, best practices, and policies on promoting diversity and inclusion of all groups in the federal STEM workforce. The focus of this group is aligned with Principle 1: Access and Opportunity of CoSTEM's federal STEM strategic plan.

In May 2024, the IWG-IS released a report on Best Practices for Reducing Organizational, Cultural, and Institutional Barriers in STEM Research[32]that provides an overview of practices designed to reduce organizational, cultural and institutional barriers to optimize organizational climate and participation in STEM.

Since the report was released, DOC/NOAA, DOC/USPTO, DOD, DOI, DOJ, DOS, DOT, EPA, NASA, NSF, SI, and USDA have taken one or more of the following actions:

- reviewed the respective CoSTEM report with outlined recommendations and no further actions were currently taken
- reviewed the respective CoSTEM report and did not identify any recommendations that the agency could take action on
- reviewed the respective CoSTEM report and identified recommendations that agency could take action on
- are reviewing current levels of participation of selected/impacted individuals and/or organizations
- have reviewed current levels of participation of selected/impacted individuals and/or organizations
- have policies and are maintaining those policies
- have captured and reported agency actions to implement policies and practices to CoSTEM
- have captured and reported agency actions to implement policies and practices to OSTP
- have broadly disseminated policies to potentially impacted individuals and/or organizations
- are collecting data on the usage of policies
- are collecting best practices
- have collected and reported best practices internal to government
- have evidence of impact of new policies

In May 2024, IWG-IS also released a report on Federal Policies and Practices to Support STEM Researchers with Caregiving Responsibilities[33] that details existing federal policies and practices that support the needs of caregivers in STEM and provides recommendations for federal agencies and federally funded institutions to consider in order to meet caregivers' needs.

Since the report was released, DOC/NOAA, DOC/USPTO, DOD, DOI, DOJ, DOS, DOT, EPA, NASA, NSF, SI, and USDA have taken one or more of the following actions:

[32] NSTC: Best Practices for Reducing Organizational, Cultural, and Institutional Barriers in STEM Research https://www.whitehouse.gov/wp-content/uploads/2024/05/CoSTEM-IWGIS-Barriers-Report.pdf

[33] NSTC: Federal Policies and Practices to Support STEM Researchers with Caregiving Responsibilities https://www.whitehouse.gov/wp-content/uploads/2024/05/CoSTEM-IWGIS-Caregivers-Report.pdf

- reviewed the respective CoSTEM report with outlined recommendations and no further actions were currently taken
- reviewed the respective CoSTEM report and did not identify any recommendations that the agency could take action on
- reviewed the respective CoSTEM report and identified recommendations that agency could take action on
- are reviewing current levels of participation of selected/impacted individuals and/or organizations
- have reviewed current levels of participation of selected/impacted individuals and/or organizations
- have policies and are maintaining those policies
- are developing new policies
- have captured and reported agency actions to implement policies and practices to CoSTEM
- are collecting best practices
- have collected and reported best practices internal to government

Interagency Working Group on Safe and Inclusive STEM Environments

The Interagency Working Group on Safe and Inclusive STEM Environments (IWG-SISE) was chartered in July 2023 in response to Section 10536 of the CHIPS and Science Act. The group coordinates federal research agency efforts to reduce sex-based and sexual harassment in STEM environments. The focus of this group aligns with Pillar 5 of CoSTEM's federal STEM strategic plan, specifically Objective 5.3: Removing Barriers and Promoting Safe STEM Research Environments. In 2024, IWG-SISE produced an inventory of federal agency policies, procedures, and resources related to preventing and responding to sexual harassment. [34] IWG-SISE also released in January 2025 a set of guidelines for federal research agencies to reduce the prevalence of sex-based and sexual harassment involving research award personnel, which includes several recommendations for agency action and implementation. [35]

[34] https://www.whitehouse.gov/wp-content/uploads/2024/02/Interagency-Working-Group-on-Safe-and-Inclusive-STEM-Environments-Inventory-2024.pdf

[35] NSTC: Guidelines for Federal Research Agencies to Reduce Sex-Based and Sexual Harassment Involving Award Personnel https://www.whitehouse.gov/wp-content/uploads/2025/01/IWG-SISE-2024-Report-for-CoSTEM.pdf

May 01, 2024

Multi-Sector Actions to Eliminate Systemic Barriers in STEMM

Today, the White House Office of Science and Technology Policy (OSTP) is announcing a new set of bold cross-sector actions that will help propel our nation toward a more equitable science, technology, engineering, mathematics, and medicine (STEMM) ecosystem. These commitments build on the Biden-Harris Administration's national vision and earlier announcements to expand access and opportunity across science and technology field and bolster America's global competitiveness.

At the first White House Summit on Equity and Excellence in STEMM, the STEMM Opportunity Alliance (SOA) – a first-of-its-kind national initiative to lead and coordinate cross-sector action to help achieve greater equity across STEMM fields – was launched with more than $1 billion in work and investments expanding opportunities in STEMM.

As a part of today's White House Summit on STEMM Equity and Excellence: Propelling Progress and Prosperity by 2050, SOA's broad coalition now represents more than 200 organizations and has powered additional commitments towards STEMM equity which now brings the total to $2 billion. That commitment will help drive progress against STEMM Equity and Excellence 2050 – a first-of-its kind strategic plan for achieving equity and excellence in the American STEMM ecosystem, released today by SOA.

To move from shared goals to aligned action, below are examples of the SOA commitments announced today. These efforts join actions recently completed by the federal government in support of STEM education and equity-related work.

For complete fact sheet (with a list of SOA funders, partners, and private commitments) : https://www.whitehouse.gov/ostp/news-updates/2024/05/01/fact-sheet-biden-harris-administration-announces-new-multi-sector-actions-to-eliminate-systemic-barriers-in-stemm/, and SOA's STEMM Equity and Excellence 2050: A National Strategy for Progress and Prosperity, https://stemmopportunity.org/national-strategy-2050

Photos: Kei Koizumi, Principal Deputy Director of White Office of Science and Technology Policy provides opening remarks; Arati Prabhakar, Assistant to the President for Science and Technology and Director of White House Office of Science and Technology Policy provides keynote remarks; and Nafeesa Owens, Assistant Director for STEM Education and Workforce, White House Office of Science and Technology Policy, provides closing remarks at the 2024 White House Summit on STEMM Equity and Excellence co-hosted by the White House Office of Science and Technology Policy and the STEMM Opportunity Alliance. Photo credit: American Association for the Advancement of Science (AAAS).

AAAS serves as the facilitating backbone organization to coordinate, align and ensure shared accountability across the network. They aggregate and disseminate what works across stakeholder audiences - including government, industry, philanthropy, education and training; and translate priorities and opportunities from across those stakeholder audiences. Learn more

Interagency and Agency Actions Supporting CoSTEM's Strategic Plan Principles

Access and Opportunity

To facilitate improvements in access and opportunity, agencies will seek to broaden STEM education, workforce, and research opportunities available to those from underrepresented communities, underserved geographic areas, and/or under-resourced academic institutions. Agencies, in doing so, may provide details on their anticipated outreach and engagement approaches, new and/or expanded funding opportunities that increase the capacity and capability of under-resourced and/or emerging research institutions, and new and/or expanded programming that incentivizes effective partnerships with under-resourced and/or emerging research institutions. Agencies may also develop planning grants to equip grant offices with the requisite knowledge to submit competitive proposals and manage awards, or offer training opportunities for staff, students, and faculty. Agencies may implement other approaches to make competitive funding models more accessible for underrepresented communities, underserved geographic areas, and under-resourced and/or emerging research institutions.[36]

Agency Actions to Broaden STEM Opportunities

AmeriCorps has three key documents that demonstrate how the agency is increasing access and opportunity: (1) AmeriCorps' current strategic plan covers the time period 2022–2026 and includes several relevant goals and objectives; (2) AmeriCorps' Equity Action Plan, released in 2022, focuses on five key areas, including recruiting and retaining a diverse corps; and (3) AmeriCorps releases annual funding via Notice of Funding Opportunities on its website.[37]

DOC/NOAA's FY24 NOAA Education Implementation Plan highlights how NOAA Education programs support, plan, and deliver high-quality education programs throughout the year.[38]

DOC's Strategic Plan 2022–2026 on Innovation, Equity, and Resilience[39] and **DOC/USPTO's** 2022–2026 Strategic Plan[40] are roadmaps outlining the agency's goals and objectives focused on driving inclusive U.S. innovation, promoting efficient delivery of reliable intellectual property (IP) rights, protecting IP against new threats, and creating positive impacts for the public through innovation. USPTO's National Strategy for Inclusive Innovation aims to lift communities, grow the economy, create quality jobs, and address global challenges by increasing participation in STEM and innovation among youth and those from historically underrepresented and under-resourced communities.[41]

DOD's STEM Strategic Plan for FY 2021–2025, includes a strategic goal focused on increasing participation of individuals from underserved and underrepresented groups in DOD STEM programs, while providing overarching guidance to DOD Components in the development and implementation of

[36] As originally conveyed in CoSTEM's 2024 federal STEM strategic plan

[37] https://americorps.gov/sites/default/files/document/AmeriCorps-Strategic-Plan-2022-2026-v2.0.pdf; https://americorps.gov/about/agency-overview/equity-action-plan; https://americorps.gov/partner/funding-opportunities

[38] https://www.noaa.gov/office-education/noaa-education-council/explainers/fiscal-year-2024-noaa-education-implementation-plan

[39] https://www.commerce.gov/sites/default/files/2022-03/DOC-Strategic-Plan-2022%E2%80%932026.pdf

[40] https://www.uspto.gov/sites/default/files/documents/USPTO_2022-2026_Strategic_Plan.pdf

[41] https://www.uspto.gov/sites/default/files/documents/NationalStrategy.pdf

their programs.[42] In 2024, DOD awarded the first cohort of the Ronald V. Dellums Memorial Science, Mathematics, and Research for Transformation (SMART) Scholarship awardees, expanding program eligibility to support students with no previous college credit who aim to pursue a bachelor's degree, and marking a pivotal step in broadening pathways to STEM education.[43]

DOE's plans exist across each of the DOE Program Elements. High level plans are available in DOE's Equity Action Plan. [44] Major planned investments may be highlighted in the FY 2025 President's budget request.[45]

DOI's U.S. Geological Survey (the science bureau within Interior) is operating under a strategic plan called The USGS 21st Century Science Strategy (2020-2030).[46] This plan centers equity and inclusion as critical organizational needs in order to achieve the agency's science goals. Section 5 on Organization Focus highlights efforts in education and outreach to address recruitment of more women and underrepresented minorities into STEM positions.

Through **DHS's** S&T OUP Website and White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities annual plan, the agency looks to increase support and opportunities for HBCUs.[47]

NASA is broadening participation in its education, workforce, and research opportunities through activities led by NASA's STEM engagement investments and through effective partnerships. These activities seek to meet the needs of their stakeholders, providing opportunities for underrepresented communities, underserved geographic areas, and under-resourced and/or emerging research institutions. Many of these activities are highlighted in NASA's Equity Action Plan and its annual report to the White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities.[48]

Federal agencies have a responsibility to provide broad access to their investments and to be accountable for ensuring that federal activities are open and accessible to members of the population. Collection and reporting on the participation of various groups in federal STEM education programs provide agencies with opportunities to gauge their effectiveness at fostering diversity and inclusion. These tracking and reporting activities are essential to public accountability and legislative mandates. Links to investment-level or agency-level reports, dashboards, and/or websites have been provided, where possible. Mechanisms for data collection vary greatly across investments. If conducted and when possible, investments shared whether their program finished a formal evaluation this year and when available, provided a link to the publicly available evaluation report. When primary objectives, audiences, and STEM fields were considered, investments/programs are not duplicative.

[42] https://dodstem-assets.dodstem.us/files/DoD_STEM_Strategic_Plan_2021.pdf
[43] https://www.dvidshub.net/news/479740/smart-scholarship-service-program-builds-diverse-dod-stem-workforce-awarding-nearly-500-new-scholarships
[44] https://www.energy.gov/articles/doe-releases-new-equity-action-plan-unveils-investments-strengthen-hbcu-opportunities
[45] https://www.energy.gov/cfo/articles/fy-2025-budget-justification
[46] https://pubs.usgs.gov/circ/1476/cir1476.pdf
[47] https://www.dhs.gov/science-and-technology/minority-serving-institutions-program
[48] https://www.nasa.gov/mission-equity/ ; https://sites.ed.gov/whhbcu/reports/fy24-agency-hbcu-plans/

Agency-Level Resources That Share Information on Program Participants and/or Participant Demographic Information

- **AmeriCorps** utilizes an AmeriCorps Participant Demographics Dashboard[49]
- **DOC/NOAA** Education Accomplishments - Common Measures[50]
- **DOC/USPTO** Master Teacher of Invention and Intellectual Property Education Program (MTIP)[51]
- **DOD** Our Impact webpage[52]
- **ED's** EIR Awards webpage[53]
- **DHS** S&T website[54]
- **EPA's** P3 teams[55]
- **NASA's** STEM Engagement Highlights 2023[56], FY23 Economic Impact Report Brochure[57] and STEM Engagement Impacts[58]
- **NSF's** FY 2025 Budget Request to Congress (Number of People Involved in NSF Activities), [59] NSF by the Numbers, [60] and Merit Review Digest, [61] which includes data on proposals, awards, and funding rates of principal investigators.
- **SI** Smithsonian Dashboard[62, 63]

Partnerships and Ecosystem Development

To facilitate improvements in partnerships and ecosystem development, CoSTEM will aim to prioritize and incentivize multi-agency collaborations and partnerships within and outside of the federal government.[64] STEM ecosystems consist of multi-sector partners united by a collective vision of supporting participation in STEM through the creation of accessible, inclusive STEM opportunities spanning all education stages and career pathways. A STEM ecosystem continuously evaluates its activities and adapts as needed, plans for the long term, and communicates its work to build broad support and advance best practices.[65]

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[49] https://data.americorps.gov/stories/s/djuy-4sez; https://data.americorps.gov/stories/s/vdu7-rx6j
[50] https://www.noaa.gov/office-education/noaa-education-council/accomplishments
[51] https://www.uspto.gov/learning-and-resources/kids-educators/master-teacher-invention-education-program
[52] https://dodstem.us/about/impact/
[53] https://www.ed.gov/grants-and-programs/grants-special-populations/economically-disadvantaged-students/education-innovation-and-research#Awards
[54] https://www.dhs.gov/science-and-technology/news/2024/10/23/st-awards-minority-serving-institutions-summer-research-team-projects
[55] https://www.epa.gov/P3/p3-teams
[56] https://www.nasa.gov/wp-content/uploads/2024/06/nasa-stem-highlights-fy2023-final-508.pdf?emrc=59958a
[57] https://www.nasa.gov/wp-content/uploads/2024/10/nasa-fy23-economic-impact-report-brochure.pdf?emrc=67532375bdba4
[58] https://www.nasa.gov/learning-resources/stem-engagement/stem-impacts/
[59] https://nsf-gov-resources.nsf.gov/files/05_fy2025.pdf?VersionId=ep6Z.CgPm8e9qd4u.zG4k5AMuoSQG1s5
[60] https://new.nsf.gov/about/about-nsf-by-the-numbers
[61] https://www.nsf.gov/nsb/publications/pubmeritreview.jsp
[62] https://www.si.edu/dashboard/public-engagement
[63] https://www.si.edu/about/reports; https://www.si.edu/sites/default/files/unit/oeema/diir_fy2023.pdf
[64] As conveyed in CoSTEM's 2024 federal STEM strategic plan
[65] https://trumpwhitehouse.archives.gov/wp-content/uploads/2017/12/Progress-Report-Federal-Implementation-STEM-Education-Strategic-Plan-Dec-2020.pdf

The federal government advances the development of STEM ecosystems through programs, investments, and activities that leverage partnerships. Partnerships between public and private entities provide opportunities to invest in and support STEM programs and initiatives. Leveraging the best that each partner contributes allows for STEM to be effective in supporting the nation's current and future workforce.

Multiagency and Agency Actions with Cross-Agency Partnerships and/or Public-Private Partnerships Exemplifying the 2024 Federal STEM Strategic Plan

ED's Institute of Education Sciences (IES) and **NSF** have established a significant partnership, investing $15 million in two AI institutes focused on AI-digital platforms and AI-augmented learning. The collaboration features multi-year awards for up to 5 years and includes bi-directional investments between agencies. Working groups on partnership strategy and educational innovation ensure sustained impact. This joint effort strengthens AI integration in academic institutions while developing critical workforce capabilities in emerging technologies.

NSF has established a cross-directorate partnership between its directorates (EDU, TIP) and its programs (NSF INCLUDES and EPSCoR) with **DOC/USPTO** to address equity in patent distribution. The partnership aims to raise public recognition of women and underrepresented groups as innovators through participation in the Council for Inclusive Innovation.[66]

A new partnership between **USAID**, **NSF**, and the Government of Kenya was formalized on May 21, 2024, through a Framework of Cooperation to invest in HBCUs. This collaboration aims to develop STEM capacity in both U.S. and Kenyan higher learning institutions through exchange programs and joint investments. NSF highlighted these initiatives during a USAID-moderated panel discussion focusing on university-private sector relationships and the democratization of global STEM talent.[67]

AmeriCorps launched in 2023 the NCCC Forest Corps program, a 5-year interagency agreement with the Department of Agriculture's U.S. Forest Service (USFS). The program was built to assist the USFS in advancing their Wildfire Crisis and Reforestation Strategies, and to cultivate the next generation of wildfire and land management professionals.[68]

DOC/NIST's Gaithersburg High School (GHS) Partnership Program Public Outreach Partnership is a NIST-led program. The purpose of the program is to provide a connection between NIST and nearby Gaithersburg High School about careers, mentorship, and talks on STEM topics. DOC/NIST's ANHA (Association of NIST Hispanic Americans) spearheads this opportunity. There are three areas of focus: Brown bag lunch talks at GHS, Capstone project mentors: A group of GHS seniors participate in "Project Lead the Way" and require mentorship in choosing and working on a capstone project, and Career panel

[66] https://new.nsf.gov/news/nsf-joins-uspto-council-inclusive-innovation

[67] https://www.whitehouse.gov/briefing-room/statements-releases/2024/05/23/fact-sheet-kenya-state-visit-to-the-united-states/

[68] https://americorps.gov/serve/americorps/americorps-nccc/forest-corps; https://vimeo.com/thenameisframe/review/1028578452/1d7087e0d0

or career fair volunteers: Volunteers are needed to share their career path and answer questions from high school students.

DOC/NOAA's CoCoRaHS Data Explorer is a user-friendly online tool that provides observers and other users easy access to the 69+ million daily precipitation reports collected by volunteers. The tool uses innovative visualization products that allow anyone to explore the data. The development of this tool was supported by NOAA's Office of Education through the Cooperative Institute for Research in the Atmosphere.[69]

DOC/USPTO's National Summer Teacher Institute (NSTI) on Innovation, Intellectual Property, and STEM Education is a free, multi-day professional development training opportunity for K–12 teachers designed to: integrate creativity, innovation, and problem-solving into STEM instructional practices; help students develop the skills, mindset, and confidence to reach their STEM potential; and increase knowledge about inventing and intellectual property and its relationship to STEM education.[70]

DOD's Scalable Asymmetric Life Cycle Engagement (SCALE) is an immersive educational program that utilizes Public-Private-Academic Partnership (PPAP) consortium-based approach to achieve national reach to the top universities in targeted microelectronics technical areas, while allowing a regional focus. SCALE combines DOD governance with inputs from all PPAP sectors; a set of national curriculum standards aligned with DOD requirements in specialty areas that go beyond current Accreditation Board Engineering and Technology (ABET) practice; a cohesive messaging and recruiting approach tailored for students from K–12 through Ph.D.; iterative adaptation of curricula and standards; and systematic programmatic evaluation to ensure increased effectiveness and government workforce targets in quality and quantity.

DOD awarded a 10-year, $190 million cooperative agreement in August 2024 for the Defense STEM Education Consortium (DSEC). Under this award, DSEC is composed of 28 regional and national partners to deliver STEM education and outreach programs to pre-K–12 and undergraduate level students and educators. This consortium model approach aims to build the nation's future STEM talent ready to support the national security mission through industry, academia, or at a defense research laboratory or engineering center.[71]

DOE's Geothermal Technologies office partnered with NSF to create the Geothermal INTERN opportunity to support the development of the Geothermal Energy Workforce. DOE/NSF announced the first two cohorts of Geothermal INTERN participants in FY 2024.[72]

[69] https://www.noaa.gov/office-education/news/new-cocorahs-data-explorer-gives-volunteers-easier-more-in-depth-way-to-view-data

[70] https://www.uspto.gov/learning-and-resources/kids-educators/nsti; https://www.uspto.gov/subscription-center/2024/calling-all-k-12-educators-apply-today-2024-national-summer-teacher

[71] https://www.scale4me.org/; https://www.scalek12.org; https://chipkids.org; https://dodstem.us/about/partners/

[72] https://www.energy.gov/eere/articles/us-department-energy-and-national-science-foundation-announce-second-intern-cohort

DOT's FAA has worked with Housing and Urban Development's Strong Families initiative to bring FAA's free STEM Aviation and Space Education (AVSED) resources to underserved communities across the county. This connection includes provision of FAA employees to connect with students, as well as access to free drone kits through the Know Before You Fly initiative.

DOT's CyberAuto Challenge, established in 2012, is the oldest and longest running event that focuses on automotive cybersecurity. It seeks to inspire and train the next generation workforce and puts students in teams with industry, government, and hackers/researchers to work on real platforms and full systems. Trainers are among the best in the world. The classes change every year, but for the past several years, DOT has emphasized electrical vehicle & infrastructure, forensics, and wireless attacks. Students from 13 different countries have participated as of 2023.

