

EXECUTIVE OFFICE OF THE PRESIDENT

OFFICE OF SCIENCE AND TECHNOLOGY POLICY

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Agency Support for the 2018 Federal STEM Education Strategic Plan

The STEM Education strategic plan contains specific actions for Federal agencies that will align current and future programs, investments, and activities with the plan's goals. Over the coming months, agencies will be developing individual plans to guide their implementation efforts through CoSTEM's Subcommittee on Federal Coordination in STEM Education.

Many agencies are already supporting the plan through their current and planned programs. Below are a selection of activities that will help realize the plan's vision of a future where all Americans will have lifelong access to high-quality STEM education and the United States remains the global leader in STEM literacy, innovation, and employment. The projects and activities highlighted here have been provided by the identifying agencies. For further information please reach out to the relevant agency press contacts. Note that all listed activities are subject to budgetary constraints and other approvals.

➤ **Department of Agriculture**

The Department of Agriculture (USDA) recognizes that STEM skills are becoming increasingly vital for all rural jobs and enterprises, particularly for the technology-oriented farms of the future. STEM education is also key to building a technically-proficient work force that will support major sectors of the rural economy, including precision agriculture, natural resources, manufacturing, government, recreation, and health. USDA supports research, education/teaching, and extension projects that increase participation by women and underrepresented minorities from rural areas in STEM.

Connecting Rural Communities to STEM Education

USDA recently announced 51 Distance Learning and Telemedicine Grants that provided over \$18 million in grant funding for cities, counties, and for-profit and non-profit corporations that operate schools and libraries in rural areas with populations of 20,000 or less in order to prepare students to join the workforce or pursue further education in STEM fields after graduation. USDA is working to create a strategy for public-private partnerships to connect rural schools, community/technical colleges, universities, and related organizations to high-speed, high-capacity Internet. This strategy will maximize the use of digital learning, especially in the deployment of curricula for those STEM subjects most relevant to rural enterprises such as agriculture, manufacturing, military, and business.

Creating Pathways to Agro-STEM Careers

In January 2019, USDA will begin accepting applications for the 2019 AgDiscovery program. The Department partners with colleges and universities nationwide, working together to nurture a future generation of agriculture professionals. The program is a unique opportunity for students to gain a first-hand view of the many fascinating career paths available in the agricultural sciences field, including plant and animal health and sciences, wildlife management, biotechnology, environmental science, forestry, entomology, and food safety and food production, as well as career paths managing the business aspects of agriculture.

Building Diversity through Strategic Partnerships

In 2019, USDA will fund internships through partnerships with educational programs and organizations that support underrepresented groups in STEM, including USDA/1890 Centers of Excellence, USDA Liaison Programs, Historically Black Colleges and Universities, Hispanic Serving Institutions, Hispanic Association of Colleges and Universities, and Tribal Colleges and Universities.

➤ Department of Commerce

The ocean, coastal, Great Lakes, weather, and climate systems that the National Oceanic and Atmospheric Administration (NOAA) studies affect people of all backgrounds, regardless of age, socioeconomic status, or education level. NOAA works with partners in science education to reach a diverse range of audiences. NOAA contributes scientific expertise, laboratories, field sites, monitoring systems, environmental satellites, weather radar, world class data centers, and more to these partnerships. NOAA's assets can be incorporated into education programs that engage youth and adults from all backgrounds in locally and globally relevant, inquiry-based learning opportunities that are applicable to their daily lives.

Expanding Digital Platforms to Bring the Ocean to the Classroom

NOAA will provide STEM outreach using telepresence-enabled ocean exploration for three expeditions in the Atlantic Ocean in Fiscal Year (FY) 2019. NOAA's unique role in exploring and mapping the ocean provides unparalleled opportunities to bring the excitement of discovery into classrooms and informal education institutions and to any computer screen or mobile device. Live, real-time interactions between ship and shore and live streaming video on the internet encourage global participation in deep and open ocean exploration and inspire ocean literacy. NOAA expects the video feed from the expeditions' remotely operated vehicles (ROVs) to be viewed an average of 200,000 to 500,000 times.

