

FEDERAL SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS (STEM) EDUCATION STRATEGIC PLAN

1. Executive Summary

“One of the things that I’ve been focused on as President is how we create an all-hands-on-deck approach to science, technology, engineering, and math. We need to make this a priority to train an army of new teachers in these subject areas, and to make sure that all of us as a country are lifting up these subjects for the respect that they deserve.”

President Barack Obama

2013 White House Science Fair, April 2013

Advances in science, technology, engineering, and mathematics (STEM) have long been central to our Nation’s ability to manufacture better and smarter products, improve health care, develop cleaner and more efficient domestic energy sources, preserve the environment, safeguard national security, and grow the economy. For the United States to maintain its preeminent position in the world it will be essential that the Nation continues to lead in STEM, but evidence indicates that current educational pathways are not leading to a sufficiently large and well-trained STEM workforce to achieve this goal. Nor is the U.S. education system cultivating a culture of STEM necessary for a STEM-literate public. Thus it is essential that the United States enhance U.S. students’ engagement in STEM disciplines and inspire and equip many more students to excel in STEM. Investing in STEM education is critical to the Nation and its economic future for a number of reasons:

- The jobs of the future are STEM jobs: The demand for professionals in STEM fields⁷ is projected to outpace the supply of trained workers and professionals. Additionally, STEM competencies are increasingly required for workers both within and outside specific STEM occupations. A recent report by the President’s Council of Advisors on Science and Technology (PCAST) estimates there will be one million fewer STEM graduates over the next decade than U.S. industries will need.
- Our K-12 system is “middle of the pack” in international comparisons: Among 33 Organization for Economic Cooperation and Development (OECD) countries that participated in a recent Programme for International Student Assessment (PISA) study, which measures students’ ability to apply what they have learned in reading, mathematics, and science and has been designed to assess whether students can use their knowledge in real-life situations¹, 12 countries had higher scores than did the United States in science and 17 had higher scores in mathematics.
- Progress on STEM is critical to building a just and inclusive society: STEM participation and achievement statistics are especially disturbing for women and minorities, who are substantially underrepresented in STEM fields. While earning a STEM degree is one important milestone in pursuing a STEM career, just 2.2 percent of Hispanics and Latinos, 2.7 percent of African Americans, and 3.3 percent of Native Americans and Alaska Natives have earned a first university degree in the natural sciences or engineering by age 24. While women constitute the majority of students on college campuses and roughly 46 percent of the workforce, they represent less than one in five bachelor’s recipients in fields like computer science and engineering, and hold only 25 percent of STEM jobs.

A Strategic Plan for Federal Investment in STEM Education

Many of the CoSTEM agencies have placed a high priority on STEM education and have developed education initiatives unique to their agency's mission, needs, and resources. To better leverage these assets and expertise, the Administration is releasing this STEM education strategic plan, the result of extensive cross-agency collaboration, to articulate a strategy for making progress on this national priority. The Administration, through the CoSTEM agencies, is committed to laying groundwork that will set the course for a coherent and impactful collective Federal STEM education investment for the next five years.

The Plan begins by providing an overview of the importance of STEM education to American scientific discovery and innovation, the need to better prepare students for today's jobs and those of the future, and the importance of a STEM-literate society (section 2) and also describes the current state of Federal STEM education efforts (section 3). The document then presents five priority STEM education investment areas where a coordinated Federal strategy can be developed, over five years, designed to lead to major improvements in key areas. This increased coordination is intended to lead to maximum impact and, as it is implemented, will lead to strategies for closer and more effective coordination among agencies with STEM investments (section 4).

Also included in this plan are initial implementation roadmaps in each of the priority STEM education investment areas, proposing potential short-, medium-, and long-term objectives and strategies that might help Federal agencies achieve the outlined goals (section 5). Additionally, throughout the document, the plan highlights (1) key outcomes for the Nation and ways Federal agencies can contribute, (2) areas where agencies will play a lead role, thereby increasing accountability, (3) methods to build and share evidence, and (4) approaches for decreasing fragmentation.

Choosing national goals that Federal agencies can contribute to

The STEM Strategic Plan sets out ambitious national goals to drive Federal investment in five¹² priority STEM education investment areas:

- Improve STEM Instruction: Prepare 100,000 excellent new K-12 STEM teachers by 2020, and support the existing STEM teacher workforce;
- Increase and Sustain Youth and Public Engagement in STEM: Support a 50 percent increase in the number of U.S. youth who have an authentic STEM experience each year prior to completing high school;
- Enhance STEM Experience of Undergraduate Students: Graduate one million additional students with degrees in STEM fields over the next 10 years;
- Better Serve Groups Historically Under-represented in STEM Fields: Increase the number of students from groups that have been underrepresented in STEM fields that graduate with STEM degrees in the next 10 years and improve women's participation in areas of STEM where they are significantly underrepresented; and,
- Design Graduate Education for Tomorrow's STEM Workforce: Provide graduate-trained STEM professionals with basic and applied research expertise, options to acquire specialized skills in areas of national importance, mission-critical workforce needs for the CoSTEM

agencies, and ancillary skills needed for success in a broad range of careers.

STEM Education Coordination Approaches

Central to the success of this Strategic Plan is moving toward a new approach to coordinating Federal investments in STEM education (Section 4.2). By designating initial lead and collaborating agencies in some of the priority STEM education investment areas, the Strategic Plan encourages a more deliberative focus among new and existing efforts, the expansion of existing collaborations, and the creation of new synergies. The intent is to establish a coordinated, coherent portfolio of STEM education investments across the Federal Government so efforts and assets are deployed effectively and efficiently, for greatest potential impact. To do so, Federal agencies will focus on two main STEM education coordination approaches:

- Build new models for leveraging assets and expertise. Implement a strategy of lead and collaborating agencies to leverage capabilities across agencies to achieve the most significant impact of Federal STEM education investments.
- Build and use evidence-based approaches. Conduct STEM education research and evaluation to build evidence about promising practices and program effectiveness, to be used across agencies, and share with the public to improve the impact of the Federal STEM education investment.

Congressional leadership and commitment to STEM education stimulated the call for this plan and has been critical in its development. The main body of this report further describes the priority STEM education investment areas and STEM education coordination approaches, and provides initial implementation roadmaps to achieve these strategic objectives. The Administration, including the COSTEM agencies, looks forward to working with legislative leaders on its continued refinement and implementation.

Complete document at

http://www.whitehouse.gov/sites/default/files/microsites/ostp/stem_stratplan_2013.pdf