Through a formal partnership with **NASA**, Minecraft Education has released series of lunar exploration inspired worlds. Gamers in these new Minecraft worlds can build and launch a rocket, guide their Orion spacecraft, and even establish a lunar base alongside their team. Minecraft Artemis Missions was developed to engage students ages 8 and up in NASA's next chapter in human spaceflight and encourage them to see themselves as future astronauts or scientists. Through the game, students can immerse themselves in the science and technology behind Artemis missions, deepening their understanding of NASA's mission and sparking an interest in the real-world applications of STEM.[73]

Micron's support of **NSF**'s the Robert Noyce Teacher Scholarship program catalyzes STEM education through FY 2024 awards focused on teacher training, developing rural Native American school educators as STEM leaders, and expanding partnerships for STEM education in high-needs schools.[74] Micron's support for NSF's ExLENT Explorations track is designed for non-STEM scholars to explore emerging technologies. The program engages a broad workforce spectrum including military, secondary school, and college participants, helping those new to emerging technologies find their path. This initiative is funded through CHIPS and Science investments.[75] NSF and Science Foundation Ireland (SFI) also announced earlier in early 2024 this year parallel programs to foster student mobility and research collaboration between the United States and Ireland. These initiatives aim to facilitate the exchange of PhD students in data science and ICT. This collaboration signifies the commitment of both agencies to promoting international collaborations and fostering a global research community.[76]

Agency Actions Where New Online CoSTEM-Aligned Resources Were Launched and Exemplify the 2024 Federal STEM Strategic Plan

- **DOC/NOAA's** Finding a career at NOAA[77]
- **DOC/USPTO's** Office of Public Engagement has expanded its EquIP HQ online resources which serve as a hub for educators, parents, and students who seek engaging activities to help foster students' creativity, ingenuity, and innovative minds. These interactive resources will take students

[73] https://www.nasa.gov/learning-resources/stem-engagement/stem-impacts/
[74] https://new.nsf.gov/funding/opportunities/dcl-nsf-micron-foundation-partnership-robert-noyce-teacher
[75] https://new.nsf.gov/tip/updates/nsf-invests-projects-experiential-learning
[76] https://www.sfi.ie/research-news/news/mobility-programme/
[77] https://www.noaa.gov/education/opportunities/students/information-for-noaa-student-opportunity-alumni/finding-career-at-noaa

on an invention journey that introduces the concepts of intellectual property (IP) in creative ways and makes connections to STEM learning experiences.[78]

- **DOE** continues to cross-post CoSTEM-aligned resources on the DOE STEM Resources page.[79] One of the more recently posted resources related to AI workforce training was developed in collaboration with NSF and hosted by the DOE Office Critical and Emerging Technologies.
- **DOI's** My DOI Career explorer and job connector[80]
- **ED**'s Engaging Communities in Innovative STEM Programs (Webinar & PPT) and Implementing Out-of-School Time STEM Programs in STEM Ecosystems[81]
- **NASA:** Earthrise[82]
- **NSF:** Beyond the Classroom[83]

Agency Actions That May Be Used to Disseminate Information About Federally Funded/Supported CoSTEM-Aligned Resources and Exemplify the 2024 Federal STEM Strategic Plan

AmeriCorps offers the Leveraging National Service in Your Schools: A Superintendent's/Principal's Toolkit to Utilizing National Service Resources. Updated in November 2021, this online toolkit provides guidance for schools, local education agencies, state education agencies, nonprofits, state and local government agencies, universities and colleges, Tribal nations, and others to request participants to address local challenges they have identified, including STEM. The resource provides specific examples of how AmeriCorps supports STEM and actionable steps for local entities to take.[84]

DOC/NOAA may provide searchable and filterable lists of educational resources and opportunities on NOAA.gov to make it easier for students, educators, and the public to find materials that are relevant to them.[85]

DOC/USPTO disseminates CoSTEM-aligned resources through a wide range of channels including K–12 educators in its Master Teacher network, alumni from the National Summer Teacher Institute, STEM conference presentations and booths, Buzz Engine, InventEd network, advertisements in national education magazines, social media, and its dedicated educational website for kids, students, and educators. [86]

The **DOD** STEM website (dodstem.us) along with corresponding social media platforms (@DoDSTEM) are the main mechanisms DOD leverages to publicly promote federally funded or CoSTEM-aligned resources. The DOD STEM website hosts searchable and filterable opportunities and resources pages, as well as an impact page for disseminating reports. Moreover, the DOD retains a wide ecosystem of

[78] https://www.uspto.gov/learning-and-resources/kids-educators

[79] https://www.energy.gov/doe-stem/search-doe-stem-resources; https://www.energy.gov/cet/supercharging-americas-ai-workforce

[80] https://careers.doi.gov/

[81] https://www.youtube.com/watch?v=01sJinO0NxU; https://www.ed.gov/media/document/eir-stem-webinar-ppt-2024; https://www.ed.gov/media/document/eirimplementing-ost-stem508pdf

[82] https://www.nasa.gov/stem-content/earthrise/; Earthrise provided a monthly curated digital newsletter of earth science resources for educators from NASA and other federal agencies in 2024.

[83] https://new.nsf.gov/impacts/beyond-the-classroom

[84] https://americorps.gov/sites/default/files/document/Leveraging-National-Service-in-Your-Schools.pdf

[85] www.noaa.gov/education/resource s; www.noaa.gov/students

[86] https://www.uspto.gov/learning-and-resources/kids-educators

partners by which these materials are distributed and regularly engages at nationwide, regional, and local STEM convenings and events to further promote opportunities & resources.

DOE Offices continue to use GovDelivery subscription email newsletters and announcements as a primary way to reach interested audiences regarding funding and STEM training opportunities. The DOE Office of Science hosts public webinars with the announcement of each solicitation to discuss the scope and answer questions from interested applicants and will continue to do this.[87]

DOI/ USGS provides educational resources for teachers and learners at the USGS Education and Water Science School websites.[88]

ED uses the EIR program listserv and external stakeholders list to include national and regional STEM organizations and intentionally targeting organizations that may represent/ support high-need students or those furthest from opportunity.

DOT's FAA shares a large amount of information on its free resources at faa.gov/education. FAA distributes educational materials and hands on activities to students that include this website. Additionally, the FAA has a robust social media outreach to share information about its resources, including traditional social media posts, live events, and a blog dedicated to STEM topics in aviation. Representatives of the agency also engaged routinely with stakeholders at all levels to share resources.

EPA will follow its usual communications strategic approaches for disseminating STEM resources and activities across social media platforms, conferences with the relevant audiences and web content.

The **NASA** EXPRESS digital newsletter provides a weekly update on NASA STEM engagement opportunities, including opportunities offered by NASA partners and other federal agencies.[89]

NSF co-hosted in March 2024, a Quantum Hill Showcase: NSF pitches Congress on the potential of quantum technology. NSF also co-hosted in September 2024, an AI Education Hill Showcase: National AI Research Institutes Congressional Showcase.[90]

Agency Actions Used to Ensure Public Participation and Community Engagement with CoSTEM-aligned Investments and Exemplify The 2024 Federal STEM Strategic Plan

DOC/NOAA connects with educators at major national conferences, including the National Science Teaching Association and the North American Association for Environmental Education through exhibits, presentations on NOAA resources, and town halls.

[87] https://www.energy.gov/eere/funding/eere-funding-opportunities; https://public.govdelivery.com/accounts/USDOEOS/subscriber/new

[88] Educational Resources | U.S. Geological Survey (usgs.gov) Water Science School | U.S. Geological Survey (usgs.gov)

[89] https://www.nasa.gov/learning-resources/nasa-express/

[90] https://www.nextgov.com/emerging-tech/2024/04/nsf-pitches-congress-potential-quantum-technology/396209/; https://aiinstitutes.org/national-artificial-intelligence-research-institutes-congressional-showcase

DOC/USPTO has fully engaged stakeholders by leveraging its Master Teacher network, hosting the National Summer Teacher Institute, presenting at local and national STEM conferences, running targeted campaigns through Buzz Engine and national education magazines, and promoting resources via social media, the USPTO educational website, and periodic educator webinars.[91]

The current **DOD** STEM Strategic Plan (FY 2021 – FY 2025), which is aligned with the CoSTEM Strategic Plan, provides guidance to DOD STEM stakeholders. In addition, the Department's STEM Advisory Council Working Group (SACWG) provides a forum and network for sharing information and resources across DOD STEM leadership on a quarterly basis.

DOE Offices have engaged in the following types of activities to engage interested communities: outreach and recruitment at scientific professional societies, including minority serving scientific professional societies; offices have engaged in site-specific outreach at MSIs; office have hosted informational webinars and technical assistance workshops to provide support in the application processes; and offices issue regular newsletters and invite the community to sign-up for GovDelivery email services on topics of their interest.

DOI organizes multi-bureau engagement at student-focused, diversity STEM conferences such as the American Indian Science and Engineering Society, the Society for the Advancement of Chicanos and Native Americans in Science, and the National Association of Black Geoscientists. At each of these, scientists and human resources professionals from several DOI bureaus engage with students about science, jobs, and careers.

Within **ED**'s Education Innovation and Research (EIR) grant program, ED has connected with a variety of regional and national organizations to provide entry-level introductions to the EIR program to encourage applications from novice and diverse applicants.

DOT's key information sharing activities include: **PHMSA** organized virtual information session about the CAAP program every year after the Notice of Funding Opportunity posted in grants.gov; as well as NHTSA's annual safety research portfolio public meeting; annual SAE Government/Industry Meeting; the International Technical Conference on the Enhanced Safety of Vehicles (ESV; conference rotates between the North American, European, and Asia-Pacific regions); and the Automotive Information Sharing and Analysis Center annual Cybersecurity Symposium.

EPA has worked to partner with other agencies as well as amplify and align with the work of other agencies for some time. By working with CoSTEM and FC-STEM networks and continuing to engage with other federal agencies with which EPA can complement, EPA is increasing the value and impact of its STEM efforts.

NASA has a rich history of collaborating across the STEM ecosystem. Through collaboration with external partners, NASA's Office of STEM Engagement (OSTEM) expands its reach, engaging students of all grade levels through opportunities that align with the agency's missions – sparking a love of space and STEM topics.

[91] https://www.uspto.gov/learning-and-resources/kids-educators/master-teacher-invention-education-program

Agency Actions for Requesting and Reviewing Feedback from Communities, States, and/or the Public on How CoSTEM-aligned Resources and/or Programming Are Being Utilized

DOC/NOAA has a web feedback survey as well as a link to click to report a problem with a page. The DOC/NOAA team manages and responses to feedback on noaa.gov/education and address suggestions as applicable.[92]

DOC/USPTO gathers feedback through OMB-approved surveys, focus groups, playtesting, and evaluations from program participants, including educators conducting invention and intellectual property education in both formal and informal learning environments. Additionally, it hosts follow-up sessions with stakeholders through periodic K–12 educator webinars hosted on USPTO virtual engagement platforms or on edWeb, gathers insights during STEM conferences, and reviews engagement metrics on its educational website and social media platforms to assess resource utilization and impact.[93]

DOD operates with transparency and accountability, placing critical emphasis on evaluation and assessment, in alignment to both the DOD STEM Strategic Plan and the DOD STEM Logic Model.[94] The DOD STEM Evaluation and Assessment Capability (EAC), which conducts an annual data call to collect programmatic data across the Department, hosts regular meetings and engagements among Department STEM leadership on evaluation and assessment efforts, and provides portfolio level analysis and reporting. Beyond this, DOD regularly conducts program evaluation efforts which incorporate feedback from program participants and key stakeholders.[95]

DOE has hosted roundtable discussions, issued RFIs, hosted townhalls or panel sessions a major professional society meetings. DOE offices have also hosted public office hours to seek input.

ED's EIR program mainly utilizes the Grantee Satisfaction Survey and other data collection methods to collect feedback on how general programming and resources are being utilized.

EPA established the Historically Black Colleges and Universities and Minority Serving Institutions Advisory Council (HBCU-MSI AC) in 2023 to provide independent advice and recommendations to the Administrator on how to increase EPA's efforts to leverage the expertise within Historically Black Colleges and Universities and Minority Serving Institutions (HBCU-MSI's) and provide opportunities to HBCUs and MSIs to help diversify the agency's workforce and nurture the next generation of environmental leaders and ensure that these vital institutions of higher learning have the resources and support to continue to thrive for generations to come. MSIs are institutions of higher education that serve minority populations and include Historically Black Colleges and Universities (HBCUs), Hispanic-Serving Institutions (HSIs), Tribal Colleges and Universities (TCUs), and Asian American and Native Hawaiian Pacific Islander-Serving Institutions (AANHPISIs).[96]

[92] www.noaa.gov/education
[93] Invention Education: Tools and Strategies to Bring Innovative Resources to Your Classroom. https://home.edweb.net/webinar/learning20240625
[94] https://dodstem-assets.dodstem.us/files/DoDSTEM-LogicModel.pdf
[95] https://dodstem.us/about/impact/
[96] https://www.epa.gov/faca/hbcu-msi-federal-advisory-council-meetings

NASA receives feedback on its STEM engagement activities through the NASA Advisory Council's STEM Engagement Committee. NASA's Office of STEM Engagement also executes an Evidence-Based Decision-Making (EBDM) Process which engages stakeholders to gather, review, and synthesize evidence to inform decisions, and includes convening expert review panel with external experts.

In the development of new **NSF** solicitations, the agency engages in listening sessions with research communities.

SI's National Air and Space Museum (NASM) Education engages in frequent program evaluation – (contracts external, professional evaluators; has an established Teacher Advisory Group) used to assess fidelity of both current and upcoming efforts, gathers feedback directly from audiences via surveys, and conducts debriefs at the conclusion of every initiative. Staff evaluate program activities to ensure that they align with inventive habits of mind, including creativity, curiosity, perseverance, and tolerance of ambiguity. This is done through analysis of completed projects as well as the conversational cues during an experience. SI recruit a national Teacher Advisory Council that reviews and advises on National Zoo and Conservation Biology Institute (NZCBI) pre-K–12 STEM programming. Program participants provide feedback via surveys that inform program outcomes.

Transparency and Accountability

CoSTEM plans to enhance dissemination of program evaluations, assessments, and outcomes, as well as program best practices and program materials and resources.[97] CoSTEM's collaborative and coordinating role can facilitate greater efficiency and cohesion across federal STEM education programs. Interagency working groups, FC-STEM's communities of practice, and use of the federal STEM education listserv help create learning communities within and across federal agencies for improving implementation and evaluation of CoSTEM investments. While sharing investments can limit duplication and identify overlap and often differ in meaningful ways, similarities—for example, in STEM fields or audiences served—can support areas of potential synergy and collaboration across and within agencies.

Federal agencies are committed to documenting and sharing information both for internal strategic planning purposes and to inform public audiences. At the federal level, sharing performance outcomes enhances public trust, supports coordinated policymaking, and promotes efficient use of resources. Ensuring the outcome data for discrete activities, single-agency programs, or cross-agency initiatives and portfolios of investment can inform and stimulate new thinking about nationally synergistic and complementary activities. Federal agencies build on existing evidence base and leverage agency resources and funding mechanisms, as available, to scale and implement it more broadly. It is important for evidence to be shared broadly and made accessible to all stakeholders invested in improving and advancing STEM.

[97]As conveyed in CoSTEM's 2024 federal STEM strategic plan

Agency-Level Resources That Identify Agency Approaches for Assessing Program Effectiveness and /or Provide Program Performance Data and Outcomes

- **DOC/NOAA** Education Accomplishments - Goal Highlights[98]
- **DOC/NOAA** Education Monitoring and Evaluation Framework[99]
- **DOC/USPTO** Noche de Ciencias (Night of Science)[100]
- **DOC/USPTO** National Summer Teacher Institute on Innovation, Intellectual Property and STEM Education[101]
- **DOD** STEM Our Impact page[102] provides overarching statistics and links to reports, to include the DOD STEM Logic Model.[103]
- **DOE's** Longitudinal study of the SC-ASCR/NNSA CSGF Program[104]
- **ED's** FY 2023 Annual Performance Report/ FY 2025 Annual Performance Plan[105]
- **NASA** STEM Engagement Impacts[106] and NASA Volume of Integrated Performance (VIPer)[107]
- **NSF** Evaluation Policy (April 2023); "High Quality and Rigor" indicates NSF's enabling practice.[108] Projects and Initiatives publications by date are found on NSF's website.[109] NSF's Annual Performance Report and Performance Plan[110]
- **SI's** Annual Performance Plan[111]

Evaluations That Were Completed on CoSTEM-aligned Investments

AmeriCorps posted several relevant evaluations in FY23 and FY24 on its Evidence Exchange, including several return on investment (ROI) studies. They include ROI studies on: (1) Green City Force, an AmeriCorps-funded program where members gain hands on experience with building sustainable infrastructure, engaging in urban agriculture, and distributing fresh produce. That experience can lead to green career pathways such as energy conservation assistants, compost coordinators, solar energy installers, energy auditors, and other positions and apprenticeships; (2) Montana Conservation Corps, an environmental service program dedicated to promoting field research and direct conservation service; and (3) Ancestral Lands Conservation Corps, an environmental service program dedicated to promoting Indigenous field research and direct conservation service. In addition, AmeriCorps shared an evaluation on Great Basin Institute (GBI), an interdisciplinary field studies organization that promotes environmental research, education, and conservation throughout the West. The Nevada Conservation Corps (NCC), a program of GBI, is an environmental service program dedicated to promoting field research and direct conservation service. NCC has administered 23 continuous AmeriCorps program years. AmeriCorps also released studies on the AmeriCorps Urban Safety Program

[98] https://www.noaa.gov/office-education/noaa-education-council/accomplishments
[99] https://www.noaa.gov/sites/default/files/legacy/document/2019/Jun/NOAA_Education_M%26E_Framework_07-18-2010.pdf
[100] https://www.uspto.gov/about-us/events/join-us-noche-de-ciencias-night-science-2024
[101] https://www.uspto.gov/learning-and-resources/kids-educators/nsti
[102] https://dodstem.us/impact/
[103] https://dodstem-assets.dodstem.us/files/DoDSTEM-LogicModel.pdf
[104] https://www.krellinst.org/csgf/study
[105] https://www.ed.gov/sites/ed/files/about/reports/annual/2025plan/fy2023apr-fy2025app.pdf
[106] https://www.nasa.gov/learning-resources/stem-engagement/stem-impacts/
[107] https://www.nasa.gov/ocfo/performance-report/
[108] https://new.nsf.gov/od/oia/eac/evaluation-policy-april-2023
[109] https://new.nsf.gov/od/oia/eac/publications-date
[110] https://new.nsf.gov/about/budget#performance-490
[111] https://www.si.edu/sites/default/files/about/si-performance-report-fy23.pdf

Detroit (AMSUS) which provides public health activities and training for members in water filtration and home indoor air quality for eco-related jobs. Finally, assessments conducted on STEM-related program groups of AmeriCorps investments included: (1) Bundled Study of Recovery Coaching Programs, (2) Bundled Study of Climate Change-Related Programs, and the Public Health AmeriCorps National Outcomes and Impact Study.[112]

DOC/USPTO FY23 Agency Financial Report highlights the agency's programs, accomplishments, and challenges.[113]

The **DOD** STEM Our Impact page provides overarching statistics and links to reports. Evaluations completed and made public towards FY23 programming include the Army Educational Outreach Program (AEOP) annual program evaluation reports;[114] the evaluation of the 2023 Naval Research Enterprise Internship Program (NREIP);[115] and the Defense STEM Education Consortium (DSEC) Annual Program Review and Data Chapter.[116]

DOT/FAA's STEM AVSED program produces an Annual Report for each year. The FY23 annual report is located on DOT/FAA's public-facing website[117].

NASA posted a report brief for the following evaluation studies (FY23 K–12 Student Outcome Assessment Report Brief, FY23 CONNECTS Evaluation Study Report Brief, and FY23 MUREP Outcome Assessment Report Brief) is available on the STEM Engagement Impacts webpage.[118]

At **SI**, a randomized control trial study funded by the ED's EIR Grant on the efficacy of Smithsonian Science for the Classroom K–5 curriculum demonstrated statistically significant positive effects on students' science and positive effects on reading and math state achievement.[119]

Agency Actions Made to Reduce Fragmentation and Duplication of CoSTEM-aligned Investments

DOC/NOAA's programs carry out specific mandates that support NOAA's mission and that are authorized and directed by statute. Individual programs have specific focus areas and are able to

[112] https://americorps.gov/evidence-exchange/return-investment-study-green-city-force ; https://americorps.gov/evidence-exchange/return-investment-study-montana-conservation-corps; https://americorps.gov/evidence-exchange/return-investment-study-ancestral-lands-conservation-corps; https://americorps.gov/evidence-exchange/great-basin-institute-nevada-conservation-corps-report-2021-2023; https://www.americorps.gov/evidence-exchange/return-investment-study-americorps-urban-safety-program-detroit; https://www.americorps.gov/evidence-exchange/bundled-evaluation-capacity-building-project-americorps-supported-recovery-coach; https://www.americorps.gov/evidence-exchange/americorps-work-climate-change-bundle-evaluation-capacity-building-project; https://www.americorps.gov/evidence-exchange/national-process-outcomes-impact-evaluation-public-health-americorps

[113] https://www.uspto.gov/sites/default/files/documents/USPTOFY23AFR.pdf

[114] https://www.usaeop.com/about/our-impact/ ; the DoD STARBASE Annual Report (https://dodstarbase.org/resources

[115] https://www.ida.org/research-and-publications/publications/all/e/ev/evaluation-of-the-2023-naval-research-enterprise-internship-program

[116] https://dodstem-assets.dodstem.us/files/APR_OY3_Final.pdf; https://rise.articulate.com/share/NqgQwV7EP-x3KL16-N77TPlutU4s8L2l#/

[117] https://www.faa.gov/education/about/faa-stem-avsed-program-annual-report

[118] https://www.nasa.gov/learning-resources/stem-reports/

[119] https://ssec.si.edu/sites/default/files/EIR%20Executive%20Summary.pdf

leverage unique federal science, data, and expertise assets for educational activities. Within this framework, NOAA focuses on coordination and collaboration across the education portfolio. Major education programs are represented in the NOAA Education Council. The makeup of the Council is responsive to NOAA's education portfolio. Through the Council, programs coordinate on a NOAA-wide Education Strategic Plan and monitor and evaluate progress annually, as required by the America COMPETES Act and subsequent legislation.

DOD's STEM Advisory Council Working Group (SACWG), Evaluation and Assessment Working Group (EACWG), other Communities of Practice and regular leadership engagement help to reduce fragmentation and duplication across the Department. This approach also allows a cohesive approach that addresses the different missions of the DOD Components. In addition, some programs operate at the individual DOD laboratory level and may focus on distinct core technical science and technology competencies, supporting the need for the broad portfolio that is executed across the Department.

DOE's internal working group, the STEM Science & Energy Tech Team (STEM SETT), which reports to the Under Secretary for Science and Innovation, is comprised of representatives from across the DOE offices who sponsor and manage STEM training and education related programs and community outreach activities. STEM SETT, which meets biweekly, was created to establish better communication, coordination, collaboration of programs and investments across the DOE and reduce duplication of effort.

DOT/FAA's STEM AVSED program has an internal governance structure at the executive (Executive Board) and senior management (Steering Committee) levels. These bodies have representatives from all FAA organizations and serve to provide collaboration and oversight of STEM AVSED related programming at a corporate level. This helps to minimize fragmentation and/or duplication of efforts.