NOAA plans to hold more than 80 live interactions between the NOAA Ship *Okeanos Explorer* and aquaria/science museums and other groups. Watching expeditions in real-time highlights the spirit of teamwork between experts from multiple fields, where their excitement is obvious and infectious, modeling to students how STEM disciplines work together. NOAA will also use these expeditions to underpin professional development workshops for about 700 teachers to help them bring STEM-based ocean exploration lessons and activities to K-12 classrooms.

Federal agency partners that join these expeditions include U.S. Geological Survey, Bureau of Ocean Energy Management (BOEM), U.S. Naval Academy, U.S. Coast Guard Academy, the Office of Naval Research, and NASA, while the data and technologies developed and applied in these efforts are shared with and directly benefit NIH, NSF, DARPA, the US Navy's NAVSEA, and the Departments of Education, Transportation, Energy, Agriculture, Interior, and Defense.

Building Ecosystems through Marine Sanctuaries

NOAA will conduct STEM outreach across their National Marine Sanctuary System through a series of workshops, competitions, and digital data collection and monitoring efforts. National marine sanctuaries in Michigan, Washington, and Georgia will partner with the Marine Advanced Technology Education (MATE) Center on unmanned autonomous vehicle (UAV) and ROV education. Through workshops and regional competitions, students will apply STEM education concepts and prepare for secondary education and careers, and educators will get training and expertise in applied technologies. Three national marine sanctuaries in California will partner to provide a youth-based citizen science program called Long-term Monitoring Program and Experiential Training for Students (LiMPETS).

Supporting Authentic Learning Experiences

NOAA will offer over 200 internships, scholarships and other experiential training for post-secondary students in 2019. NOAA-supported students will use cutting-edge technologies to investigate challenging and transdisciplinary real-world problems, like improving forecast accuracy for hurricane landfall and intensity, increasing aquaculture productivity to drive economic growth and reduce dependence on foreign imports, and improving ocean models to enhance ecosystem productivity.

Engaging Students with Transdisciplinary Challenges

NOAA supports a nationwide STEM outreach competition known as the National Ocean Science Bowl (NOSB) that will engage 1,500 students from more than 200 high schools. This event will serve to introduce students to interdisciplinary opportunities that enrich science education. NOAA, NASA, and BOEM will partner with the Consortium for Ocean Leadership to run the NOSB. The NOSB is an educational forum for high school students to increase their knowledge of the ocean sciences around a transdisciplinary theme, which integrates disciplines of technology, biology, chemistry, physics, and geology. Over 100 students, representing the top team from each region, will advance to the national competition in Washington, DC, planned for April 2019.

➤ Department of Defense

The Department of Defense (DoD) is the largest employer of scientists and engineers in the nation. DoD continually seeks to increase development of a representative, world-class STEM talent pool capable of filling their workforce needs and providing continuous access to STEM talent throughout the Nation. DoD STEM represents the Department's mission to attract, inspire, and develop exceptional STEM talent across the educational continuum to sustain the Department's technological edge.

Promoting Work-based Learning

DoD will continue to support over 2,000 STEM internships in more than 60 Defense laboratories and facilities. These work-based learning internships are competitively awarded; and the interns gain valuable real-world, hands-on experience and research skills while being introduced to the scientific and technological challenges faced by the DoD.

Supporting STEM Education and Outreach

In 2019, the DoD will commit approximately \$135 million through the National Defense Education Program to STEM education and outreach. DoD's STEM portfolio spans preK -12th grade students and teachers, undergraduate students, and graduate students. This funding includes at least 300 new scholarships that will be awarded in the highly competitive Science, Mathematics, and Research for Transformation Scholarship-for-Service Program.