NASA internally coordinates its STEM education/engagement investments through the NASA STEM Engagement Board (STEM Board). The STEM Board is comprised of NASA leaders from across NASA's Mission Directorates, Research Centers, and functional offices who, among other responsibilities, ensure NASA's investments in STEM education/engagement are coordinated and not duplicative of one another through an annual portfolio planning process. NASA staff are also actively involved in the CoSTEM community and leverage the extensive contacts within the community to ensure NASA's efforts are synergistic with, and not duplicative of, STEM education activities offered by other Federal agencies.

SI's STEAM Education Initiative, part of the 2027 SI Strategic Plan Science Focus Areas, is designed to reduce fragmentation and enhance pan-institutional collaboration in STEAM Education for youth ages 0–18.[120]

[120] https://www.si.edu/strategicplan-2027

U.S. Department of Labor Evaluations (2022-2023)

- The Ready to Work Partnership Grant Evaluation: Final Report of the Impact Study of Four Employment Services Programs for the Long-Term Unemployed
- Expanding Apprenticeship to New Sectors and Populations: The Experiences and Outcomes of Apprentices in the American Apprenticeship Initiative Final Report
- Experiences of America's Promise Participants During the Shecession: Examining Gender Differences in Labor Market and Training Program Outcomes Short Paper
- Did Apprentices Achieve Faster Earnings Growth Than Comparable Workers? Findings from the American Apprenticeship Initiative Evaluation Brief
- Apprenticeship Building America Implementation Study Design: Youth Apprenticeship and Pre-apprenticeship Study Report
- A Review of the Literature on Registered Apprenticeships: Evaluating Registered Apprenticeship Initiatives
- Women in Apprenticeships and Nontraditional Occupations in the United States
- State Incentives to Promote and Support Apprenticeship Takeaways from Eight States
- How the COVID-19 Pandemic Affected State Apprenticeship Systems Takeaways from Eight States
- Models of Youth Registered Apprenticeship Expansion: Evidence from the Youth Apprenticeship Readiness Grants Issue Brief
- Youth Apprenticeship in the United States: Apprenticeship Evidence-Building Portfolio Report
- Understanding the Capacity of State Apprenticeship Systems: Apprenticeship Evidence-Building Portfolio Environmental Scan
- How Did Workers with a History of Long-Term Unemployment Fare during the COVID Recession? Topic Brief
- Survey Non-Response Bias in the Evaluation of the Ready to Work Partnership Grant Program Topic Brief
- The Ready to Work Partnership Grant Evaluation: Technical Appendix for the Final Report of the Impact Study of Four Employment Services Programs for the Long-Term Unemployed
- Creating and Expanding Regional Workforce Partnerships for Skill H1-B Industries and Occupations: Implementation of America's Promise Job-Driven Training Grants Final Implementation Study Report
- Providing Employment Services to the Long-Term Unemployed: Insights on Program Impact from the Ready to Work Partnership Grant Evaluation Summary Brief
- Technical Appendix for Experiences of America's Promise Participants During the COVID-19 Recession: Examining Gender Differences in Labor Market and Training Program Outcomes
- Department of Labor Evaluation Design Pre-Specification Plan: America's Promise Job Driven Grant Program Evaluation
- Employer Perspectives on Regional Workforce Partnerships: Lessons from America's Promise Issue Brief
- Employer Engagement Strategies in Regional Partnerships: Lessons from America's Promise Issue Brief
- Do Employers Earn Positive Returns to Investments in Apprenticeship? Evidence from Registered Programs under the American Apprenticeship Initiative Final Report
- Engaging Employers to Register Apprenticeship Programs: Outcomes from the American Apprenticeship Initiative Evaluation Employer Engagement Demonstration Final Report
- Challenges and Opportunities for Expanding Registered Apprenticeship with Workforce Innovation and Opportunity Act (WIOA) Title I: Findings from the American Apprenticeship Initiative Evaluation Brief
- Expanding Registered Apprenticeship Opportunities to Underrepresented Populations: Findings from the American Apprenticeship Initiative Evaluation Brief
- Beyond Productivity: How Employers Gain More from Apprenticeship: Findings from the American Apprenticeship Initiative Evaluation Brief

Section 2: Actions Related to CoSTEM's Pillar on STEM Research and Innovation Capacity

In 2022, President Biden signed the CHIPS and Science Act into law in an effort to drive opportunity and equity for all of America in science, technology, engineering, and mathematics (STEM) and innovation. The legislation authorized federal investments to expand the geographic and institutional diversity of research institutions that are awarded federal funding and the students and researchers those institutions serve. The Act also aimed to broaden the geographic diversity of research and innovation funding to leverage the talent and ideas found all across America, including supporting learners, educators, and researchers at minority-serving institutions (MSIs) and emerging research institutions (ERIs) and in rural communities. The Act, specifically Section 10524, tasked the National Science and Technology Council (NSTC) to submit to Congress a report identifying challenges and barriers to federal research and development awards for high research activity status (R2) Historically Black Colleges and Universities (HBCUs), and recommendations for federal research agencies to sustainably boost the research capacity of high research activity status HBCUs through awards-making authorities.[121] The Act, specifically Section 10522, also requested guidelines/ recommendations to support sustained activities to increase clarity, transparency, and accountability of federal research agency investments in STEM education and research activities of HBCUs, TCUs, and other MSIs/ERIs, including such institutions in rural areas.

Federal Funding at MSIs/ERIs in STEM

The distribution of federal STEM funding varies across types of institutions of higher education. Although some types of institutions may have a larger share of support in the form of research and development (R&D), others may have a larger share of fellowships, traineeships, training grants (FTTGs) or other general support for STEM/science and engineering (S&E), as these latter types of funding activities are considered fundamental for building R&D capacity. To provide insight into where the federal government is focused on building capacity, it is important to understand where federal funds are distributed. Some of this information can be found at National Center for Science and Engineering Statistics (NCSES)'s Survey of Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions—now the Federal S&E Support module within the Survey of Federal Funds for Research and Development (Federal Funds for R&D) and through recent OMB collections (see callout box on page 37).

NCSES's survey collects data from federal agencies about obligations for S&E activities. These obligations reflect R&D; funding of FTTGs; R&D plant; facilities and equipment for instruction in S&E, and other general support for S&E. NCSES's survey also provided details on federal obligations for S&E support by type of activity and by federal agency for selected sets of minority-serving institutions, specifically, high-Hispanic-enrollment institutions (HHEs)[122], high-American Indian-enrollment

[121] NSTC: Advancing Research Capacity at High Research Activity Historically Black Colleges and Universities (HBCUs) https://www.whitehouse.gov/wp-content/uploads/2024/05/CoSTEM-HBCU-Report.pdf

[122] HHE institutions are defined by the U.S. Department of Education as nonprofit public and private institutions of higher education whose full-time equivalent enrollment of undergraduate students is at least 25% Hispanic, according to data that institutions reported in IPEDS, conducted by the National Center for Education Statistics (NCES). Institutions that enroll between 15% and 24% Hispanic students are considered "emerging HHEs." Many researchers use high-Hispanic

institutions (HAIEs), Tribal colleges and universities (TCUs), historically Black colleges and universities (HBCUs), and women's colleges and universities (WCUs).[123,124] The most current information from NCSES on federal agency investments in research to HBCUs, TCUs, and other MSIs/ERIs is from FY 2022.[125]

According to NCSES, in FY 2022, a total of 1,089 higher education institutions received federal obligations for science and engineering (S&E) support. Federal agency obligations to institutions of higher education (IHE) for such activities was $44.6 billion.

High-Hispanic-enrollment institutions/HHEs[126] received $3.6 billion (to 186 HHEs) in FY 2022. As many of the top HHE recipient institutions are considered high-performing R&D institutions, federal support to HHEs for R&D totaled $3.2 billion, or 90% of total federal S&E support to HHEs, whereas federal support to HHEs for FTTGs accounted for $239 million, or 7% of their S&E total. The shares of R&D and FTTGs support to HHEs varies only slightly from the shares given to all higher education institutions. For instance, the shares of R&D and FTTGs for all institutions are 93% and 4% respectively, whereas the shares for R&D and FTTGs for HHEs are 90% and 7%, respectively. More than half of all federal S&E support to HHEs was from HHS ($1.9 billion to 99 institutions), followed by NSF ($911 million to 153 institutions). The Department of Defense (DOD) was the third-leading funder of S&E support to HHEs, with $383 million to 55 institutions. The University of Arizona was the leading recipient of federal S&E support among HHEs with $364.7 million.

In FY 2022, five institutions were designated as high-American Indian-enrollment institutions/HAIEs[127], which in total received $99 million in federal obligations for S&E support. Federal support to HAIEs for R&D totaled $91 million, or 92% of total federal S&E support to all HAIEs. FTTG support to HAIEs accounted for $4 million, or 4% of total federal S&E support to HAIEs. NSF was the leading funding

enrollment and Hispanic-serving institution (HSI) interchangeably. HSIs meet a federally designated criterion (i.e., public and private nonprofit institutions whose undergraduate, full-time equivalent student enrollment is at least 25% Hispanic) and are eligible to apply for Hispanic-serving institution status. Because there is no information on whether institutions apply for the HSI designation, the National Center for Science and Engineering Statistics (NCSES) uses the 25% enrollment criterion to determine which institutions have HHE status. For additional information, see https://www2.ed.gov/about/offices/list/ope/idues/hsidivision.html. Reference from: https://ncses.nsf.gov/pubs/nsb20223/notes

[123] Per NCSES reporting, although some types of minority-serving institutions, such as TCUs and HBCUs, may be mutually exclusive, by definition, others may not be as the classifications are based on percentage of population enrollment thresholds. WCUs are self-designated in their reporting to the Integrated Postsecondary Education Data System.

[124] According to the Integrated Postsecondary Education Data System survey conducted by the National Center for Education Statistics, there were 32 higher education institutions identified as WCUs for the 2021–22 academic year.

[125] https://ncses.nsf.gov/pubs/nsf24331#historically-black-colleges-and-universities

[126] Per NCSES reporting, HHEs includes those institutions of higher education whose full-time equivalent (FTE) enrollment of undergraduate students is at least 25% Hispanic, according to fall 2022 enrollment data self-reported by the institutions in the Integrated Postsecondary Education Data System survey conducted by the National Center for Education Statistics (NCES). NCES determined FTE enrollment by calculating that approximately three part-time students are equivalent to one full-time student.

[127] Per NCSES reporting, HAIE institutions includes those institutions of higher education that are not tribal colleges or universities and that have an enrollment of undergraduate students that is not less than 10% Native American students, according to fall 2022 enrollment data self-reported by the institutions in the Integrated Postsecondary Education Data System survey conducted by the National Center for Education Statistics.

agency to HAIEs with $43 million, with 95% of these funds obligated to the University of Alaska, Fairbanks.

In FY 2022, historically Black colleges and universities/HBCUs[128] received $658 million in federal funding. Federal support to HBCUs for R&D totaled $498 million, or 76% of total S&E support to HBCUs, whereas FTTGs to HBCUs accounted for $111 million, or 17% of total federal S&E support. USDA was the largest funder of S&E support to HBCUs with $249 million. HHS and NSF each had total S&E support obligations of $193 million and $131 million, respectively. North Carolina A&T State University was the leading recipient of federal S&E support among all HBCUs with $52.3 million.[129]

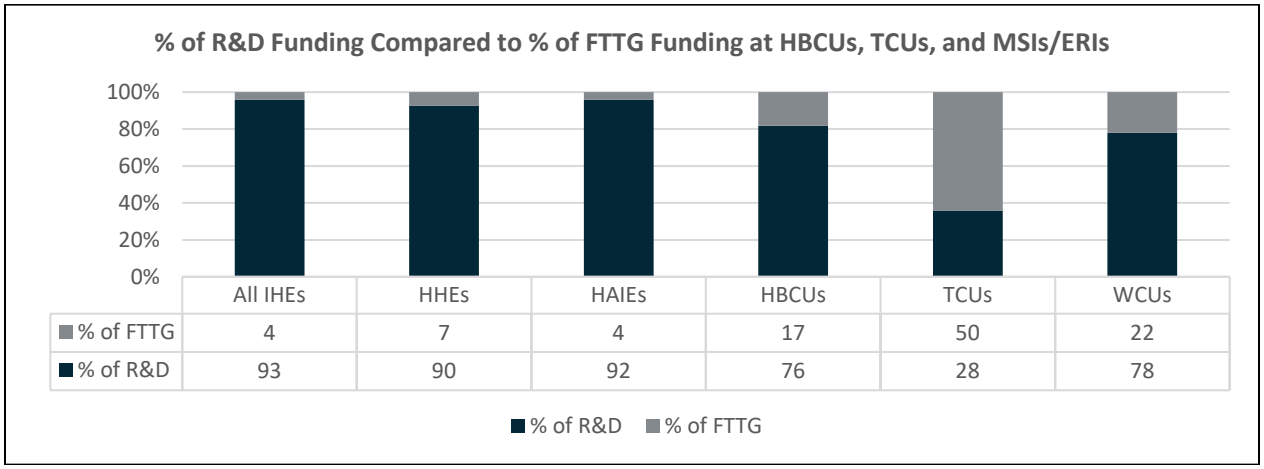
Tribal colleges and universities (TCUs)[130] received $40 million (33 TCUs) in FY 2022 in federal funding. In FY 2022, 50% ($20 million) of these funds were for FTTGs, R&D accounted for 28% ($11 million), and all other general support for S&E accounted for 22% ($9 million), demonstrating a focus on building further capacity for S&E in TCUs, compared with the distribution of activity types to all institutions of higher education. NSF was the largest funder of S&E support with obligations of $22 million (54%). USDA followed with $14 million. Among TCUs, Sisseton Wahpeton College was the leading recipient of federal S&E support with $5.3 million.

In FY 2022, total federal obligations for S&E support to women's colleges and universities/ WCUs totaled $17 million, with $14 million (78%) for R&D. The only other form of S&E support was in the form of FTTGs, which totaled $4 million across 10 institutions, which constitutes 22% of total federal S&E support to WCUs. NSF is the leading agency to fund S&E at WCUs with $12 million (67%), followed by HHS with $5 million (29%). DOD and NASA accounted for 2% and 1%, respectively, of total federal funding to WCUs. Of the $14 million in R&D, $4 million (26%) of federal R&D obligations to all WCUs was obligated to Spelman College. Of the $4 million in FTTGs, Bryn Mawr College and Mount Saint Mary's University each received $1 million in obligations, accounting for 60% of all FTTGs to WCUs.

[128] Per NCSES reporting, the Higher Education Act of 1965, as amended, defines an HBCU as "any historically Black college or university that was established prior to 1964, whose principal mission was, and is, the education of Black Americans, and that is accredited by a nationally recognized accrediting agency or association determined by the Secretary (of Education) to be a reliable authority as to the quality of training offered or is, according to such an agency or association, making reasonable progress toward accreditation."

[129] https://ncses.nsf.gov/pubs/nsf24325/

[130] Per NCSES reporting, TCUs is from the White House Initiative on American Indian and Alaska Native Education (see https://sites.ed.gov/whiaiane/). In accordance with Executive Order No. 13270, "Tribal Colleges and Universities," as extended by Executive Order No. 13316, the list includes all of the colleges cited in section 532 of the Equity in Educational Land-Grant Status Act of 1994 (7 U.S.C. 301 note), any other institution that qualifies for funding under the Tribally Controlled Community College Assistance Act of 1978 (25 U.S.C. 1801 et seq.), and Diné College, which is authorized in the Navajo Community College Assistance Act of 1978, Public Law 95-471, title II (25 U.S.C. 640a note). The statutory definition of American Indian tribally controlled colleges and universities, to which the Higher Education Act refers at §316(b)(3), 20 U.S.C. 1059c(b)(3), is in section 2(a)(4) of the Tribally Controlled College and University Assistance Act of 1978, 25 U.S.C. 1801(a)(4).



	All IHEs	HHEs	HAIEs	HBCUs	TCUs	WCUs
% of FTTG	4	7	4	17	50	22
% of R&D	93	90	92	76	28	78

Based on OMB data, the amount of federal funding to HBCUs has reached recent historic highs, over $19 billion.[131, 132] Recent data also indicates the amount and percentage of funding received by HBCUs towards R&D activities has increased (see callout box on page 38). There has also been an increase in the funding awarded to HBCUs as contracts. In FY 2021, almost $2 million in contract funding was awarded to HBCUs, with most of these funds supporting R&D activities. When looking at all Federal funding to HBCUs in FY 2021, most funds were awarded as grants, and over $76 million were awarded through a mechanism other than contracting or grants (e.g., through cooperative agreements). In FY 2022 and again in FY 2023, almost $9 million was awarded to HBCUs as contracts. Like FY 2021, the vast majority of funds awarded to HBCUs were awarded as a grant, with approximately $130 million (in FY 2022) and approximately $115 million (in FY 2023) as another type of federal funding. While the amount of federal funding to HBCUs has increased over the last few years, including the amount received as contracts, the amount of federal funds HBCUs receive as contracts continues to be less than 1% of the total federal funding they receive (see callout box on page 38).

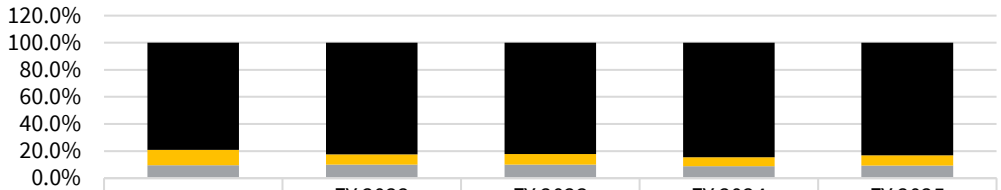
[131] https://www.whitehouse.gov/briefing-room/statements-releases/2024/05/16/fact-sheet-biden-harris-administration-announces-record-over-16-billion-in-support-for-historically-black-colleges-and-universities-hbcus/; https://www.whitehouse.gov/briefing-room/statements-releases/2024/09/16/fact-sheet-biden-harris-administration-announces-1-3-billion-in-additional-funding-and-a-record-of-over-17-billion-in-total-support-for-historically-black-colleges-and-universities-hbcus/;

[132] based on a 2024 OMB data collection and as reported during the January 7th, 2025 meeting of the President's Board of Advisors on Historically Black Colleges and Universities (https://sites.ed.gov/whhbcu/policy/presidents-board-of-advisors-pba-on-hbcus/)

Federal Funding at HBCUs

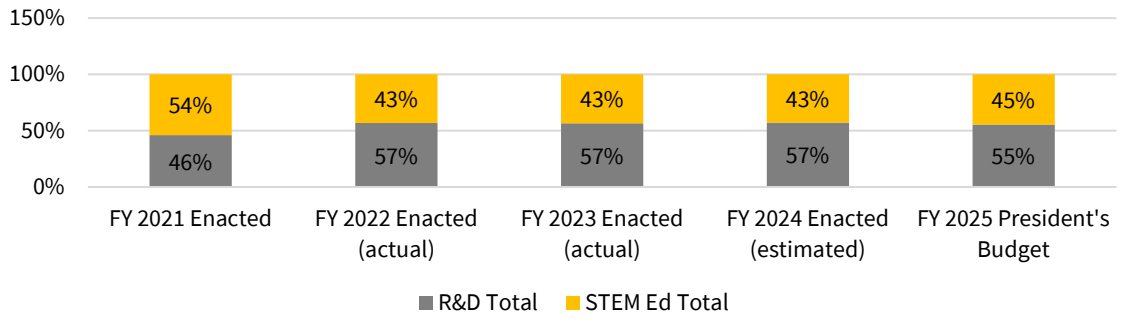
(based on a 2024 OMB Data Collection)

Percentage of Federal Funding Awarded to HBCUs Towards STEM R&D and STEM Education (FY 2021-FY 2025)

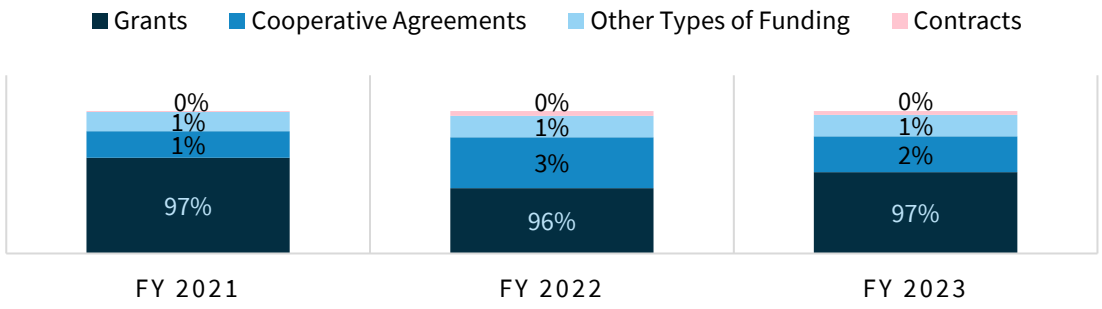


	FY 2021 Enacted	FY 2022 Enacted (actual)	FY 2023 Enacted (actual)	FY 2024 Enacted (estimated)	FY 2025 President's Budget
Other Total	79.2%	82.4%	82.3%	84.6%	83.1%
STEM Ed Total	11.2%	7.6%	7.7%	6.6%	7.5%
R&D Total	9.6%	10.0%	10.1%	8.8%	9.4%

Percentage/Ratio of STEM Education Funding vs. R&D Funding Awarded to HBCUs (FY 2021- FY 2025)



Percentage Of Federal Funding Awarded To HBCUs As Contracts



Recommendations for Supporting MSIs/ERIs in STEM

In the report, Advancing Research Capacity at High Research Activity Historically Black Colleges and Universities (HBCUs), seven barriers were noted that hinder STEM advancement at HBCUs.[133] Data suggests TCUs and other MSIs face similar barriers.[134,135,136,137,138,139,140,141] To sustainably boost the STEM capacity of HBCUs, TCUs, and MSIs/ERIs in support of the Act, specifically Section 10522, the following recommendations are re-iterated from the report as ways federal agencies can increase the engagement and participation of HBCUs, TCUs, and other MSIs/ERIs, including such institutions in rural areas, in federal programs; to carry out sustained activities to increase clarity, transparency, and accountability of federal research agency investments in STEM education and research; and to increase the capacity of HBCUs, TCUs, and other MSIs/ERIs to compete effectively for grants, contracts, cooperative agreements, or other federal funding.

Recommendation: Strengthen Outreach and Engagement Activities

Provide structured, government-initiated outreach

- Ensure in-person engagement balances in-person events at agencies and events on-campus.
- Make sure institutions know if a PI, researcher, educator, or administrator can request an outreach visit from federal staff.
- Utilize virtual engagement tools to regularly reach rural and remote populations.
- Before conducting outreach, have awareness of the institutions' areas of existing research strengths, ask for capabilities/capacity statements in advance of visits, capture their current federal funding profile (i.e., which other agencies fund them), and build connections between the institutions' existing funding and other funding opportunities (within the agency) where researchers have also found success.

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[133] NSTC: Advancing Research Capacity at High Research Activity Historically Black Colleges and Universities. https://www.whitehouse.gov/ostp/news-updates/2024/05/15/nstc-advancing-research-capacity-at-high-research-activity-historically-black-colleges-and-universities/

[134] Readout from OSTP's Public Listening Sessions in Support of the Next Federal STEM Strategic Plan https://www.whitehouse.gov/ostp/news-updates/2023/03/31/readout-from-ostps-public-listening-sessions-in-support-of-the-next-federal-stem-strategic-plan/

[135] Mortensen, M., Nelson, C. E., & Strauss, J. 2001. Refereed Research: Survey of Tribal Colleges Reveals Research's Benefits, Obstacles. Tribal College Journal, 13(2), 28-32. https://tribalcollegejournal.org/survey-tribal-colleges-reveals-researchs-benefits-obstacles/

[136] National Academies of Sciences, Engineering, and Medicine. 2019. Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce. Washington, DC: The National Academies Press. https://doi.org/10.17226/25257.

[137] 2022 Listening Session hosted by ED's IES and White House Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity for Native Americans and Strengthening Tribal Colleges and Universities. https://ies.ed.gov/funding/pdf/Leveraging_Native_American_and_Alaska_Native_Voices.pdf

[138] National Institutes of Health. UNITE External Listening Sessions: Summary Report. https://www.nih.gov/sites/default/files/research-training/initiatives/ending-structural-racism/RFI_UNITE_externallistening-session-summary-report-508%5B42%5D.pdf

[139] Alliance for Learning Innovation. ALI Task Force Brief: Role of HBCUs, MSIs & TCUs in Education R&D. https://fas.org/wp-content/uploads/2024/05/ALI-Taskforce-Brief-HBCUs.pdf

[140] National Academies of Sciences, Engineering, and Medicine. 2024. A Plan to Promote Defense Research at Minority-Serving Institutions. Washington, DC: National Academies Press. https://doi.org/10.17226/27838.1

[141] National Academies of Sciences, Engineering, and Medicine. 2024. Building Defense Research Capacity at Historically Black Colleges and Universities, Tribal Colleges and Universities, and Minority-Serving Institutions. Washington, DC: The National Academies Press. https://doi.org/10.17226/27511.

Update agency communication practices

- Designate positions/identify liaisons at agencies to support genuine, culturally competent engagement with faculty, staff, and students.
- Ensure that information about new funding opportunities is shared far in advance of application deadlines, to ensure ample time for prospective grantees to prepare an application; also consider increasing the length of the submission window and use of recurring deadlines to allow for partnering and proposal development.
- Ensure past info sessions and webinars are centrally posted for access at any time.
- Consider more proactive outreach that is shared directly with MSIs/ERIs (e.g., emails, newsletters) in addition to outreach that individuals have to seek (e.g., websites, online portals).
- Ensure materials posted on agency websites are updated and, where possible, centralized to provide information on agency and cross-agency resources that support research activities at MSIs/ERIs.

Strengthen interagency coordination

- Agencies should work together to streamline event coordination, email communications, resources, and requests.
- Collaborate with other agencies to host convenings, workshops, and other events.
- Fund a federally coordinated website that compiles information about STEM education and R&D funding opportunities that MSIs/ERIs are eligible to apply to.

Recommendation: Provide Comprehensive Technical Assistance and Training

Federal agencies can provide technical assistance to prospective awardees on how to navigate the federal funding process. This is especially true for federal contracting as the procurement process is radically different from the grantmaking process and is governed by different regulations, agency offices, and other requirements. Additionally, intellectual property education and training can be a strong tool to help advance research and innovation to impact in the marketplace.

Adopt consistent and clear models of communication and prioritize accessibility in funding opportunities

- Limit jargon, extensive use of acronyms, or language that might otherwise be ambiguous to new investigators and/or institutions.
- Have clear and consistent communication protocols that include location of goals and objectives, criteria and process for selection, and additional information that could ease new investigators and institutions in navigating the funding pathway.
- Create graphics and other multimedia products hosted on agency websites that guide applicants through the process of grant and/or contract solicitations when possible. The goal of such efforts should be to increase the clarity and decrease the ambiguity of the application process, thus empowering institutions to submit competitive proposals.
- Work with communities of practice and/or with grantees to better understand the barriers facing institutions and researchers, and create technical assistance materials accordingly. (e.g., timelines, milestones, check-in points, etc.)

Allow for more opportunities for funding supportive cohort structures and communities of practice of grantees and potential grantees

- Provide access to funding that allows researchers to have support from experienced program managers or program liaisons.
- Increase awareness of the proposal process and increase opportunities for prospective grantees to engage with current awardees to demystify the proposal process.
- Incorporate opportunities for researchers or prospective researchers to connect with other researchers funded by similar programs/agencies/research communities
- Support currently funded researchers in the identification of new funding opportunities before their current award ends.

Fund or allow for funding of innovative training and resource exchange models

There may have small and overburdened sponsored research offices, contract administrators, and procurement staff. Funding should be allocated to:

- Attract and retain skilled staff and administrators.
- Facilitate peer training, mentoring, or staff exchange programs between MSIs/ERIs, R1s, and federal extramural offices.

Foster exchanges within government that would also help to foster institutional exchanges, where research development professionals, contract specialists, and foundation/partnership specialists might work together sharing and using effective strategies for applying for and securing external funding.

Recommendation: Increase the Flexibilities and Expand the Funding Available to Support Institutional Capacity

Federal agencies should expand the mechanisms available within funding to support MSIs/ERIs.

Incorporate multi-targeted comprehensive funding approaches that allow for ecosystem development

Provide a broad set of funding opportunities to support students and researchers at MSIs/ERIs as well as the institutions' administrative, research, and physical infrastructure. Examples include but are not limited to:

- Scholarships, paid internships, and registered apprenticeships for students,
- Fellowships for graduate students, postdoctoral researchers, and early career faculty,
- Basic, translational, and convergent research grants,
- Exploratory, pilot, and planning research grants,
- Faculty startup grants, seed funding, and bridge funding,
- Workshop and conference grants,
- Faculty training and professional development grants,
- Physical research infrastructure grants,
- Access to federal or federally funded state-of-the-art research instrumentation,
- Broadband infrastructure investments, and
- Intellectual property, technology transfer, and commercialization support.

Invest in shared/collaborative sponsored research offices (SRO) or resource centers

Establish resource centers that provide:

- Grant development seminars for proposers.
- Proposal submission assistance to PIs and grant administration staff.
- Deliver targeted trainings for staff on the administrative logistics of submitting proposals and managing funded awards.
- Training for administrators and staff on how to better understand the federal procurement process.
- Training for administrators and researchers on how best to support sponsored office staff and federal budget officers while a grant or contract is being administrated.
- Funding that supports third-party grant/contracting consortiums to manage pre-award and post-award processes.
- Support funding for technology transfer office capacity, or state commercialization consortiums to provide support for emerging programs.
- Integrate intellectual property education for students and faculty early in the R&D cycle to expand opportunities for licensing and tech transfer of research endeavors to commercial products.

Support research infrastructure needs through a variety of mechanisms

Potential areas for agency implementation include:

- Embed funds/line items for capacity-building support into non-competitive and competitive research, education, and training awards to include improvements to physical facilities.
- Allow award personnel budgets to include support for research management or award administration staff.
- Allow for the use of award funds to purchase business management system software to manage grants/procurement/research expenditures.
- Use mechanisms to sustain support for and access to federally funded centers and labs after the primary funding period ends.

Recommendation: Demystify the Funding Process and Support Clearly Defined Pathways for Building Research Capacity

To enable MSIs/ERIs to more easily apply for funding, agencies can make notices of funding opportunity solicitations, and other funding announcements more accessible to faculty, staff, and students.

Delineate clear ways for institutions and researchers to build capacity, capability, and competitiveness over time

- Identify and offer discussion forums, listening sessions, and idea labs that allow innovative approaches for increasing research development, infrastructure, and capacity to be developed, and exercise federal authority and flexibilities to fund such innovative proposals.
- Ensure there are clear ways for researchers to assess their readiness to carry out a research project in advance of proposal submission.
- Ensure regular engagement and assessment of researcher access and utilization to understand which programs across government are most effective in meeting institutional capacity needs vs. individual capacity needs.
- Increase awareness of co-funding opportunities and increase the number of programs that allow co-funding within and across agencies. Agencies should ensure faculty know about co-funding

opportunities so that proposals are eligible for co-funding upon submission and can be considered for co-funding in the event co-funding becomes available. Co-funding could provide capacity building not available in R&D-only funding opportunities alone. For example, such funds could allow the use of program funds as start-up dollars to recruit new faculty or to retain faculty by increasing compensation to competitive levels.

- Identify graduated steps or tracks across the agency in which researchers can anticipate funding as a next step in building their capacity (i.e., starting with a small training award, moving to a larger R&D award, then securing a contract with subcontractors) Consider capabilities and capacities that would be needed (and that would be funded) along the R&D trajectory.

Amend agency award policies and procedures

Agencies should explore, where allowable, modifications that address resource challenges, such as:

- Increase the ceilings for direct costs based on established capacity needs.
- Permit allowable costs to include teaching and service buy-outs for faculty.
- Permit allowable costs to include travel funds to attend prospective or related federal agency convenings related to research and development.
- Ensure grant policies provide support to investigators, researchers, students and other trainees who may have caregiving responsibilities.
- Supplement expenses usually covered by overheads.
- Remove or reduce cost-sharing requirements.
- Ensure funds can be used to hire project staff who can help coordinate cross-disciplinary/multi-sector teamwork, project communication, and performance and dissemination efforts.

Revisit and revise programs as well as create/pilot new funding to increase the opportunities to build research capacity and secure competitive R&D awards

- Allow for longer award periods/periods of performance.
- Increase funding ceilings.
- Limit eligibility for funding to only lower-capacity institutions to prevent competition with well-resourced institutions.
- Embed capacity building funds or co-funding support into competitive research awards. Consider allocating a percentage or a budget amount of program funds to supplement competitive research awards (grants and contracts) to MSIs/ERIs to provide extra funding, time, resources, and/or staffing support to carry out capacity building activities before formally starting the research portion of the project. A set number of awards or funds should be made across programs, disciplinary areas, research foci, etc. to ensure capacity is constantly being developed across the research enterprise.

Recommendation: Facilitate Effective and Equitable Partnerships

Federal agencies can leverage their positions as funders to facilitate effective, meaningful, and equitable partnerships between MSIs/ERIs and other entities. Importantly, federally funded partnerships should be based on trust, build institutional knowledge of grant and contract funding, and establish networks for future collaborations that result in increased federal R&D investment. Having strong multi-sector partnerships is critical and sometimes required to secure federal funding, especially grants and contracts for large-scale research centers and hubs. MSIs/ERIs need opportunities to lead these partnerships, drawing on their many strengths.

Include funding requirements for genuine partnership-building

While funding opportunities can be effective in fostering relationships, incorporating language that encourages genuine partnerships can help to ensure that federally funded collaborations do not perpetuate inequities. Examples of potential actions include:

- Releasing notices of intent in advance of releasing funding opportunities such that MSIs/ERIs have adequate time to secure partners.
- Requiring that proposals for research collaborations include sections that describe envisioned investigator and institutional roles and the nature of the proposed partnership.
- Requiring that MSIs/ERIs partners on proposals must receive a specific minimum portion (e.g., at least half) of the requested project budget.
- Requiring applicants to describe how students and other trainees will be able to utilize the resources made available by the partnership.
- Weighing relevant grant and contract solicitation evaluation criteria to reward applicants with authentic MSIs/ERIs partnerships.
- Incorporate "no-go clauses" within contract and grant terms to prevent funding from being allocated to awardees that do not provide performance reports that demonstrate MSIs/ERIs engagement in alignment with the activities and metrics stipulated within the proposal.
- Allow for MSIs/ERIs /sub-awardees to provide/include performance reports directly to federal reporting systems.
- Fund resources and events that facilitate partnership development.

Federal agencies can make links between MSIs/ERIs and potential partners. Such connection-making activities can include:

- Online repositories of MSI/ERI R&D capacity and/or capability statements.
- Convenings to enable MSIs/ERIs to network and share capabilities with prospective partners.
- "Matchmaking" sessions with other institutions and federal agencies.
- Developing interagency funding opportunity announcements to enable MSIs/ERIs to acquire a broader, more sustainable, access to federal funding opportunities.
- Sub-competitions through nonprofit partners, which could help to circumvent complex funding requirements, reduce constraints on allowable research costs, and provide training on writing competitive federal grant proposals.

Recommendation: Combat Biases During Proposal Review

Transform who participates in the merit review system

Part of the "hidden curriculum" of securing research funding is understanding how proposals will be evaluated. The merit review process can be improved by:

- Offering "mock panel review" sessions for MSI/ERI faculty.
- Creating and expanding opportunities for MSIs/ERIs faculty to sit on agency grant proposal review boards or agency advisory boards.
- Continuing to offer the option for virtual participation in panel reviews, which became widespread during the COVID-19 pandemic.
- Standardizing processes for recruiting and selecting reviewers across and between agencies.
- Changing incentive structure for reviewer participation to ensure that scholars from all backgrounds are better represented in the merit review process.

- Ensuring that feedback on unfunded proposals is constructive and does not include biased judgments on institutional capabilities.

Increase opportunities for MSI/ERI faculty members to serve within the federal government

An increase in the number of faculty who gain understanding of internal federal research agency processes will promote information and bidirectional resource exchanges between agencies and MSIs/ERIs. It will also allow for perspectives of HBCU researchers to inform federal activities. Agencies can:

- Raise awareness about the value and use of the IPA mechanism.
- Ensure IPA guidelines are accessible to non-governmental readers and are of consistent detail and quality across federal agencies.
- Actively recruit MSIs/ERIs research faculty for sabbaticals at federal agencies through IPA temporary assignments.
- Increase training opportunities that MSIs/ERIs administrators and leadership can access to process and manage IPA appointment requests.
- Amplify and celebrate research that takes place at MSIs/ERIs and highlight the accomplishments of PIs at MSIs/ERIs in articles, convenings, and achievement awards.

Recommendation: Prioritize Transparency

Setting public agency-wide goals and monitoring

Setting agency-wide funding goals—along with measurable and trackable commitments to build research capacity across the nation, leveraging currently underutilized institutions—can only be accomplished with concrete strategies.

- Establish approaches to engage more MSIs/ERIs in the research enterprise.
- Track MSIs/ERIs engagement and involvement along the way to identify and address challenges in agency approaches.
- Set explicit agency-wide targets for number of proposal submissions, awards, gross obligation dollar amounts, funding rates, and other relevant metrics.
- Regularly measure progress on achieving targets.
- Publicize the agency's involvement with MSIs/ERIs as well as communicate shared accomplishments and success stories with MSIs/ERIs.

Prioritize performance assessment of* MSIs/ERIs *inclusivity across agency opportunities with data

In order to understand which new interventions and changes to existing programs are actually effective in advancing research capacity, agencies need to effectively assess outcomes. Agencies can:

- Routinely analyze program data related to proposal submission rates, merit review processes and outcomes, funding rates, and program features that may be correlated with MSIs/ERIs success.
    - Disaggregate data to reveal funding rates for MSIs/ERIs.
    - Assure that individuals leading evaluation efforts have direct experience with and understanding of MSIs/ERIs.
- Make performance outcomes public through accessible reports on agency websites.
- Share effective policies and adapt/adopt promising practices from other agencies via interagency collaboration.
- Regularly confer with MSIs/ERIs during program evaluations and program improvement phases.

Supporting HBCUs, TCUs, and MSIs/ERIs within and beyond CoSTEM

As a part of CoSTEM's chartered IWG on HBCU, TCU, and MSI STEM Achievement and consistent with the CHIPS and Science Act, federal research agencies are also recommended to:

- identify existing liaison(s) or the potential for new liaisons who could potentially support agency actions that enhance direct communication with HBCUs, TCUs, and MSIs/ERIs to increase agency's understanding of the capacity and needs of such institutions and to raise awareness of available federal funding opportunities at such institutions; coordinate programs, activities, and initiatives while accounting for the capacity and needs of HBCUs, TCUs, and MSIs/ERIs; track agency STEM investments in and engagement with MSIs/ERIs; and report progress toward increasing participation of HBCUs, TCUs, and MSIs/ERIs in STEM programs;
- investigate innovative funding processes/structures that support broader participation by HBCUs, TCUs, and MSIs/ERIs;
- conduct on-site reviews of research facilities at HBCUs, TCUs, and MSIs/ERIs, as practicable, and make recommendations regarding strategies for becoming more competitive in research;
- hold or provide guidance on geographically accessible or virtual workshops on agency research priorities and on how to write competitive award proposals and how to bolster award management capacity for the entire award lifecycle, from application to completion;
- identify and ensure opportunities for HBCUs, TCUs, and MSIs/ERIs to directly communicate with agency officials responsible for managing competitive award programs in order to receive feedback on research ideas and proposals, including guidance on the agency's merit review process;
- foster mutually beneficial public-private collaboration among federal research agencies, industry, federal laboratories, academia, and nonprofit organizations to— identify alternative sources of funding for STEM education and research at HBCUs, TCUs, and MSIs/ERIs; provide access to high-quality, relevant research experiences for students and faculty of HBCUs, TCUs, and MSIs/ERIs; expand the professional networks of students and faculty of HBCUs, TCUs, and MSIs/ERIs; broaden STEM educational opportunities for students and faculty of HBCUs, TCUs, and MSIs/ERIs; and support the transition of students at HBCUs, TCUs, and MSIs/ERIs into the STEM workforce;
- support the ongoing development and implementation of agency approaches that consider the following opportunities to: issue new or expanding existing funding opportunities targeted to HBCUs, TCUs, and MSIs/ERIs; modifying existing research and development program solicitations to incentivize effective partnerships with HBCUs, TCUs, and MSIs/ERIs; offer planning grants for HBCUs, TCUs, and MSIs/ERIs to develop or equip grant offices with the requisite depth of knowledge to submit competitive grant proposals and manage awarded grants; offer additional training programs, including individualized and timely guidance to grant officers, faculty, and postdoctoral researchers at HBCUs, TCUs, and MSIs/ERIs to ensure their understanding of the requirements for an effective grant proposal; and other approaches for making competitive funding models more accessible for HBCUs, TCUs, and MSIs/ERIs;
- to the extent practicable, support the production of a summary of STEM funding opportunities and proposal deadlines targeted at HBCUs, TCUs, and MSIs/ERIs, including grants, contracts, cooperative agreements; and
- to the extent practicable, identify in annual budget requests potential areas for collaboration with HBCUs, TCUs, and MSIs/ERIs in relevant fiscal years, including relating to potential meetings and workshops.

Section 3: Actions related to CoSTEM's Principle on Transparency and Accountability

Leveraging CoSTEM's Efforts to Collect and Report Participant Data on Federal Programs

The Committee on STEM (CoSTEM) is responsible for documenting "rates of participation by women, underrepresented minorities, and persons in rural areas" in federally sponsored CoSTEM programs and activities.[142] A key first step in providing this information was determining who constitutes 'participants' in these programs and activities.

The following guidelines were developed for CoSTEM's consideration by the Interagency Working Group on Transparency and Accountability (IWGTA) in FY 2019. The IWGTA executed a pilot project with ten agencies to better understand the applicability and utility of these guidelines in FY 2020. The guidelines presented here reflect insights from the pilot and additional feedback received from respondents to an FY 2021 survey.

Designating Participants

CoSTEM's Federal Coordination in STEM (FC-STEM) Subcommittee endorsed the following guidelines to assist agencies in designating participants in CoSTEM programs and activities. For the purposes of CoSTEM reporting/America COMPETES Act reporting, these guidelines assume that:

- Participants are only designated for activities that:
    - are supported by a STEM education investment, as 'STEM education investment' is defined by CoSTEM (referencing the former definition of a CoSTEM investment, Appendix 3 of this report) *and*
    - deliver services to individuals. An activity supported by a STEM education investment must deliver services to individuals for the activity to require participant reporting.
- Participants are individuals. This is true even in cases where a non-Federal organization or institution may deliver/implement the program and gain some benefit. Thus, a participant may receive services (a) as a result of an application the individual has made directly to an agency's STEM education investment supported activity *or* (b) from an organization that delivers the activity.
- Specifically, participants are individuals who *benefit* from an activity. This includes both individuals who benefit directly from their involvement in an activity (primary beneficiaries) and, *at the discretion of the program/managing agency*, other individuals who benefit indirectly *in a way that is aligned with the STEM education program or activity's stated goals or objectives* (secondary beneficiaries).
- It is feasible to collect and report (aggregate) information on participant characteristics. Key considerations in assessing the feasibility of participant reporting include:
    - The individuals who benefit from the STEM education program or activity are "knowable". They do not engage with the program or activity in an anonymous fashion (e.g., an individual downloading material from a website). The nature of the participation allows for demographic information to be collected. The benefit to the individual is of a nature (e.g., adequate length or depth) to justify the administrative burden of data collection and reporting.

[142] Section 101(b)(6) of the America COMPETES Reauthorization Act of 2010

- Agency policies and authorities allow for the collection and reporting of participant information.
- Any administration, financial, or other barriers to collecting and/or reporting participant information can be addressed.

Assessing the Feasibility of Reporting

Not all CoSTEM investments/activities may be able to report and/or collect participant demographic data. Table 2 identifies key considerations CoSTEM agencies were to use for assessing the feasibility of reporting.

Table 2. Agency Challenges and Barriers to Reporting[143]

Areas of Consideration	Specific Challenges or Barriers to Reporting
Known Participants and Participant-based Factors	The nature in which participants engage in the program/activity are such that their identity cannot be known, or demographic information cannot be collected effectively (e.g., accessing content or materials from an open online resources, members of the public attend a museum/public STEM event)
	Agency "access" to the participants and/or degree of separation between the agency and the participants (does the applicant directly apply to the agency, or an organization – how many levels removed)
	Participants are minors
	Duration of participant exposure (considerations for both long-term and short-term exposure)
Agency Policy and Authorities	Legal restrictions in the regulatory or authorizing language for an agency; Federal-wide restrictions
	Privacy Act requirement and authorities
	Program Office/Manager perception of whether demographic questions can be asked
Administrative and Costs	Paperwork Reduction Act waiver needed to collect information directly from participants
	Changing granting policy and grantee requirements and implementation lead time requirements
	Changing application systems and associated approvals, including obtaining appropriate approvals for systems of record that may contain Personally Identifiable Information (PII)
	Increased program costs associated with information collection and reporting

[143] Appendix 3. Designating a STEM Education Participant and adding the Status of Rural Areas (Version: 04.06.2022); NSTC: 2022 Progress Report on the Implementation of the Federal STEM Education Strategic Plan https://www.whitehouse.gov/wp-content/uploads/2023/02/Final_2022_CoSTEM_Progress_Report.pdf

These guidelines reflect a commitment to employing common approaches when determining the feasibility of reporting on STEM education investments and their outcomes. At the same time, they recognize that

- similar federal STEM education investments/activities may have different goals and desired outcomes, and therefore may have different categories of individuals who should be counted as participants, and
- what it means to participate meaningfully (e.g., in ways that it is hypothesized—or which evidence indicates is more or less likely—to result in intended STEM engagement and/or learning outcomes) may vary considerably across CoSTEM investments.