Using Robotics to Foster Ecosystems

The DoD will continue to engage students in activities that promote transdisciplinary learning by supporting more than 1,200 FIRST Robotics teams. Each team will be mentored by a DoD scientist or engineer who will provide a valuable connection to the DoD science and technology ecosystem. In an effort to reach students who are traditionally underrepresented in STEM, DoD prioritizes supporting teams with military dependents and students from Title 1 schools.

➤ **Department of Education**

The Department of Education (ED) is committed to all students having access to a high-quality STEM education and will support this goal through its discretionary grant programs. ED is focused on ensuring that the Nation's students are exposed to STEM early in their lifelong education journeys and have the tools needed for success in the 21st century economy.

Scaling Computational Thinking Education

At ED, promoting STEM education, with a particular focus on computer science (CS), is a top priority. In fall 2018, the Department not only fulfilled but surpassed President Trump's directive to invest \$200 million in these areas. In total, the Department obligated \$279 million in STEM discretionary grant funds in FY 2018. These investments mark a significant step toward advancing STEM education in the United States.

Expanding Pathways to Career Technical Education

To increase work-based learning and training through educator-employer partnerships, ED is implementing the Pathways to STEM Apprenticeship for High School Career and Technical Education (CTE) Students demonstration program. The Department is currently supporting six State efforts for a three-year project period to expand and improve the transition of high school CTE students to postsecondary education and employment through apprenticeships in the STEM fields, including computer science.

Sharing Best Practices

To blend successful practices from across the learning landscape, ED's "What Works Clearinghouse" (WWC) tool is providing educators and the public with the information they need about educational programs, products, practices, and policies in order to make evidence-based decisions about what works in education. The WWC offers extensive reviews of approaches to math and science education, as well as interventions designed to help students transition between high school and higher education and careers.

➤ **Department of Energy**

The Department of Energy (DOE) has an over 60 year history of educating and training U.S. scientists and engineers for jobs and careers that serve to advance national goals in science, energy, national security, and the environment. DOE currently supports a number of programs and efforts aligned with the goals of the 2018 Federal Strategic Plan for STEM Education.

Hosting Work-Based Learning at the DOE National Laboratories

DOE is expanding the number of work-based learning and training opportunities available to undergraduate students at the DOE National Laboratories. Through internships for students from community colleges and four-year universities working on projects that span the DOE mission areas, participants gain hands-on experience in research and technology development under the mentorship of DOE laboratory staff. DOE will increase the number of internships available at the DOE laboratories and seek to attract more students from underrepresented populations to participate in these internships.

Building Stronger STEM Ecosystems

Collectively, the DOE National Laboratories and DOE facilities engage over 250,000 K-12 students a year through programs that range from direct classroom instruction in STEM and instructional materials to STEM demonstrations and in-house tours of scientific facilities. The DOE Laboratories and facilities contribute to the STEM ecosystems within their regions by engaging students and educators in STEM learning opportunities, and are poised to serve a greater role in inspiring and preparing underrepresented populations to pursue STEM. DOE is committed to working with its National Laboratories and facilities to identify the fundamental barriers to participation by underrepresented groups and develop mechanisms to overcome those barriers.

➤ Department of Labor

The Department of Labor (DOL) strives to advance opportunities for profitable employment. Through the Employment and Training Administration (ETA), DOL is expanding work-based learning opportunities on a national scale, focusing on apprenticeships. ETA aims to accelerate the expansion of apprenticeships to new industry sectors and to increase apprenticeship opportunities for all Americans. Veterans, military spouses, service members re-entering the civilian workforce, and underrepresented groups in apprenticeship, including women, people of color, and ex-offenders will benefit from these investments.

Increasing Work-Based Learning and Training through Apprenticeships

DOL is implementing the Industry-Recognized Apprenticeship Program. These apprenticeships will expand work-based learning opportunities in fields that have not traditionally used the apprenticeship model, including a number of STEM occupations in the health care, IT, and wireless sectors. The Department expects to start accepting applications in 2019.