Accordingly, while these guidelines provided a framework to facilitate common approaches to CoSTEM participant reporting, they assume federal agencies will exercise discretion in determining who to count as participants and that subsets of reportable individuals will be determined agency by agency, taking into consideration both specific investment goals and the feasibility of generating and sharing robust evidence on the characteristics of individuals who participate in federally supported STEM education investments, programs, and activities.

Collecting and Reporting Applicant Data on Federal Research Awards (including STEM Education Awards)

The CHIPS and Science Act of 2022 is designed to boost U.S. competitiveness, innovation, and national security.[144] It invests in semiconductor research and manufacturing in the United States. The Act also authorized investments in public sector research in science and technology, covering areas such as human spaceflight, quantum computing, and materials science, and supports STEM workforce development.

Section 10502 of the Act calls for each federal research agency[145] to collect from all applicants from merit-reviewed research and development awards the following information: demographics, primary field, award type, institution type, review rating, budget request, funding outcome, and awarded budget. It also indicates that this information should be summarized and publicized, disaggregated and cross-tabulated by race, ethnicity, sex, and socioeconomic indicators (which may include employment status, occupation, educational attainment, parental education, and income), geographic location, and years since completion of doctoral degree, in conjunction with NSF's report as required by Section 37 of the Science and Engineering Equal Opportunities Act.[146]

OSTP is to establish guidance for agencies to use to collect such data. Within two years of release of this guidance and on an annual basis, each federal research agency should then submit such record-level data to NSF's National Center for Science and Engineering Statistics (NCSES). To inform development of such guidance, NSF, in coordination with OSTP, conducted initial information gathering activities. These activities are summarized below with recommendations for next steps.

[144] https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/09/fact-sheet-chips-and-science-act-will-lower-costs-create-jobs-strengthen-supply-chains-and-counter-china/

[145] Per the CHIPS and Science Act, a federal research agency is any federal agency with an annual extramural research expenditure of over $100,000,000 in fiscal year 2022 constant dollars.

[146] 42 U.S.C. 1885d; Public Law 96–516

Documenting Current Policies and Practices

To inform the development of guidance to ensure uniformity and standardization of the data collected across agencies, OSTP and NSF leveraged the federal R&D Community of Practice. The Research and Development (R&D) Community of Practice (CoP) was established in 2016 in response to a recommendation from the NSTC Fast-Track Action Committee on R&D Reporting Standards. The CoP serves as a platform for federal agencies to address needs associated with reporting and classification of R&D to the Office of Management and Budget (OMB) and NCSES, and as a means for OSTP and OMB to communicate their needs to agencies.

OSTP and NSF asked agencies in the R&D CoP the following three questions:

- For which of the following items identified in the Section 10502 does your agency currently collect record-level information for research awards?
- Other than funding, what challenges would be introduced by a policy that changes the amount and type of record-level information your agency collects?
- Who is the POC from your agency that should be involved in future discussions about developing guidance/a policy to ensure uniformity and standardization in research award data?

Key Takeaways from Agency Responses

Seventeen agency/office responses were received. OSTP also met with select agency staff to discuss their responses.

Summative Responses to Question #1: For which of the following items identified in Section 10502, does your agency currently collect record-level information for research awards?

- A common request or point of clarification from agencies was to define what "record-level" meant as the CHIPS and Science Act does not define the term "record-level."
- Demographics: Most respondents do not collect applicant demographic data nor awardee demographic data, such as age, race, ethnicity, gender, marital status, income, education attainment, or employment status. If information is collected, it is collected at the level of the applicant's or awardee's organization. Organization level data includes organizational size (including whether an organization is minority-owned), state, and/or type (academic, nonprofit, industrial). The Department of Education's (ED) Institute of Education Sciences (IES) collects demographic information from Principal Investigators (PIs) and Co-Principal Investigators (co-PIs) on applications for its research grants. However, ED does not currently collect demographic information for any other grant or contract awards for which extramural R&D obligations are reported to NSF or OMB. For some agencies that collect and report awardee data, race, ethnicity, gender, or disability status is self-reported by the awardee.
- Primary field: Most agencies requested a definition or a reference to a definition.
- Award type: Many agencies requested a definition or a reference to a definition. Questions asked included whether award type referred to/was inclusive of contracts, grants, or other funding types. Agencies also asked if award type referred to/attempted to distinguish single year awards from multiple year awards.
- Institution type: Some respondents requested a definition or a reference to a definition. Most agencies categorize awardee organization type as academic, nonprofit, government, or industrial. Institution data can also indicate additional attributes or details such as public/private, K–12,

institutions of higher education, local or state government, federal, state, etc. Minority-serving Institution (MSI) status is also captured by some agencies.

- Review Rating: Agencies conveyed that collecting or reporting these data would most likely involve agency program offices as its not information that is or could be supplied by an applicant or awardee. Agencies capture data for proposals that are externally merit-reviewed.
- Budget Request: Agencies collect these data at the proposal submission /project level.
- Funding Outcome: Agencies collect these data at the award/project level, at times through interim and final project reports.
- Awarded Budget: Agencies capture the awarded amount at the project level. However, awarded amounts may not collected or reported by/at an agency's program level.

Summative Responses to Question #2: Other than funding, what challenges would be introduced by a policy that changes the amount and type of record-level information your agency collects?

Anticipated challenges or logistical considerations shared by agencies:

- Definitions for "merit reviews," "budget request," "funding outcome," and "awarded budget" are required to ensure the consistency of data submitted from federal agencies. Government-wide definitions would have to be established and agreed to as terminology is inconsistent or unclear across agencies.
- Different Systems – For one agency, grant data is entered into one system and another is used for contracts.
- Current system capabilities do not collect or don't currently support the collection of all suggested data points. of the data requested above.
- Maintaining databases and ensuring quality across diverse programs and over time has its challenges, particularly if information on awards comes in at different times in the award cycle.
- Agencies would need to ensure coding is the same across systems. For example, a state university could either be coded as an academic organization or a state governmental organization. Guidance would need to ensure accuracy of the information across different data capture systems with ways of cross checking.
- With limited staff, additional data collection and reporting would create an administrative burden.
- Voluntary--One agency has required research grant applicants to complete the Research & Related Personal Data form (OMB Number 4040-0001), which asks for information on gender, race, ethnicity, disability status, and citizenship, prior to submitting the application. Applicants are assured that the information provided will be separated from their application, kept confidential, and not be considered in the review process. However, submitting information about one's demographic status to the federal government is voluntary, and there is a 'do not wish to provide' option for each of the categories. The percentage of individual respondents who selected "do not wish to provide" for any one of the five demographic categories ranges from 18 to 30 percent for research competitions. This limits collection of demographic information and ability to make that information available publicly while meeting requirements to maintain confidentiality and protect against disclosure.
- Possible issues with demographic information being considered as Personally Identification Information (PII) and maintaining privacy and confidentially of data.
- Collecting information on the primary field. Although applicants for grants are encouraged to indicate the department in which the researchers are based, not all do, and those departments do

not always map clearly onto the classification of fields of study. Applicants other than institutions of higher education may not work within a department associated with a field of research.
- Another potential challenge involves the institution type. For research grants, applicants must complete a form which allows the applicant to select one 'type of applicant' from a prepopulated list. It is possible for an applicant to be more than one type of institution – for example, both a public/state-controlled institution of higher education and a Hispanic-serving institution. Currently, the form does not provide a multi-select option.
- One agency is exploring whether and how to collect applicant information for programs that support some activities that are classified as research and development but for which the primary purpose is not research.
- For some agencies, they have interagency agreements to use grants.gov. Any field changes or additions would need to go through its oversight agency, HHS.
- challenges: Data Scope should remain only to the public information currently available within the fields listed and does not compromise privacy/confidentiality.
- Agencies also identified the following possible challenges:
    - Time needed to collect data
    - Effort to review and reconcile data
    - Finding a way to extract data that is outside module
    - Additional burden to awardees to provide data

Summative Responses to Question #3: Who is the POC from your agency that should be involved in future discussions about developing guidance/a policy to ensure uniformity and standardization in research award data?

Agencies submitted points of contact from a variety of offices, demonstrating that different staff have various data management responsibilities across agencies.

Examples of Positions/Titles:
- Chief Scientist
- Office of Senior Procurement Executive
- Strategic Collections and Clearance Team
- Office of the Chief Data Officer
- Procurement & Grants Policy Division
- Grants Policy and Compliance
- Policy Office, Division of Institution and Award Support, Office of Budget

Additional Considerations for Section 10502 Data Collection

Other CHIPS and Science Act Data Collections to Consider

While NSF has not been charged to collect data in support of Section 10501[147] of the CHIPS and Science Act, federal research agencies are in fact asked to consider sharing the following data per Section 10501:

[147] Sec. 10501. Federal Research Agency Policies for Caregivers. (a) OSTP GUIDANCE. —Not later than 12 months after the date of the enactment of this Act, the Director, in consultation with the heads of relevant agencies, shall provide guidance to each Federal research agency to establish policies that—(1) apply to all— (A) research awards granted by such agency;

demographic data that can be disaggregated by sex, geographic location, and socioeconomic indicators, which may include employment status, occupation, educational attainment, parental education, and income, at both institutions of higher education and Federal laboratories.

NSF has been charged to collect data in support of Section 10504[148] of the CHIPS and Science Act. NSF is, as practicable, to collect: sex; race; socioeconomic indicators, which may include employment status, occupation, educational attainment, parental education, and income; geographic location; ethnicity; citizenship status; and years since completion of doctoral degree. Organizational data would also need to be collected such as: the number and percentage of faculty; the number and percentage of faculty at each rank; the number and percentage of faculty who are in nontenure-track positions, including teaching and research; the number and percentage of faculty who are reviewed for promotion, including tenure, and the percentage of that number who are promoted, including being awarded tenure; faculty years in rank; the number and percentage of faculty to leave tenure-track positions; the number and percentage of faculty hired, by rank; and the number and percentage of faculty in leadership positions.

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and (B) principal investigators of such research and their trainees, including postdoctoral researchers and graduate students, who have caregiving responsibilities, including care for a newborn or newly adopted child and care for an immediate family member who has a disability or a serious health condition; and (2) provide, to the extent feasible— (A) flexibility in timing for the initiation of approved research awards granted by such agency; (B) no-cost extensions of such research awards; (C) award supplements, as appropriate, to research awards to sustain research activities conducted under such awards; and (D) any other appropriate accommodations at the discretion of the director of each such agency. (b) UNIFORMITY OF GUIDANCE. —In providing guidance under subsection (a), the Director shall encourage uniformity, to the extent practicable, and consistency in the policies established pursuant to such guidance across all Federal research agencies. (c) ESTABLISHMENT OF POLICIES. —Consistent, to the extent practicable, with the guidance under subsection (a), Federal research agencies shall— (1) maintain or develop and implement policies for individuals described in paragraph (1)(B) of such subsection; and (2) broadly disseminate in easily accessible formats such policies to current and potential award recipients. (d) DATA ON USAGE.—Federal research agencies shall consider— (1) collecting data, including demographic data that can be disaggregated by sex, geographic location, and socioeconomic indicators, which may include employment status, occupation, educational attainment, parental education, and income, on the usage of the policies under subsection (c), at both institutions of higher education and Federal laboratories; and (2) reporting such data on an annual basis to the Director in such form as required by the Director.

[148] Sec. 10504. Collection Of Data on Demographics of Faculty. (a) COLLECTION OF DATA. — (1) IN GENERAL. —Not later than 5 years after the date of the enactment of this Act and at least every five years thereafter, the Director of the National Science Foundation shall carry out a survey to collect data from award recipients on the demographics of STEM faculty, by broad fields of STEM, at different types of institutions of higher education that receive Federal research funding. (2) SURVEY CONSIDERATIONS.—To the extent practicable, the Director of the National Science Foundation shall survey, by sex, race, socioeconomic indicators, which may include employment status, occupation, educational attainment, parental education, and income, geographic location, ethnicity, citizenship status, and years since completion of doctoral degree— (A) the number and percentage of faculty; (B) the number and percentage of faculty at each rank; (C) the number and percentage of faculty who are in nontenure-track positions, including teaching and research; (D) the number and percentage of faculty who are reviewed for promotion, including tenure, and the percentage of that number who are promoted, including being awarded tenure; (E) faculty years in rank; (F) the number and percentage of faculty to leave tenure-track positions; (G) the number and percentage of faculty hired, by rank; and (H) the number and percentage of faculty in leadership positions. (b) EXISTING SURVEYS. —The Director of the National Science Foundation, may, in modifying or expanding existing Federal surveys of higher education (as necessary)— (1) take into account the considerations under subsection (a)(2) by collaborating with statistical centers at other Federal agencies; or (2) make an award to an institution of higher education or nonprofit organization (or consortia thereof) to take such considerations into account. (c) REPORTING DATA. —The Director of the National Science Foundation shall publish statistical summary data collected under this section, including as part of the National Science Foundation's report required by section 37 of the Science and Engineering Equal Opportunities Act (42 U.S.C. 1885d; Public Law 96–516).

NSF Surveys that could be Leveraged to Support 10502 Collection and Reporting

The Survey of Federal Funds for Research and Development (Federal Funds Survey) is the primary source of information about federal funding for R&D in the United States.[149] The Federal Funds Survey provides detailed data on federal agency obligations for R&D.[150] Federal agencies provide data on their obligations such as Type of R&D, Field of R&D by type of R&D, Performer by type of R&D, Geographic location (within the United States, by area of the state and by foreign country), and R&D plant (i.e., facility construction and major equipment). Currently, the data collected and reported by agencies for this survey does not fulfill Section 10502 mandates.

The Survey of Earned Doctorates (SED) is an annual census of individuals who earn research doctoral degrees from accredited U.S. academic institutions. The survey is sponsored by NCSES within NSF and by three other federal agencies: NIH, ED, and the National Endowment for the Humanities.
Key variables collected in the SED are listed below.

- Academic institution of doctorate
- Baccalaureate-origin institution (U.S. and foreign)
- Birth year
- Citizenship status at graduation
- Country of birth and citizenship
- Disability status
- Educational attainment of parents
- Educational history in college
- Field of each degree earned
- Graduate and undergraduate educational debt
- Marital status, as well as the number and age of dependents
- Postgraduation plans (e.g., work, postdoc, other study or training)
    - Primary and secondary work activities
    - Source and type of financial support for postdoctoral study or research
    - Type and location of employer
    - Basic annual salary
- Race and ethnicity
- Sex
- Sources of financial support during graduate school
- Type of academic institution (e.g., historically Black colleges and universities, Carnegie codes, public or private) awarding the doctorate

The population for the SED consists of individuals receiving a research doctorate[151] from a U.S. academic institution. The self-administered Web survey is the primary mode of SED completion. The data from this survey are published annually in the series, Doctorate Recipients from U.S.

[149] https://ncses.nsf.gov/surveys/federal-funds-research-development/2022-2023

[150] Obligations: A legally binding commitment for goods or services, with monies set aside to be paid out in the future, usually in the form of grants and contracts.

[151] A research doctorate is a doctoral degree that (1) requires completion of an original intellectual contribution in the form of a dissertation or an equivalent culminating project (e.g., musical composition) and (2) is not primarily intended as a degree for the practice of a profession. The most common research doctoral degree is the PhD. Recipients of professional doctoral degrees, such as MD, DDS, DVM, JD, DPharm, DMin, and PsyD, are not included in the SED.

universities.[152] Other survey data products are also available at NCSES's website.[153] Information from the survey is also included in Science and Engineering Indicators and in Diversity and STEM: Women, Minorities, and Persons with Disabilities.[154,155]

Recommendations for Collecting Data Moving Forward in Support of Section 10502

R1. Distinguish the difference between Applicants, Awardees, and Participants
R2. Determine which of the three (Applicants, Awardees, and Participants) will be collected and what considerations needs to be made regarding order
R3. Confirm the methodology for collection
R4. Determine the most common data across reporting agencies
R5. Define survey terminology for interagency use

Suggested Piloting Proposal for Agency Consideration

OSTP suggests that these recommendations be piloted by NSF as well as at least two other federal agencies. The goals of this pilot are threefold: (1) to document any challenges implementing the guidelines/recommendations; (2) to recommend any refinements of the guidelines that may be necessary for broader implementation; and (3) to generate initial evidence. Participating agencies would formally adopt these reporting guidelines for the purposes of the pilot; encourage agencies to participate in the pilot; and ask agencies to encourage their staff to participate actively in the pilot.

Pilot parameters: OSTP recommends the following framework and procedures be used to pilot the following guidelines and definitions, drawing from CoSTEM's previous work on defining program participants.

- Management: NSF will establish a "pilot working group (PWG)" consisting of CoSTEM and R&D CoP members, and agency staff responsible for data collection and/or analysis at their respective agencies.
- Pilot procedures: The PWG will facilitate the execution of the pilot, in coordination with the agencies involved. The pilot will proceed according to five milestones:
    - The PWG will develop procedures for conducting the pilot, along with the development of a feedback data collection instrument. NSF and OSTP will review and approve the procedures and instrument prior to agencies participating in the pilot.
    - The PWG will work with NSF and OSTP to identify appropriate investments to be included in the pilot effort.
    - Providing support during the pilot: While agencies are executing the pilot, the PWG will provide support to the agencies involved and make adjustments to pilot procedures, if necessary.
    - As agencies complete the pilot, the PWG will collect the feedback from the agencies involved.
    - The PWG will develop a report to be delivered to NSF and OSTP.
- Timing and scope: The amount of time that agencies spend engaged in the pilot process will depend on a number of factors specific to the agency. As noted above, agencies will execute the

[152] http://ncses.nsf.gov/sed/
[153] https://ncses.nsf.gov/surveys/earned-doctorates
[154] https://ncses.nsf.gov/indicators
[155] https://ncses.nsf.gov/wmpd

pilot.[156] Specifically, OSTP envisages that one individual (e.g., a program/investment manager) from each agency will participate actively in the pilot, with four primary responsibilities.
    - Provide the pilot PWG with raw data and/or analyses where these are available, Pilot is meant to capture current data collection capabilities. Agencies are *not* expected to enact changes to their data collection capabilities for this pilot, unless those changes in data collection capabilities were already underway at the agency.
    - Provide the pilot PWG with feedback on the pilot process.
    - Review and provide comments on a summary report the pilot PWG will prepare for NSF and OSTP.
    - Participate as appropriate in presenting results and recommendations on the pilot to NSF and OSTP.
- Pilot feedback data: The pilot PWG will solicit input from agency representatives on recommended definitions. If possible, agencies will be encouraged to provide data to NSF and OSTP using the previously described framework, but this will likely not be possible for all programs. Because of this, the pilot PWG will also solicit input and feedback on items including, but not limited to:
    - The feasibility and barriers for collection
    - The agency resources to include cost to be able collect
    - The agency estimated timeframe to address barriers and costs to be able to collect data
    - The potential feasibility of, and any barriers to, reporting data to NSF
    - Additionally, the pilot PWG will engage representatives from OMB/OIRA to provide feedback on the processes required to overcome specific barriers and challenges associated with Paperwork Reduction Act (PRA) and Privacy Act requirements, prior to implementing the collection and reporting of participant data.
- Deliverable to NSF and OSTP: The PWG will produce a summary report detailing the capacity, systemic barriers, and challenges that exist for agencies involved in the pilot to implement the recommended common definitions to support NSF data collection, federal agency data usage, and as applicable, CoSTEM reporting requirements. Although the pilot will only include a small subset of agencies and may not be representative of all federal research agencies, it will provide some initial information on the feasibility of implementing common data collection across STEM research awards. The summary report will also include agency estimated costs, resources and timeframe to be able to collect data. The summary report will be submitted to OSTP, NSF, and as applicable, CoSTEM leadership within three months after the conclusion of the pilot.

[156] In order for NCSES to conduct such a pilot, NSF would need to have sufficient lead time, as well as additional staff and financial resources, to prepare and execute the pilot.

Section 4: Actions Related to CoSTEM's Pillar on STEM Workforce

Progress Towards Building the Bioworkforce of the Future

In September 2022, President Biden signed Executive Order 14081 on Advancing Biotechnology and Biomanufacturing Innovation for a Sustainable, Safe, and Secure American Bioeconomy to enable the United States to harness the full power of biotechnology and biomanufacturing.[157] In response to this Executive Order, the Bioworkforce Interagency Working Group, co-led by OSTP and DPC, released Building the Bioworkforce of the Future in June 2023.[158] The report details how federal agencies can equitably expand pathways into biotechnology and biomanufacturing jobs to ensure that cutting-edge products resulting from biotechnology invented in the United States are manufactured in the United States.

The goals of the report are to ensure that (1) U.S. education and training programs can meet the rapidly changing skill needs for jobs in biotechnology and biomanufacturing and can meet the increasing demand for workers in the bioeconomy; (2) a diverse pool of workers, including those from communities underrepresented in the bioworkforce, can prepare for, secure, and advance in good bioeconomy jobs and careers; and (3) federal resources are directed at evidenced-based education and training approaches that advance equity. Key to achieving these goals is supporting biotechnology and biomanufacturing talent development at Historically Black Colleges and Universities (HBCUs), Tribal Colleges and Universities (TCUs), and Minority-Serving Institutions (MSIs). These goals are consistent with the objectives within CoSTEM's Pillar 3: STEM Workforce.

The report outlines five recommendations for how the federal government can expand education and training opportunities in biotechnology and biomanufacturing for people across the country. Since June 2023, agencies across the federal government have made significant progress in implementing these recommendations, as detailed in the agency highlights below. These highlights are a small subset of the many federal activities that support the recommendations. Additional programs that support the recommendations are featured in Section 1.

The report also includes a list of select federal programs that could support biotechnology and biomanufacturing training and education within the appendix. Below is an updated list of such programs. This updated list is not inclusive of all federal programs that could support biotechnology and biomanufacturing training and education.

Select actions in support of Recommendation 1: Expand and diversify the talent pool for biotechnology and biomanufacturing jobs and careers to promote innovation and advance equity.

DOE's Office of Biological and Environmental Research (BER) has invested in building institutional capacity at HBCUs and MSIs for systems biology research and student training and mentoring through grants under Reaching a New Energy Sciences Workforce (RENEW) and Funding for Accelerated,

[157] https://www.whitehouse.gov/briefing-room/presidential-actions/2022/09/12/executive-order-on-advancing-biotechnology-and-biomanufacturing-innovation-for-a-sustainable-safe-and-secure-american-bioeconomy/

[158] https://www.whitehouse.gov/wp-content/uploads/2023/06/Building-the-Bioworkforce-of-the-Future.pdf

Inclusive Research (FAIR). These efforts seek to engage a broader set of researchers in basic biological research.

DOD's Defense STEM Education Consortium (DSEC) is a partnership between DOD, academia, industry, and nonprofit organizations aimed at broadening STEM literacy.[159] Through DSEC, DOD funds San Diego Miramar College, a community college, to provide several applied biotechnology courses, which prioritize students from underrepresented communities, including first-generation college students and veterans, their spouses, and their dependents. Through these courses, students gain hands-on experience, practicing techniques used in industry labs and manufacturing products for actual customers.

ED supports increased diversity in the bioworkforce by providing pathways into biotechnology and biomanufacturing through the Perkins V career and technical education formula grants to states. These grants support TCUs, Alaska Native populations, and Native Hawaiian populations.

HHS/Administration for Strategic Preparedness and Response (ASPR) is working to generate excitement in biomedical and health security fields and build a more inclusive STEM workforce via the Science, Preparedness and Response, Innovations, and New Technologies (SPRINT) Program under the Biomedical Advanced Research and Development Authority (BARDA).[160] Through SPRINT, BARDA is engaging with high school students in underserved communities in the National Capital Region. In July 2024, BARDA launched the first-ever SPRINT internship opportunity, a six-week paid internship program for high school students in grades 10–12.[161] The internship enabled students to work closely with BARDA scientists on specific projects and get an inside look into how the federal government prepares for and responds to emergencies that impact health.

HHS/NIH announced in April 2024 increases in stipends and childcare subsidies for predoctoral and postdoctoral scholars supported by Kirschstein National Research Service Awards.[162] The new stipend levels for postdoctoral scholars begin at $61,008 per year and increase based on years of experience. This is one of several recommendations from the December 2023 final report of the NIH Advisory Committee to the Director Working Group on Re-Envisioning NIH-Supported Postdoctoral Training[163] that NIH is working to implement. The report draws on a Request for Information on Re-Envisioning U.S. Postdoctoral Research Training and Career Progression within the Biomedical Research Enterprise that NIH conducted in 2023.[164]

NSF has made more than $11 million in new awards dedicated to the biotechnology workforce. Many of these awards were made through the Advanced Technological Education (ATE) Program. NSF continues to make awards to HBCUs, TCUs, and MSIs in all areas of science, including biology and biotechnology, to advance both workforce development and research.

[159] https://dodstem.us/about/partners/
[160] https://medicalcountermeasures.gov/barda/sprint
[161] https://medicalcountermeasures.gov/media/assets/SPRINT/SPRINT_Internship_Opportunity_070824.pdf
[162] https://nexus.od.nih.gov/all/2024/04/23/increases-for-national-research-service-award-stipends-and-childcare-subsidies/; https://grants.nih.gov/grants/guide/notice-files/NOT-OD-24-104.html
[163] https://acd.od.nih.gov/documents/presentations/12152023_Postdoc_Working_Group_Report.pdf
[164] https://grants.nih.gov/grants/guide/notice-files/NOT-OD-23-084.html

USDA, through the NextGen program, is supporting MSIs to identify, recruit and train the next generation of food and agriculture professionals, including those in biotechnology and biomanufacturing careers.[165] Program grantees have disbursed more than 800 scholarships and fellowships to reduce financial barriers to student enrollment in degree programs. Program grantees also support internships for more than 740 students, enabling students to learn about and develop applicable skills for careers in biotechnology and biomanufacturing. USDA and program grantees are supporting each student's success by organizing student-focused webinars on federal careers and job application strategies; organizing student career exploration events; and supporting visits to and experiential learning opportunities at academic, industry, and USDA laboratories and facilities.

Select actions in support of Recommendation #2: Strengthen worker-centered sector strategies and other partnerships between employers, labor organizations, community colleges, and other training providers to grow and diversify the bioworkforce.

DOL announced in July 2024 over $244 million through two grant programs to help modernize, diversify, and expand the Registered Apprenticeship system in growing U.S. industries.[166] Registered Apprenticeships are industry-led opportunities that offer individuals paid work experiences; progressive wage increases; and portable, nationally-recognized credentials.[167] The two programs include grantees that list biomedical fields, biotechnology, or biomanufacturing as a targeted industry for their programming. Nearly $195 million will be delivered through the second round of grant funding under the Apprenticeship Building America Initiative, which supports public-private partnerships designed to serve a range of industries, including biomanufacturing.

ED serves as the point agency for the Columbus Workforce Hub, announced in 2023.[168] Columbus is one of five Workforce Hubs launched by the Biden-Harris Administration to leverage the American Rescue Plan, the Bipartisan Infrastructure Law, the CHIPS and Science Act, and the Inflation Reduction Act to catalyze private- and public-sector investments and create good-paying jobs across the country.[169] Amgen is one of the primary employer partners for the Columbus Workforce Hub and has made strong commitments in the region, including breaking ground on a $365 million biomanufacturing facility that will employ 400 Ohioans by the end of 2024. Columbus State Community College and other colleges have been preparing to scale up the number of individuals trained for each job on the biomanufacturing career ladder.

[165] https://www.nifa.usda.gov/grants/programs/learning-leading-cultivating-next-generation-diverse-food-agriculture-professionals

[166] https://www.dol.gov/newsroom/releases/eta/eta20240711-0

[167] https://www.apprenticeship.gov/employers/registered-apprenticeship-program

[168] https://www.whitehouse.gov/briefing-room/statements-releases/2023/07/12/fact-sheet-biden-harris-administration-launches-workforce-hub-in-columbus-ohio-and-announces-new-commitments-to-help-more-workers-access-good-jobs/

[169] https://www.whitehouse.gov/briefing-room/statements-releases/2023/05/16/fact-sheet-biden-harris-administration-announces-strategies-to-train-and-connect-american-workers-to-jobs-created-by-the-presidents-investing-in-america-agenda/

NSF supports biotechnology learning experiences through the Experiential Learning for Emerging and Novel Technologies (ExLENT) Program. ExLENT supports cross-sector partnerships to create career pathways into the biotechnology sector.

Additionally, **DOC**, **DOL**, **ED**, and **NSF**, with support from **DOD** and other agencies, are working with Manufacturing USA Institutes—including BioMADE, the National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL), and BioFabUSA—to increase awareness of and support the expansion of worker-centered sector strategies for biotechnology and biomanufacturing.

Select actions in support of Recommendation #3: Develop and rigorously evaluate innovative approaches to education and training for biotechnology and biomanufacturing jobs and careers, scaling and promoting those found to be most effective.

DOL's Chief Evaluation Office (CEO), in partnership with the Employment and Training Administration (ETA), recently launched the Sectoral Strategies and Employer Engagement evaluation to examine how sector-based workforce development programs can conduct effective employer engagement, develop career pathways to fill critical jobs, and build evidence to support the features of robust sector strategies. The evidence produced by this evaluation is likely to generate relevant insights into sector-focused training models and practices.

USDA's Investing in Research Agility, Innovation, Relevance (AIR): Agricultural Research Service (ARS) investments strategically strengthen the agricultural bioeconomy workforce. For example, the ARS Postdoctoral Fellows for the Agricultural Bioeconomy Program enables postdoctoral scholars to promote the adoption and use of new tools and methods in agricultural research. Additionally, through the Alternative Proteins Initiative, ARS strengthened its crop genome editing capacity to address the needs of the alternative proteins industry and to enhance human nutrition and food safety.

DOE Bioenergy Technologies Office's (BETO's) Bioenergy Research and Education Bridge (BRIDGES) creates partnerships with high schools, community and technical colleges, and universities to develop educational case studies aligned to the needs of the bioenergy industry workforce. [170] The case studies are based on foundational bioenergy research at DOE national laboratories, offering students authentic learning experiences and a window into cutting-edge bioenergy research. To date, BRIDGES has developed seven sets of student and instructor guides on topics such as upcycling plastics and bioenergy feedstocks. BRIDGES foundational materials are available in both English and Spanish, and the entire case study toolkit will soon also be available in both English and Spanish. BRIDGES continues to build its network of partners to include national education organizations, historically Black community colleges, and MSIs. BRIDGES regularly hosts a series of webinars, workshops, and office hours to help educators integrate case studies into their curriculum.

[170] https://www.energy.gov/eere/bioenergy/bioenergy-research-and-education-bridge-program

Select actions in support of Recommendation #4: Partner with state, local, and Tribal governments, education and training providers, bioscience associations, unions and other worker-serving organizations, and other stakeholders to raise awareness about the promise and potential of careers in the bioworkforce.

DOD's DSEC funded the expansion of the Learning Undefeated: Emerging Leaders in Biotechnology Program[171] into the San Antonio region in 2024. Leveraging the DSEC network and the Alamo STEM Ecosystem,[172] Learning Undefeated will deliver a fast-paced, hybrid program to introduce high school and college women to biotechnology in an all-female-cohort environment. The Emerging Leaders program includes virtual workshops and an advanced biotechnology laboratory-intensive course to increase student knowledge in, support positive experiences in, and foster positive attitudes towards biotechnology.

DOL is supporting Opportunities Industrialization Center (OIC) of America, Inc., Arizona Technology Council Foundation DBA SciTech Institute, and STEM Next Opportunity Fund under rounds two, three, and four of the Workforce Pathways for Youth grants. Each grantee is focused on training youth for career pathways in STEM occupations. The grantees empower youth from underserved communities in pursuing STEM careers by building partnerships between out-of-school time organizations, employers, and education and workforce development institutions to effectively promote youth's awareness of, interest in, and access to STEM career pathways. Further, services include the expansion and reinforcement of youth's STEM career literacy and skills through out-of-school time programs.[173]

HHS/ASPR held BARDA's first-ever SPRINT Innovator Experience in November 2023 at the BLUE KNIGHT™ Hub at JLABS @ Washington, DC on the Children's National Research & Innovation Campus.[174] BLUE KNIGHT™ is a public-private partnership between BARDA and Johnson & Johnson Innovation. The event provided 60 students from Calvin Coolidge High School and DC International Public School the opportunity to engage directly with JLABS companies.

HHS/NIH, through Research Evaluation and Commercialization Hubs (REACH), supports academic innovators in converting promising scientific discoveries into medical products.[175] REACH simultaneously supports training of a diverse biomedical workforce that is globally competitive in technology development and entrepreneurship. The third cohort of REACH was awarded at the end of FY 2023 to five new locations, covering 12 states, with over 75 institutions participating, including HBCUs, TCUs, and MSIs. Each hub will receive $4 million over four years from NIH. Hubs are required to establish public-private partnerships to support their local/regional entrepreneurial ecosystem.

USDA's National Institute of Food and Agriculture (NIFA) awarded a four-year grant to the University of Houston and Texas A&M University, two HSIs, for the project, Skills Development in Synthetic Biology

[171] https://www.learningundefeated.org/emerging-leaders-in-biotechnology/
[172] https://www.alamostemecosystem.org/
[173] https://www.dol.gov/agencies/eta/youth/workforce-pathways-for-youth
[174] https://jnjinnovation.com/news/blog-post/blue-knight-at-jlabs--washington-dc-and-jlabs--nyc-nurturing-the-next-generation-of-talent-together
[175] https://seed.nih.gov/portfolio/reach

For Climate Smart And Sustainable Agriculture.[176] The project team will introduce students from communities underrepresented in STEM to career opportunities in agriculture by developing new courses in plant biotechnology and synthetic biology. Additionally, USDA hosted an event for National Biobased Products Day and International Women's Day in March 2024 at the USDA Eastern Regional Research Center in Wyndmoor, PA. [177] This event spotlighted USDA's cutting-edge research, biobased innovations, and women scientists.

Select actions in support of Recommendation #5: Improve data and analytic capacity and cross-sector collaboration to advance equity and support effective workforce development—including the development of industry-recognized credentials and competency models.

DOE BETO's Algae Technology Educational Consortium (ATEC) offers 30 algae cultivation and biotechnology badges and certifications. ATEC developed this micro-credentialing digital badging system in conjunction with industry stakeholders. The collaboration between ATEC and industry supports development of a workforce with the hands-on skillsets needed within the algae industry. The micro-credentials are valuable not only to those entering the algae industry but also to the existing workforce for training and re-certification purposes. Many of the skills emphasized in the micro-credentials are transferrable to other industries. Additionally, ATEC advances equitable access to algae technology educational materials through the development of massive open online courses (MOOCs). ATEC also works to strengthen workforce capabilities through The Algae Academy, which offers free, hands-on algae-based STEM learning kits for K–12 classrooms.

DOL will collaborate with ED and other agencies to send clear and timely labor market information to workforce partners nationally to help these partners understand where federal investments are being made so that the education and workforce ecosystem can build and scale programs to meet emerging demand—including for the bioworkforce. O*NET, an occupational information system sponsored by DOL, contains several bioeconomy occupations in its database.[178] The O*NET database's occupation information is updated quarterly.

NSF, in partnership with **DOL**, **DOC/NIST**, and other agencies and in collaboration with key industry representatives, will convene a forum to build alignment on recognized competency models, development of new competency models, and exploration of credentialing mechanisms for the bioworkforce.

[176] https://portal.nifa.usda.gov/web/crisprojectpages/1031430-skills-development-in-synthetic-biology-for-climate-smart-and-sustainable-agriculture.html
[177] https://www.usda.gov/media/press-releases/2024/03/08/usda-celebrates-second-national-biobased-products-day
[178] https://www.onetonline.org/find/all

Table: Updated List of Select Federal Programs that Could Support Biotechnology and Biomanufacturing Education and Training[179]

Program Name (hyperlinked to respective website)	**Federal Administering Department/Agency**
1890 Capacity Building Grants	USDA
AFRI Education and Workforce Development Program - Agricultural Workforce Training at Community Colleges	USDA
AFRI Education and Workforce Development Program - Food and Agricultural Non-Formal Education	USDA
AFRI Education and Workforce Development Program - Meat and Poultry Processing - Agricultural Workforce Training	USDA
AFRI Education and Workforce Development Program – Predoctoral and Postdoctoral Fellowships	USDA
AFRI Education and Workforce Development Program - Research and Extension Experiences for Undergraduates	USDA
AFRI Sustainable Agricultural Systems Program	USDA
Alaska Native-Serving and Native Hawaiian-Serving Institutions Education Competitive Grants Program	USDA
Biotechnology Risk Assessment Research Grants	USDA
Capacity Building Grants for Non-Land-Grant Colleges of Agriculture	USDA
Education Grants for Hispanic-Serving Institutions	USDA
From Learning to Leading: Cultivating the Next Generation of Diverse Food and Agriculture Professionals (NextGen)	USDA
Higher Education Challenge Grants Program	USDA
Higher Education Multicultural Scholars Program	USDA
National Needs Graduate and Postgraduate Fellowship Grants Program Funding Opportunity	USDA
New Beginning for Tribal Students	USDA
Scholarships for Students at 1890 Institutions	USDA
Secondary Education, Two-Year Postsecondary Education, and Agriculture in the K–12 Classroom Challenge Grants Program	USDA
Tribal Colleges Education Equity Program	USDA
Women and Minorities in Science, Technology, Engineering, and Mathematics Fields Program (WAMS)	USDA

[179] This list is not inclusive of all federal programs that could support biotechnology and biomanufacturing training and education.

NIIMBL/Manufacturing USA Institute	DOC
BioFabUSA/Manufacturing USA Institute	DOD
BioMADE/Manufacturing USA Institute	DOD
Defense STEM Education Consortium (DSEC)	DOD
Emerging Technologies - Biotech	DOD
HBCU/MSI Biotechnology Center of Excellence	DOD
National Defense Education Program (NDEP) STEM Education and Outreach Grant Awards (including Biotechnology Outreach & Workforce Development Grants)	DOD
Adult Education and Family Literacy Act State Grants, Title II of the Workforce Innovation and Opportunity Act	ED
The Carl D. Perkins Career and Technical Education Act State Grants	ED
HBCU Capital Financing Loan Program	ED
Perkins Career and Technical Education Innovation and Modernization Grants	ED
Native American Career and Technical Education Program	ED
Native Hawaiian Career and Technical Education Program	ED
Pell Grants	ED
R&D Infrastructure Grant Program	ED
Algae Technology Educational Consortium (ATEC)	DOE
Biological and Environmental Research (BER) Reaching a New Energy Sciences Workforce (RENEW)/Funding for Accelerated, Inclusive Research (FAIR) Awards	DOE
Administrative Supplement for Continuity of Biomedical and Behavioral Research Among First-Time Recipients of NIH Research Project Grant Awards	HHS
Administrative Supplements to Promote Diversity in Research and Development	HHS
Administrative Supplements to Promote Research Continuity and Retention of NIH Mentored Career Development (K) Award Recipients and Scholars	HHS
BARDA SPRINT (Science, Preparedness & Response, Innovations, and New Technologies) Program	HHS
B-INSPIRE: Research on Behavioral Interventions that Promote the Careers of Individuals in the Biomedical Research Enterprise	HHS
Family-Friendly Initiatives	HHS
I-Corps at NIH	HHS
IDeA Networks of Biomedical Research Excellence (INBRE)	HHS
IDeA Regional Entrepreneurship Development (I-RED) Program	HHS
Innovative Programs to Enhance Research Training (IPERT)	HHS

National Institute of General Medical Sciences Predoctoral Basic Biomedical Sciences Research Training Program (T32), Biotechnology Track	HHS
Research Evaluation and Commercialization Hubs (REACH)	HHS
Research Supplements to Promote Diversity in Health-Related Research	HHS
Research Supplements to Promote Re-Entry into Biomedical and Behavioral Research Careers	HHS
Small Business Transition Grant	HHS
Training Modules for Enhancing Biomedical Research Workforce Training	HHS
Apprenticeship Building America Program	DOL
H-1B Skills Training Grants	DOL
Indian and Native American Programs	DOL
Job Corps	DOL
Reentry Employment Opportunities Program	DOL
Registered Apprenticeship	DOL
State Apprenticeship Expansion Formula Program	DOL
Strengthening Community Colleges Training Grants	DOL
Women in Apprenticeship and Nontraditional Occupations (WANTO) Technical Assistance Grant Program	DOL
Workforce Innovation and Opportunity Act Adult and Dislocated Worker Program	DOL
Workforce Innovation and Opportunity Act Youth Formula Program	DOL
Workforce Pathways for Youth	DOL
YouthBuild	DOL
Advanced Technological Education (ATE)	NSF
Career-Life Balance (CLB) Initiative	NSF
Centers of Research Excellence in Science and Technology - Research Infrastructure for Science and Engineering (CREST-RISE)	NSF
Enabling Partnerships to Increase Innovation Capacity (EPIIC)	NSF
Experiential Learning for Emerging and Novel Technologies (ExLENT)	NSF
Graduate Research Fellowship Program (GRFP)	NSF
Hispanic-Serving Institutions (HSI)	NSF
Historically Black Colleges and Universities - Excellence in Research (HBCU-EiR)	NSF
Historically Black Colleges and Universities - Undergraduate Program (HBCU-UP)	NSF
Louis Stokes Alliances for Minority Participation (LSAMP)	NSF

Non-Academic Research Internships for Graduate Students (INTERN) Supplemental Funding Opportunity	NSF
Research Experiences for Undergraduates (REU)	NSF
Research Traineeships (NRT)	NSF
Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM)	NSF

Closing Summary

For over a decade, CoSTEM has leveraged expertise from federal agencies to develop and implement a coordinated strategy to advance STEM across the United States. CoSTEM released its third federal STEM strategic plan at a crucial time: one in which the nation must navigate the rapid advancement of critical and emerging technologies while ensuring all individuals have access to the knowledge, skills, training, and opportunities necessary to leverage those technologies and thrive in a changing world. By organizing federal efforts around five major pillars and three cross-cutting principles, CoSTEM's strategic plan provides a framework for doing so, advancing STEM education and cultivating the full continuum of STEM talent.

This document captures current and potential agency actions in support of CoSTEM's new federal STEM strategic plan. That plan describes how the federal government, in coordination with partners throughout the STEM ecosystem, aims to prepare all people to be inspired and connected (STEM engagement); to learn and to teach (STEM teaching and learning); to be trained and recruited (STEM workforce); to discover and innovate (STEM research and innovation capacity); and to thrive in learning, working, and research settings (STEM environments) across the country.

This first report on the new strategic plan addresses reporting requirements from the America COMPETES Reauthorization Act of 2010 (as amended by the American Innovation and Competitiveness Act of 2017 and the CHIPS and Science Act of 2022).[180] Additional information about the federal CoSTEM investments can be found in the appendices. Future progress reports will address implementation of CoSTEM's federal STEM strategic plan.

[180] https://uscode.house.gov/view.xhtml?req=(title:42%20section:6621%20edition:prelim

Appendices

Appendix 1. Federal Agency Alignment to CoSTEM's Federal STEM Strategic Plan (Version 01.08.2025)

Federal agencies intend to support the implementation of the Federal Strategic Plan for Advancing STEM Education and Cultivating STEM Talent through interagency, multi-agency, and/or individual agency investments, initiatives, activities, and/or actions. Representation below reflects agency alignment based on current agency investments/programs or initiatives; anticipated agency initiatives, activities, or actions; and/or anticipated interagency participation.