DOL has also announced \$150 million in grant opportunities for institutions of higher education to work in partnership with national industry associations to expand apprenticeships to new industry sectors reliant on H-1B visas, such as computer science, engineering, and health care. These grants are expected to be awarded in early 2019.

DOL has launched Apprenticeship.gov which serves as a platform to connect career seekers, job creators, and educators. The web portal features an apprenticeship tool finder where career seekers can search for apprenticeship opportunities by location and occupation. The purpose of the web portal is to increase access to information about apprenticeship programs and opportunities, including those in STEM related fields. The Department will continue to expand this website's functionality throughout 2019.

➤ National Aeronautics and Space Administration

The National Aeronautics and Space Administration's (NASA) journeys have propelled technological breakthroughs, pushed the frontiers of scientific research, and expanded our understanding of the universe. These accomplishments, and those to come, share a common genesis: education in STEM. NASA creates unique opportunities for students to contribute to NASA's work in exploration and discovery and builds a diverse future STEM workforce by engaging students in authentic learning experiences with NASA people, content, and facilities. To achieve these goals, NASA strives to strengthen strategic partnerships with stakeholder organizations across the STEM ecosystem, and through NASA Centers and Mission Directorates.

Investing in Diversity, Inclusion, and Equitable STEM Education Opportunities

NASA is pleased to announce a new collaboration in support of the National Science Foundation (NSF) INCLUDES network. Over the coming months, NASA will work with the NSF INCLUDES community to better understand how NASA's unique assets can support partners in the NSF INCLUDES network as they seek to broaden participation in STEM careers.

Incorporating STEM Education into Management Structures

In recognition of the importance of STEM education to the NASA community, NASA has elevated its NASA Advisory Council Ad Hoc Task Force on STEM education to the status of a permanent, standing committee. While the Ad Hoc Task Force has supported NASA's STEM education efforts for many years, this move ensures that the STEM education community has a voice on the NASA Advisory Council for years to come.

➤ National Science Foundation

The National Science Foundation (NSF) strives to achieve excellence in U.S. STEM education at all levels and in all settings (both formal and informal) in order to support the development of a diverse and well-prepared workforce of scientists, technicians, engineers, mathematicians, and educators and a well-informed citizenry that have access to the ideas and tools of science and engineering. The purpose of these activities is to enhance the quality of life of all citizens and the health, prosperity, welfare, and security of the nation.

Scaling Diversity, Inclusion, and Equity across the Federal Government

NSF INCLUDES is one of the 10 NSF Big Ideas and focuses on making a lasting impact in diversifying the STEM workforce of the future through partnerships and collaboration at scale. NSF has committed \$44 million towards this initiative and going forward will expand partnerships with NASA, NOAA, and United States Geological Survey (USGS) to help them establish their own INCLUDES programs. Boeing has also committed \$1 million to NSF INCLUDES to support women returning to the STEM workforce.

Investing in the STEM Workforce of the Future

NSF is committing \$10 million in FY 2019 that will be matched by Boeing to research and develop new learning environments for the STEM workforce of the future, including K-12 education. From understanding how elementary students think about data to preparing teachers to teach in online classrooms, this funding opportunity will provide new learning materials and teaching tools to educate the STEM workforce. These new materials and tools will be enhanced with critical research on the most effective strategies for training the STEM workforce.

In addition, NSF will fund 200 internships of up to \$55,000 in both FY 2019 and FY 2020 through the INTERN opportunity, where graduate students will complete internships in non-academic settings to enhance their preparation for multiple career pathways after graduation. This program will help build the STEM workforce necessary for future success of the Nation.

Advancing Digital Literacy and Data Science

NSF is committing \$10 million in the newly launched Data Science Corps in FY 2019 to promote data literacy, build capacity to harness data at the local, State and national levels, and provide basic training in data science to the existing workforce across communities. The program will provide practical experiences, teach new skills, and offer teaching opportunities in a variety of settings to data scientists and data science students.