	Pillar 1: STEM Engagement			**Pillar 2: STEM Teaching and Learning**			**Pillar 3: STEM Workforce**			**Pillar 4: STEM Research and Innovation Capacity**			**Pillar 5: STEM Environments**		
	Obj 1.1	**Obj 1.2**	**Obj 1.3**	**Obj 2.1**	**Obj 2.2**	**Obj 2.3**	**Obj 3.1**	**Obj 3.2**	**Obj 3.3**	**Obj 4.1**	**Obj 4.2**	**Obj 4.3**	**Obj 5.1**	**Obj 5.2**	**Obj 5.3**
AmeriCorps	■			■		■	■	■							
USDA	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
DOC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
DOD	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
ED	■	■		■	■	■		■		■	■		■		
DOE	■	■	■	■	■	■	■	■	■		■	■	■	■	■
HHS											■			■	■
DHS				■			■	■			■	■			
DOI	■		■	■			■								
DOJ	■				■		■				■	■	■	■	■
DOL					■	■		■							
DOS				■	■	■	■	■	■	■	■	■	■		
DOT			■		■		■	■				■		■	■
EPA	■	■	■	■	■	■	■	■	■		■	■	■	■	■
NASA	■			■		■		■			■				
NSF	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
NRC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
ODNI					■		■	■							
OPM							■								
SI	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Appendix 2: Definition of a CoSTEM Investment (Version 11.26.2024)

A funded federal program or formalized set of agency activities with a dedicated fiscal year allocation, authorization, or appropriation, federal staff to manage its budget, and has at least one of the following primary objectives:

- STEM engagement. Support afterschool/out-of-school STEM education experiences. Increases interest in and understanding of STEM and increases STEM literacy. Support the connection of STEM knowledge to real-world problems. increases individuals' ability to participate and belong in STEM. Support STEM career awareness.
- STEM education and teaching. Develop STEM skills, practices, or knowledge of learners. Increase the number of individuals who enroll in STEM majors, complete STEM degrees or credentials, or are prepared to enter advanced STEM education. Prepare, develop, train, and retain educators (preservice or in-service) to improve their STEM content knowledge and pedagogical skills.
- STEM training and workforce development. Increase the number of individuals who complete STEM career technical education, training, or certification; who are trained with STEM skill sets to enter into the STEM workforce (including the skilled technical workforce); or are prepared to enter or re-enter into STEM careers.
- STEM research training and career development. Increase the number of, retain, and advance individuals in STEM career pathways or STEM research careers. STEM fellowship, traineeship, and training grant programs, including programs with a primary goal of training graduate students and postdoctoral graduates, are included.
- STEM education R&D. Address persistent challenges in STEM interest, learning, teaching, and participation through research, development, and evaluation. Develop evidence-based models, methodologies, knowledge, and technologies for or from STEM education, education research, research synthesis (including meta-analysis and meta-synthesis), and evaluation.
- STEM institutional capacity. Support, advance, and develop STEM personnel, capabilities, capacities, and infrastructures in educational institutions such as colleges and universities, informal education institutions, state education agencies, and local education agencies.
- STEM environment/ecosystem reform. Improve and expand access to STEM opportunities; remove or reduce barriers in STEM through a focus on STEM environment reforms, which consider complex interplays of individual, contextual (e.g., classroom, research lab, or workplace office), institutional, and systemic factors.
- Innovation and entrepreneurship learning and training. Increase the number of individuals who are prepared to conceive, develop, deliver, and scale new products, services, processes, and models using STEM skills, practices, or knowledge in support of STEM talent, career, and/or innovation development pathways.

Investments with a primary focus of increasing access and opportunity and/or building and advancing capacity in STEM education, STEM research, or in the STEM workforce, particularly those from underrepresented/underserved communities, geographic areas and jurisdictions and/or emerging research institutions, should be included.

Program/activities that have the following objectives may not be considered a CoSTEM investment if:
R&D programs (i.e., basic research awarded via competitive grants) where the education and training of STEM learners, workers, and researchers is not the program's primary objective.

- Programs designed to provide and retain current federal employees or military personnel in STEM fields through continuous education or training are excluded.
- Medical/health care-related programs that have a priority objective of clinical education (e.g., those for nurses, doctors, dentists, or veterinarians) are excluded.
- Programs focused on subjects other than STEM subjects or include STEM subjects as one of many possible focal subjects (more non-STEM areas than STEM) are excluded*.
- Programs focused on broad system reform that encompasses far more than STEM education, STEM training, or STEM talent development are excluded.
- Programs or activities that support one-time or ad hoc STEM education, STEM training, or STEM talent development are excluded.
- Programs or activities that support knowledge, interest, or skills not specific to STEM disciplines, research, careers, or workforce are excluded.

*The Department of Education, the Department of Labor, the Department of State, and the Department of Justice are excluded from this provision in order to include contributions to the CoSTEM portfolio that are funded via investments that may support education, training, and talent development in STEM subject areas.

CoSTEM investments that have annual obligations equal to or more than $0.5 million must be reported in response to annual data call requests. CoSTEM investments may be part of a larger federal investment. Federal salaries and expenses as well as activities that are one-time or irregular expenditures of overhead funds are excluded.

For the purposes of CoSTEM, **STEM** is defined broadly as the individual or transdisciplinary areas of science (agricultural science; biological science; chemical science; environmental science; earth, atmospheric, and ocean science; materials science; medicine/health science; physical science) and social sciences (e.g. psychology, sociology, anthropology, cognitive science, economics, behavioral sciences), technology, engineering, mathematics, and computer science disciplines, topics or issues, which include but are not limited to other areas of science and technology, such as biotechnology, climate science, data science, cybersecurity, quantum, space/aeronautics, artificial intelligence, etc. Invention education, innovation and entrepreneurship topics and skills should also be included, as related to the above STEM topics.

Appendix 3. Definition of a STEM Education Investment (Version: 03.06.2019)

CoSTEM Investment: A funded STEM education activity that has a dedicated fiscal year budget of more than $300,000 and staff to manage the budget. This budget may be part of a budget for a larger program. Federal salaries and expenses and activities that are one-time or irregular expenditure of overhead funds are excluded. STEM Education: Formal or informal (in school or out) education that is primarily focused on STEM disciplines, topics, or issues, as defined above. All the investments included in the STEM education inventory have one of the following as a primary objective:

- Learning: Develop STEM skills, practices, or knowledge of students or the public.
- Engagement: Increase learners' interest in STEM, their perception of its value to their lives, and/or their ability to participate in STEM. Pre- and In-Service Educator/Education Leader Performance: Train or retain STEM educators (K- 12 pre-service or in-service, postsecondary, and informal) and education leaders to improve their content knowledge and pedagogical skills.
- Postsecondary STEM Degrees: Increase the number of students who enroll in STEM majors, complete STEM credentials or degree programs, or are prepared to enter STEM careers or advanced education.
- STEM Careers: Prepare people to enter into or advance in the STEM workforce with training or certification (where STEM discipline specific knowledge and skill are the primary focus of the education investment).
- STEM System Reform: Improve STEM education through a focus on education system reform.
- Institutional Capacity: Support advancement and development of STEM personnel, programs, and infrastructure in educational institutions such as universities, informal education institutions, state education agencies, and local education agencies.
- Education Research and Development: Develop evidence-based STEM education models and practices.

For the purposes of this inventory, activities that have the following primary objectives are not considered to be a STEM education investment:

- Providing post-doctoral research fellowships/scholarships.
- Focusing on subjects other than STEM subjects or including STEM subjects as one of many possible focal subjects (more than two other non-STEM areas).*
- Focusing on broad education system reform that encompasses far more than STEM education.
- Supporting one-time or ad hoc STEM education investments.
- Engaging in volunteer activities by Federal employees (e.g., judging STEM competitions, visiting classrooms).
- Providing outreach for education (raising awareness of education programs) or communication about an agency and its activities.
- Distributing STEM education products that are no longer part of a funded education investment.
- Supporting knowledge, interest, or skills not specific to STEM disciplines.

*The Department of Education is excluded from this provision, in order to include the Department of Education's contributions to the Federal STEM education portfolio that are funded via investments that may support education in STEM and non-STEM subject areas.

STEM: For the purposes of this inventory, STEM includes physical and natural sciences, technology, engineering, mathematics, and computer science disciplines, topics, or issues (including environmental science, environmental stewardship, and cybersecurity). CoSTEM recognizes that various different and usually broader definitions are used for "STEM." This relatively narrow definition has been chosen to constrain the focus of the inventory to specific areas that have similar educational contexts, issues, and challenges, in order to maximize the inventory's usefulness in characterizing and improving the effectiveness of the federal spending intended to address this particular set of educational contexts, issues, and challenges.

Appendix 4. Summary of the Federal CoSTEM Investment Inventory

The *America COMPETES Reauthorization Act of 2010* calls for OSTP to include in its annual reporting an inventory of federal STEM investments. In accordance with the *America COMPETES Act*, individual budget data for FY 2023, FY 2024, and FY 2025 is in Appendix 5[181] and summarized here in Appendix 4.[182]

Agency	Total Investments	FY 2023 Actual (millions)	FY 2024 Estimated Totals (millions)	FY 2025 President's Budget (millions)
AmeriCorps	4	$91.00	$91.00	$91.00
U.S. Department of Agriculture	21	$197.50	$210.80	$222.40
U.S. Department of Commerce	15	$56.00	$58.70	$58.80
U.S. Department of Defense	14	$306.14	$320.96	$247.97
U.S. Department of Education	13	$466.50	$488.70	$477.00
U.S. Department of Energy	89	$396.11	$501.19	$455.22
U.S. Environmental Protection Agency	4	$13.00	$12.60	$12.70
U.S. Department of Health and Human Services	82	$1,062.65	$1,125.50	$1,095.79
U.S. Department of Homeland Security	13	$45.47	$44.13	$47.93
U.S. Department of Interior	1	$1.00	$1.00	$1.00
U.S. Department of Labor	1	$68.90	$14.00	$0.00
U.S. Department of Transportation	10	$115.67	$123.29	$115.86
U.S. Department of Veterans Affairs	5	$2,736.59	$3,077.26	$3,092.40
Institute of Museum and Library Services	2	$3.00	$6.20	$5.50
National Aeronautics and Space Administration	7	$186.70	$188.40	$190.10
U.S. National Science Foundation	27	$1,484.90	$1435.00	$1,532.50
U.S. Nuclear Regulatory Commission	3	$31.20	$32.80	$27.00
Smithsonian Institution	1	$5.50	$5.50	$5.60
TOTAL	312	$7,267.83	$7,737.04	$7678.77

[181] Agencies have different definitions of "programs," "projects," and "activities." The CoSTEM "investment" definition was created to provide a common unit of analysis. Investments in Appendix 4 and 5 based on the definition of a CoSTEM investment Version: 03.06.2019 (Appendix 3) and as collected by OMB.

[182] The expansion of healthcare education included in the 2024 STEM inventory largely accounts for differences between the 2023 and 2024 CoSTEM inventory as such, comparisons should be made with caution.

Appendix 5: Federal CoSTEM Investment Inventory (FY 2023, FY 2024, and FY 2025)

In accordance with the *America COMPETES Act*, individual budget data for CoSTEM investments for FY 2023, FY 2024, FY 2025 are reflected below. Investments were included if they had any funding in FY 2023 or FY 2024. The inventory provided reflects investment consolidations and/or terminations in FY 2023. Investments with no new appropriations stayed on the inventory as remaining investment funds are dispersed. Investments in the table below are alphabetized by Agency, Subagency, Investment Name.[183]

Agency	Sub-Agency/Sub-Organization	Program Name	FY 2023 Actual ($, millions)	FY 2024 Estimate ($, millions)	FY 2025 President's Budget ($, millions)
AmeriCorps		AmeriCorps NCCC	2.80	2.80	2.80
AmeriCorps		AmeriCorps State & National (Competitive)	43.80	43.80	43.80
AmeriCorps		AmeriCorps State (Formula)	40.40	40.40	40.40
AmeriCorps		AmeriCorps VISTA	4.00	4.00	4.00
Agriculture	APHIS	AgDiscovery	1.10	1.20	1.20
Agriculture	APHIS	Historically Black Colleges/Universities Vet Tech Programs	0.80	0.90	0.90
Agriculture	APHIS	Other APHIS STEM Programs/Conferences/Internships	0.50	0.50	0.50
Agriculture	APHIS	Tribal College/University Curriculum Enhancement - Funding provided to Navajo Technical University to assist with strengthening its Veterinary Technology0.1	0.10	0.10	0.10
Agriculture	APHIS	USDA-APHIS "Safeguarding Natural Heritage: Strengthening Youth Connections to the Land" Summer Enrichment Program	0.30	0.30	0.30
Agriculture	NIFA	1890 Institutions Capacity Building Grants Program: Teaching	14.00	21.80	21.80

[183] Agencies have different definitions of "programs," "projects," and "activities." The CoSTEM "investment" definition was created to provide a common unit of analysis. Investments in Appendix 4 and 5 based on the definition of a CoSTEM investment Version: 03.06.2019 (Appendix 3) and as collected by OMB.

Agriculture	NIFA	Agriculture and Food Research Initiative	22.90	18.70	20.00
Agriculture	NIFA	Agriculture in the Classroom	1.00	0.50	1.00
Agriculture	NIFA	Education Grants for Alaska Native & Native Hawaiian-Serving Institutions	3.10	4.10	4.10
Agriculture	NIFA	Education Grants for Hispanic-Serving Institutions	15.90	15.90	15.90
Agriculture	NIFA	Extension Services at 1890 Institutions	72.00	72.00	76.00
Agriculture	NIFA	Facility Improvements at 1890 Institutions	21.50	21.50	24.80
Agriculture	NIFA	From Learning to Leading: Cultivating the Next Generation of Diverse Food and Agriculture Professionals[184]	-	-	-
Agriculture	NIFA	Grants for Insular Areas (Combined program)	2.40	2.00	2.50
Agriculture	NIFA	Multicultural Scholars, Graduate Fellowship and Institution Challenge Grants	9.90	9.90	9.90
Agriculture	NIFA	Payments to 1994 Institutions (Tribal Colleges Ed. Equity)	6.80	6.90	14.80
Agriculture	NIFA	Scholarships at 1890 Institutions	10.00	20.00	10.00
Agriculture	NIFA	Smith-Lever 3b&c Special Needs Projects	0.50	0.50	0.50
Agriculture	NIFA	Smith-Lever 3d Children, Youth, and Families at Risk	8.40	8.00	8.40
Agriculture	NIFA	Smith-Lever 3d Federally Recognized Tribes Ext Program	4.30	4.00	7.70
Agriculture	NIFA	Women and Minorities in STEM Fields	2.00	2.00	2.00
Commerce	EDA	STEM Apprenticeship Program	2.50	2.50	2.50

[184] Program was funded thru supplemental appropriation Inflation Reduction Act/ARPA.

Commerce	NIST	NICE support - STEM Education and Workforce Development[185]	4.00	7.00	7.00
Commerce	NIST	NIST DEIA Initiative - STEM Pipeline for the Next Generation Scientists and Engineers[186]	2.50	2.50	2.50
Commerce	NIST	NIST Summer Institute for Middle School Science Teachers[187]	0.30	0.30	0.30
Commerce	NIST	STEM Pipeline for the Next Generation Scientists and Engineers.[188]	1.00	1.00	1.00
Commerce	NIST	Summer Undergraduate Research Fellowship Program[189]	0.80	0.80	0.80
Commerce	NOAA	Competitive Education Grants (including Environmental Literacy Grants)	3.50	3.50	3.50
Commerce	NOAA	Dr. Nancy Foster Scholarship Program	0.70	0.70	0.90
Commerce	NOAA	Educational Partnership Program with Minority Serving Institutions	20.80	20.80	20.80
Commerce	NOAA	Ernest F. Hollings Undergraduate Scholarship Program	6.20	6.30	6.60
Commerce	NOAA	Margaret A. Davidson Graduate Research Fellowship	1.40	1.70	1.80
Commerce	NOAA	National Sea Grant College Program	1.70	1.70	1.30
Commerce	NOAA	NOAA Bay Watershed Education and Training (B-WET)	8.70	8.70	8.70
Commerce	NOAA	NOAA Teacher at Sea Program	0.60	0.60	0.60
Commerce	NOAA	Office of Ocean Exploration Education Programs	1.00	0.50	0.50

[185] A component of NIST STRS-Laboratory Programs
[186] A component of NIST STRS-Laboratory Programs
[187] A component of NIST STRS-Laboratory Programs
[188] A component of NIST STRS-Standards coordination and special programs
[189] A component of NIST STRS-Laboratory Programs

Defense	AFRL	Department of Air Force Legacy Program	1.66	2.01	2.11
Defense	AFRL	Department of Air Force STEM[190]	5.20	5.60	5.69
Defense	Army / Office of the Deputy Assistance Secretary of the Army for Research & Technology	Army Educational Outreach Program (AEOP)	10.80	12.50	12.80
Defense	DTRA	Joint Science and Technology Institute	1.00	1.20	1.48
Defense	DOD (P&R/M&RA)	DOD STARBASE Program	50.00	53.00	
Defense	MDA	MDA - Inspiring Generations with New Ideas to Transform Education (IGNITE)	0.40	0.50	0.50
Defense	NSA	GenCyber	5.72	1.26	1.91
Defense	NSA	National Center of Academic Excellence in Cybersecurity (NCAE-C)	45.94	32.24	2.10
Defense	NSA	STEM Development Program	2.05	2.45	5.87
Defense	ONR	Navy - Science and Engineering Apprenticeship Program (SEAP)	1.10	1.30	0.58
Defense	ONR	The Naval Research Enterprise Intern Program (NREIP)	5.67	6.30	1.93
Defense	OUSD(R&E)	National Defense Education Program (NDEP) Science, Mathematics And Research for Transformation (SMART)	103.90	131.70	143.60
Defense	OUSD(R&E)	National Defense Education Program (NDEP) STEM Education and Outreach	27.70	25.90	24.40
Defense	OUSD(R&E)	National Defense Science and Engineering Graduate (NDSEG) Fellowship Program	45.00	45.00	45.00

[190] Name adjusted to "Department of Air Force STEM" with Space Force as a second Service served by the K–12 STEM Program.

Education	IES	American Rescue Plan Act	-	-	-
Education	IES	Pooled evaluation	3.70	4.50	27.70
Education	IES	Regional Educational Laboratories	5.90	9.20	9.30
Education	IES	Research in Special Education	12.10	12.90	10.50
Education	IES	Research, Development, and Dissemination	57.10	64.10	65.00
Education	OESE	Education Innovation and Research	87.00	90.30	-
Education	OPE	Developing Hispanic Serving Institutions STEM and articulation programs	94.30	94.30	100.00
Education	OPE	Fund for the Improvement of Postsecondary Education (FIPSE)	56.50	49.40	100.00
Education	OPE	Graduate Assistance in Areas of National Need (GAANN)	23.50	23.50	23.50
Education	OPE	Minority Science and Engineering Improvement Program	16.40	16.40	16.40
Education	OPE	Strengthening Predominantly Black Institutions	4.00	4.00	4.00
Education	OPE	Teacher Loan Forgiveness	40.10	40.50	41.00
Education	OPE	Upward Bound Math and Science Program	65.90	79.60	79.60
Energy	EERE	Advanced Vehicle Competitions	4.45	7.30	7.30
Energy	EERE	Algae Technology Education Consortium	3.04	0.08	-
Energy	EERE	BETO STEM Activity	0.45	0.45	-
Energy	EERE	Bioenergy Research and Education Bridge	0.43	0.19	0.57

Energy	EERE	BTO STEM and Workforce Fellows	2.13	1.81	2.00
Energy	EERE	Clean Energy Fellows (BTO)	2.00	2.00	2.00
Energy	EERE	Collegiate Wind Competition	1.20	2.00	-
Energy	EERE	DEI in STEM AOPs (WPTO)	0.60	0.60	0.60
Energy	EERE	Energy Management Program (IEDO)	-	3.50	3.75
Energy	EERE	Fellowship Program (SETO)	2.00	3.11	3.00
Energy	EERE	FIRST Global Challenge (HFTO)	0.08	-	0.05
Energy	EERE	FIRST Robotics Challenge (HFTO)	-	-	-
Energy	EERE	Funding support for marine energy undergraduate senior design and/or research projects (WPTO)	-	2.00	-
Energy	EERE	Funding to Minority-Serving Institutions STEM Research and Development Consortium (MSRDC) (WPTO)	1.20	-	-
Energy	EERE	Gaps in Workforce Training apprenticeship, and workforce development ambassadorship programming	-	10.00	-
Energy	EERE	GEM Fellows (HFTO)	0.23	0.05	0.10
Energy	EERE	Geothermal Energy STEM Activities	2.30	10.00	-
Energy	EERE	H2 Twin Cities (HFTO).	-	0.10	-
Energy	EERE	Hydrogen, and Fuel Cell STEM Activities	1.00	0.90	-
Energy	EERE	iBUILD (BTO)	2.10	1.62	1.65
Energy	EERE	Inclusive Energy Innovation Collegiate Competition (WPTO)	0.30	-	-
Energy	EERE	Industrial Assessment Centers	-	-	-

Energy	EERE	Jump into STEM (BTO)	1.27	1.17	1.30
Energy	EERE	LEEP Program (IEDO)	0.89	1.00	0.35
Energy	EERE	Marine Energy Graduate Student Research Program (WPTO)	0.50	0.50	2.00
Energy	EERE	Minority Serving Institutions (MSI) Program	0.50	0.50	0.50
Energy	EERE	NSF Engineering Research Initiation (WPTO)	0.80	-	-
Energy	EERE	NSF Interns (HFTO)	-	0.50	0.15
Energy	EERE	ORISE Development Programs (IEDO)	0.30	3.22	2.50
Energy	EERE	ORISE Fellows (HFTO)	0.94	0.30	0.80
Energy	EERE	Solar Decathlon (BTO)	3.93	-	1.00
Energy	EERE	Solar District Cup	0.08	1.50	1.50
Energy	EERE	Solar STEM Activities	4.20	4.40	
Energy	EERE	STEM & Workforce FOA Awards (SETO)	5.50	4.16	6.00
Energy	EERE	STEM and Workforce Development (BTO)	2.13	1.81	2.00
Energy	EERE	University Engagement Program to increase OSW	-	-	2.60
Energy	EERE	Water Power STEM Activities	2.60	6.40	-
Energy	EERE	Water Power STEM Activities: Collegiate competitions, educational content development and outreach WPTO)	2.18	2.50	2.50
Energy	EERE	Wind Fellowship and Internship Programs to Expand Diversity in the Workforce	-	9.00	-

Energy	EERE	Wind for Schools	-	-	-
Energy	EERE	Wind Workforce Development	1.55	1.00	-
Energy	EERE	Workforce Development (IEDO)	-	7.00	7.40
Energy	EJE	Minority Education, Workforce, & Training (MEWT)	-	1.70	2.50
Energy	EJE	Minority Educational Institution Student Partnership Program	2.25	1.70	2.50
Energy	EM	Minority Serving Institution Partnership Program (MSIPP)	56.00	56.00	56.00
Energy	FECM	HBCUs, Education, and Training	8.00	6.00	14.00
Energy	FECM	Special Recruitment Programs	1.00	1.00	1.00
Energy	FECM	University Carbon Research	5.00	4.00	5.00
Energy	FEMP	Workforce Development	3.00	4.50	-
Energy	IE	Alaska Resource Education (ARE) Energy Education and Outreach	0.60	0.60	0.60
Energy	IE	Clean Energy Innovator Fellowship	-	3.90	3.90
Energy	IE	IE Internship	0.70	0.20	0.20
Energy	MESC	Industrial Assessment Centers	10.00	15.00	20.00
Energy	NE	Nuclear Reactor Safety Workforce Training IIJA	25.00	25.00	-
Energy	NE	University Nuclear Leadership Program	6.50	6.60	8.50
Energy	NNSA	Center of Excellence for Materials Degradation and Life Extension	2.70	2.70	2.80

Energy	NNSA	Computational Sciences Graduate Fellowship	2.00	2.50	2.10
Energy	NNSA	Minority Serving Institution Partnership Program (MSIPP)	45.00	45.00	45.00
Energy	NNSA	MSI Pit Production Workforce Development Partnership	10.00	10.00	-
Energy	NNSA	NNSA Graduate Fellowship Program (NGFP)	11.60	12.70	15.20
Energy	NNSA	Nuclear Nonproliferation International Safeguards Graduate Fellowship Program	0.80	0.90	1.00
Energy	NNSA	Rickover Fellowship Program in Nuclear Engineering	1.40	1.45	1.45
Energy	NNSA	Savannah River Site Community Reuse Organization Workforce Opportunities in Regional Careers Program	1.40	1.40	-
Energy	NNSA	Stewardship Science Academic Alliances (SSAA) Grants and Cooperative Agreements26	25.00	25.90	25.90
Energy	NNSA	Tribal Education Partnership Program (TEPP)	10.00	10.00	10.00
Energy	OE	Grid Storage Launchpad Education Program	-	1.50	0.50
Energy	OE	Grid Storage Launchpad Education Program/Lab Embedded Entrepreneurship Program	-	-	-
Energy	OE	Lab Embedded Entrepreneurship Program (LEEP)	-	0.74	0.50
Energy	OE	Partnership with NSF Research Experiences for Undergraduates (REU) program	-	-	-
Energy	OE	Reaching a New Energy Sciences Workforce (RENEW) Initiative	1.90	-	-
Energy	OE	Storage Prize for Entrepreneurial Enrichment and Development (SPEED) Initiative	-	-	1.00
Energy	CESER	CyberSource Competition	2.60	3.00	3.00
Energy	CESER	ORISE Fellows	0.40	0.45	0.45

Energy	CESER	University-based Cybersecurity Centers	2.00	2.00	3.00
Energy	CESER	University-based R&D-Congressionally Directed	2.00	2.00	-
Energy	OTT	EnergyTech University Prize	0.90	1.00	1.00
Energy	OTT	OTT Fellowship Program	0.50	0.50	0.50
Energy	OTT	Technology Commercialization Internship Program	0.40	0.30	0.40
Energy	SC [ASCR/BES/BER/FES/HEP/ARDAP/NP/WDTS/IRP]	Reaching a New Energy Sciences Workforce - RENEW	60.00	107.00	120.00
Energy	SC [ASCR]	Computational Sciences Graduate Fellowship	15.00	20.00	25.00
Energy	SC [BES/ NP/IRP]	American Chemical Society Summer School in Nuclear and Radiochemistry	0.80	0.90	0.80
Energy	SC [BES]	LCLS Internship Program	0.60	0.60	0.60
Energy	SC [HEP]	U.S. Particle Accelerator Training	1.00	1.00	1.00
Energy	SC [WDTS/ FES]	Science Undergraduate Laboratory Internships	15.70	16.00	14.00
Energy	SC [WDTS]	Albert Einstein Distinguished Educator Fellowship	1.20	1.20	1.20
Energy	SC [WDTS]	Community College Internship	2.20	2.30	2.30
Energy	SC [WDTS]	Graduate Student Research Program	5.00	6.10	5.50
Energy	SC [WDTS]	National Science Bowl	3.00	3.10	3.10
Energy	SC [WDTS]	Visiting Faculty Program	2.10	2.10	2.10

EPA	Office of the Administrator	Environmental Education Grants	3.60	3.60	3.30
EPA	Office of the Administrator	National Environmental Education and Training Partnership	2.40	2.40	2.20
EPA	ORD	P3-People, Prosperity & the Planet-Award: A National Student Design Competition for Sustainability	1.00	1.20	1.20
EPA	OW	Water Infrastructure Workforce Investment Grants	6.00	5.40	6.00
Health and Human Services	NIH	Academic Research Enhancement Award for Undergraduate-Focused Institutions (R15 Clinical Trial Not Allowed)	0.38	0.92	-
Health and Human Services	NIH	Advancing Research Careers Program (F99/K00 & UE5)	-	-	2.24
Health and Human Services	NIH	Biasing immunological development with early life microbial colonization	0.45	0.45	0.45
Health and Human Services	NIH	Big Data Analytics Emerging Scholar (e-Scholar) Program for Minority Students	0.31	0.31	0.31
Health and Human Services	NIH	Biomedical Research Inclusion & Diversity to Grow Excellence in Science - Undergraduate Program in Pathology for HBCUs (BRIDGE-UP HBCU)	0.33	0.33	0.33
Health and Human Services	NIH	BITE (Bat Immunology Training and Education) - an undergraduate experiential program for developing the next generation of One Health scientists	-	0.43	0.43
Health and Human Services	NIH	CGH's Global Cancer Research Leadership Training Award	0.25	0.50	0.50
Health and Human Services	NIH	Engaging and Mentoring through Biomedical Research and Career Exploration (EMBRACE)	0.34	0.34	0.35
Health and Human Services	NIH	Enhancing Virology Training of Underrepresented Minority Students through Summer Research	0.35	0.35	0.35
Health and Human Services	NIH	Exploring the dynamics of nsp1 and RNA interaction in SARS-CoV with undergraduate researchers	0.41	0.41	0.41
Health and Human Services	NIH	HBCU/MSI Mentored Research Program in the Structural Biology of Human Pathogens	-	0.34	0.34
Health and Human Services	NIH	Informatics Technology for Cancer Research Education Resource	0.53	0.80	-

Health and Human Services	NIH	Medical Research Scholars Program	0.95	0.93	0.93
Health and Human Services	NIH	New Program-NCATS CTSA Program Research Education Grants	0.43	0.65	0.86
Health and Human Services	NIH	NIA Research and Entrepreneurial Development Immersion (REDI): Entrepreneurship Enhancement Award (K01)	0.82	1.20	2.10
Health and Human Services	NIH	NIA Research and Entrepreneurial Development Immersion (REDI): Entrepreneurship Enhancement Award (R41/R42 & R43/R44)	0.88	0.48	-
Health and Human Services	NIH	NIDCR Dental Public Health & Informatics Fellowship Program	0.39	0.70	0.90
Health and Human Services	NIH	NIDCR Dental Specialty and PhD Program (DSPP)(K12)	0.70	0.66	0.70
Health and Human Services	NIH	Research Enhancement Award Program (REAP) for Health Professional Schools and Graduate Schools (R15 Clinical Trial Not Allowed)	0.64	-	-
Health and Human Services	NIH	Rice-HCC ACCELERATE: Augmenting Community College Education to Leverage Experiential Research and Advance Training Equity	-	0.33	0.33
Health and Human Services	NIH	Short Courses to Promote the Broad and Rigorous Use of Common Fund Data (R25 Clinical Trial Not Allowed)	-	-	0.70
Health and Human Services	NIH	T32 initiative- PAR-20-044- Ruth L. Kirsch stein National Research Service Award (NRSA) Institutional Training for a Dental, Oral and Craniofacial Research Workforce (T32)	3.18	3.25	3.18
Health and Human Services	NIH	T90/R90 initiative-PAR-20-056-Institutional Training for a Dental, Oral and Craniofacial Research Workforce (T90/R90 Independent Clinical Trial Not Allowed)	5.86	7.20	7.89
Health and Human Services	NIH	Temporal responses in host-virus interactions	0.45	0.45	0.45
Health and Human Services	NIH	AD/ADRD Clinical Trials Short Course	0.79	0.79	0.79
Health and Human Services	NIH	Aging Research Dissertation Awards to Increase Diversity	0.67	0.74	0.54
Health and Human Services	NIH	Bridges to the Baccalaureate Program	9.26	9.37	9.37
Health and Human Services	NIH	Bridges to the Doctorate	0.23	-	-

Health and Human Services	NIH	Cancer Education Grants Program	23.22	23.31	22.84
Health and Human Services	NIH	Cancer Research Training Award (CRTA) Program	76.47	81.35	81.83
Health and Human Services	NIH	Drug Abuse Dissertation Research	0.86	0.87	0.87
Health and Human Services	NIH	Enhancing Science, Technology, EnginEering, and Math Educational Diversity (ESTEEMED) Research Education Experiences (R25)	2.12	3.07	3.20
Health and Human Services	NIH	Fogarty Global Health Training Program (US predoc component)	0.60	0.70	0.70
Health and Human Services	NIH	Genome Research Experiences to Attract Talented Undergraduates into Genomic Fields to Enhance Diversity (GREAT R25)	1.39	1.75	2.31
Health and Human Services	NIH	Graduate Partnerships Program	21.30	35.00	38.85
Health and Human Services	NIH	Health Careers Opportunity Program	0.71	0.48	0.21
Health and Human Services	NIH	Initiative for Maximizing Research Education in Genomics; Diversity Action Plan	2.93	2.88	3.34
Health and Human Services	NIH	Initiative for Maximizing Student Development	3.79	-	-
Health and Human Services	NIH	Kidney Technology Development Research Education Program (R25 - Independent Clinical Trial Not Allowed); solicited via two funding announcements: RFA-DK-19-006 and RFA-DK-20-006[191]	0.54	0.55	0.55
Health and Human Services	NIH	Launching Future Leaders in Global Health (LAUNCH) Research Training Program	0.65	0.98	0.99
Health and Human Services	NIH	MARC U-STAR NRSA Program	14.33	12.77	12.77
Health and Human Services	NIH	Mathematics and Science Cognition and Learning (MSCL) Program	9.78	9.84	9.89
Health and Human Services	NIH	National Institute of Diabetes and Digestive and Kidney Diseases Research, Education Program Grants for Summer Research Experiences (R25)[192]	0.75	0.76	0.76

[191] This program is part of the total NIDDK enacted budget of $2.3B.
[192] This program is part of the total NIDDK enacted budget of $2.3B.

Health and Human Services	NIH	National Institute of Neurological Disorders and Stroke Neuroscience Development for Advancing the Careers of a Diverse Research Workforce	4.26	4.38	4.38
Health and Human Services	NIH	National Institute on Aging Medicine, Science, Technology, Engineering and Mathematics: Advancing Diversity in Aging Research (ADAR) through Undergraduate Education	10.93	12.40	13.32
Health and Human Services	NIH	National Library of Medicine Institutional Training Grants for Research Training in Biomedical Informatics and Data Science	10.44	9.07	10.50
Health and Human Services	NIH	NCI Predoctoral to Postdoctoral Fellow Transition Award (F99 Portion Only)	1.90	2.10	2.10
Health and Human Services	NIH	NIA Research and Entrepreneurial Development Immersion (REDI): Entrepreneurship Enhancement Award	1.39	2.14	3.97
Health and Human Services	NIH	NIDA Research Education Program for Clinical Researchers and Clinicians	5.10	5.38	5.38
Health and Human Services	NIH	NIDDK Education Program Grants (R25 Clinical Trial Not Allowed) PAR-21-034[193]	1.17	1.17	1.17
Health and Human Services	NIH	NIH Blueprint and BRAIN Initiative Diversity Specialized Predoctoral to Postdoctoral Advancement in Neuroscience (D-SPAN) Award	3.19	4.50	4.52
Health and Human Services	NIH	NIH Building Infrastructure Leading to Diversity (BUILD) Initiative (RL5 portion only)	5.12	-	-
Health and Human Services	NIH	NIH Building Infrastructure Leading to Diversity (BUILD) Initiative (TL4 portion only)	4.33	-	-
Health and Human Services	NIH	NIH Science Education Partnership Award (SEPA) (R25 - Clinical Trial Not Allowed)	0.53	-	0.52
Health and Human Services	NIH	NIMHD Minority Health and Health Disparities International Research Training (T37)	2.37	1.35	1.35
Health and Human Services	NIH	NLM's Short-term Research Education Training Programs in Biomedical Informatics and Data Science	0.78	0.78	0.78
Health and Human Services	NIH	Office of Intramural Training and Education (OITE)	0.37	0.20	0.20
Health and Human Services	NIH	Oxford-Cambridge Scholars Program (Ox/Cam)	0.57	0.54	0.54

[193] This program is part of the total NIDDK enacted budget of $2.3B.

Health and Human Services	NIH	Post-baccalaureate Intramural Research Training Award Program	70.28	79.96	83.82
Health and Human Services	NIH	Postbaccalaureate Research Education Program (PREP)	17.95	18.76	18.76
Health and Human Services	NIH	Programs to Increase Diversity Among Individuals Engaged in Health-Related Research (PRIDE)	3.28	3.53	3.53
Health and Human Services	NIH	Providing Research Education Experiences to Enhance Diversity in the Next Generation of Substance Abuse and Addiction Scientists	3.17	3.43	3.43
Health and Human Services	NIH	Research Supplements to Promote Diversity in Health-Related Research	138.50	138.50	138.50
Health and Human Services	NIH	RISE (Research Initiative for Scientific Enhancement)	3.84	-	-
Health and Human Services	NIH	Ruth L. Kirschstein National Research Service Award Institutional Research Training Grants (T32, T35)	362.70	384.20	380.00
Health and Human Services	NIH	Ruth L. Kirschstein NRSA for Individual Predoctoral Fellows, including Underrepresented Racial/Ethnic Groups, Students from Disadvantaged Backgrounds, and Predoctoral Students with Disabilities	132.50	146.60	140.80
Health and Human Services	NIH	Science Education Partnership Award	35.48	37.46	-
Health and Human Services	NIH	Short Courses on Interdisciplinary Behavioral and Social Sciences Research on Aging	0.45	0.45	0.45
Health and Human Services	NIH	Short-Term Research Education Program to Increase Diversity in Health-Related Research	6.64	8.61	8.60
Health and Human Services	NIH	Short-Term Research Experience for Underrepresented Persons (STEP-UP; R25)[194]	2.25	2.26	2.26
Health and Human Services	NIH	Strengthening Institutional Capacity to Conduct Global Cancer Research NCI D43	1.89	2.70	2.70
Health and Human Services	NIH	Student Intramural Research Training Award Program	5.86	6.31	6.62
Health and Human Services	NIH	Summer Institute for Training in Biostatistics	1.54	1.69	1.68
Health and Human Services	NIH	Summer Research Education Experience Programs	6.70	7.73	8.44

[194] This program is part of the total NIDDK enacted budget of $2.3B.

Health and Human Services	NIH	Team-Based Design in Biomedical Engineering Education (R25)	0.70	0.75	0.78
Health and Human Services	NIH	Transition to Aging Research for Predoctoral Students (F99/K00 Clinical Trial Not Allowed)	1.62	2.60	2.96
Health and Human Services	NIH	UMD-NCI Partnership for Integrative Cancer Research	0.92	1.13	1.13
Health and Human Services	NIH	Undergraduate Research Education Program (UP) to Enhance Diversity in Environmental Health Sciences	0.84	0.95	1.19
Health and Human Services	NIH	Undergraduate Research Training Initiative for Student Enhancement (U-RISE)	18.52	21.18	21.18
Health and Human Services	NIH	Undergraduate Scholarship Program for Individuals from Disadvantaged Backgrounds	4.70	4.63	4.86
Health and Human Services	NIH	Undergraduate Summer Research Education in Kidney, Urologic, and Hematologic Diseases; solicited via two funding announcements: RFA-DK-13-005 and RFA-DK-18-006[195]	0.74	0.74	0.74
Health and Human Services	NIH	Werner H Kirsten Student Internship Program	1.09	1.09	1.09
Homeland Security	CWMD	National Nuclear Forensics Expertise Development Program	2.00	6.50	6.50
Homeland Security	CISA	Academic Programs and Sponsorships	0.95	0.50	0.50
Homeland Security	CISA	Albert Einstein Distinguished Fellow	0.17	0.18	0.18
Homeland Security	CISA	Continuous Diagnostics Mitigation Technology Training	2.10	1.60	1.80
Homeland Security	CISA	Cyber Competition – U.S. Cyber Team	0.05	0.05	0.05
Homeland Security	CISA	Cyber Workforce Development Cooperative Agreement	3.00	-	-
Homeland Security	CISA	Cybersecurity Education and Training Assistance Program (CETAP)	6.80	6.80	6.80
Homeland Security	CISA	Federal Cyber Defense Skilling Academy	10.30	10.30	10.30

[195] This program is part of the total NIDDK enacted budget of $2.3B.

Homeland Security	CISA	Incident Response Training	0.90	1.30	1.30
Homeland Security	CISA	Industrial Control Systems (ICS) Training	8.90	9.10	10.20
Homeland Security	CISA	NICE Challenge	2.20	2.20	2.20
Homeland Security	CISA	Scholarship for Service	0.40	0.40	0.40
Homeland Security	S&T	Educational Programs - Minority Serving Institutions	7.70	5.20	7.70
Institute of Museum and Library Services		IMLS - Library Services Act	0.20	0.60	0.50
Institute of Museum and Library Services		IMLS- Museum Services Act	2.80	5.60	5.00
Interior	USGS	Educational Mapping Program (EDMAP)	1.00	1.00	1.00
Labor	ETA	H-1B Training Activities	68.90	14.00	-
NASA	OSTEM	MUREP	45.50	45.50	46.30
NASA	OSTEM	NextGen STEM Project (NGS)	14.00	13.50	15.40
NASA	OSTEM	Space Grant - National Space Grant College and Fellowship Program	58.00	58.00	57.00
NASA	SMD	GLOBE Program	9.4	11.9	11.9
NASA	SMD	SMD Robotics Alliance Program	5	5	5
NASA	SMD	SMD Science Activation Program	52	52	52
NASA	STMD	TechRise Student Challenge	2.8	2.5	2.5
NSF	BIO	Research and Mentoring for Postbaccalaureates in Biological Sciences (RaMP)	29.50	-	31.40

NSF	BIO, ENG, and CISE	Research Experiences for Teachers (RET)	8.30	9.20	6.50
NSF	BIO, ENG, CISE, GEO, MPS EDU	Research Experiences for Undergraduates (REU) Sites	90.80	72.10	80.20
NSF	BIO, ENG, CISE, EDU	Improving Undergraduate STEM Education	107.80	103.00	109.30
NSF	CISE	CyberTraining	35.50	21.00	21.00
NSF	CISE, EDU MPS	Harnessing the Data Revolution (HDR): Data Science Corps (DSC)[196]	3.30	-	-
NSF	ENG	Emerging Frontiers in Research and Innovation (EFRI) Research Experience and Mentoring (REM)	1.60	1.00	1.00
NSF	EDU	Advanced Technological Education (ATE)	72.00	75.00	74.00
NSF	EDU	Advancing Informal STEM Learning (AISL)	69.40	62.50	71.20
NSF	EDU	Alliances for Graduate Education and the Professoriate (AGEP)	9.40	8.00	9.90
NSF	EDU	Cybercorps: Scholarship for Service (SFS)	72.90	63.00	74.00
NSF	EDU	Discovery Research K–12 (DR-K12)	99.50	95.00	90.00
NSF	EDU	Eddie Bernice Johnson Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (INCLUDES) Initiative	31.40	23.30	37.40
NSF	EDU	EDU Core Research (ECR)	84.10	76.70	75.00
NSF	EDU	Excellence Awards in Science and Engineering (EASE)	4.80	2.20	6.70
NSF	EDU	Graduate Research Fellowship Program (GRFP)	318.70	284.50	341.10

[196] This program is a subset of the Harnessing the Data Revolution (HDR) program, which was one of NSF's Big Ideas. Funding for the Harnessing the Data Revolution Big Idea, which included the Data Science Corps program, ended in FY 2023.

NSF	EDU	Hispanic-Serving Institutions	52.70	46.50	55.90
NSF	EDU	Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)	42.40	36.50	44.90
NSF	EDU	Innovative Technology Experiences for Students and Teachers (ITEST)	32.00	48.10	34.70
NSF	EDU	Louis Stokes Alliances for Minority Participation (LSAMP)	54.90	49.50	55.00
NSF	EDU	National STEM Teacher Corps	-	40.00	30.00
NSF	EDU	NSF Research Traineeships (NRT)	59.10	58.00	60.00
NSF	EDU	NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM)	84.00	144.40	104.20
NSF	EDU	Robert Noyce Scholarship (Noyce) Program	67.00	67.00	66.40
NSF	EDU	Tribal Colleges and Universities Program (TCUP)	19.70	16.50	20.90
NSF	EDU, CISE	Computer Science for All (CSforAll)	24.40	20.00	19.80
NSF	OISE	International Research Experiences for Students (IRES)	9.70	12.00	12.00
Nuclear Regulatory Commission	RES	University Nuclear Leadership Program	17.90	16.00	10.00
Nuclear Regulatory Commission	SBCR	Minority Serving Institutions Grants Program	1.00	2.00	2.00
Nuclear Regulatory Commission	Office of the Chief Human Capital Officer	Training Resources related to STEM Education and Workforce Development	12.30	14.80	15.00
Smithsonian		STEM Informal Education and Instruction	5.50	5.50	5.60

Transportation	FAA	Air Transportation Centers of Excellence[197]	0.30	-	-
Transportation	FAA	Aviation Grant Management program.	15.00	20.00	2.13
Transportation	FAA	Aviation Research[198]	-	-	-
Transportation	FAA	Aviation Workforce & Education Division	4.70	4.80	5.20
Transportation	FHWA	Dwight David Eisenhower Transportation Fellowship Program	1.89	1.88	1.88
Transportation	FHWA	Garrett A. Morgan Technology and Transportation Education Program	-	1.80	0.65
Transportation	FHWA	National Summer Transportation Institute Program (NSTI)	1.68	2.70	2.70
Transportation	FHWA	Summer Transportation Institute Program for Diverse Groups (STIPDG)	1.21	1.40	1.40
Transportation	FHWA	Summer Transportation Institute Program for Diverse Groups (STIPDG)	1.21	1.40	1.40
Transportation	FHWA	University Transportation Centers Program	89.68	89.31	100.50
Veterans Affairs	VBA	Edith Nourse Rogers STEM Scholarship	37.30	39.80	43.90
Veterans Affairs	VBA	Veteran Employment Through Technology Education Courses (VET TEC)[199]	85.30	46.30	-
Veterans Affairs	VHA	Education and Training Non-GME Trainees	229.25	285.83	307.05
Veterans Affairs	VHA	Education and Training Support	1,584.62	1,804.73	1,798.93
Veterans Affairs	VHA	Graduate Medical Education (GME) Trainees	815.89	900.66	942.63

[197] Moved to the Aviation Grant Management program.
[198] Moved to the Aviation Grant Management program.
[199] Vet Tec Program ended in 2024.