Update on the Committee on Science Technology Engineering and Math Education (CoSTEM) Activities: Implications for Federal Undergraduate Research Programs

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CoSTEM Undergraduate Interagency Working Group Co-Chair
Federal Coordination in STEM Education (FC-STEM) Interagency Working Groups: An Overview and Update

Susan Singer
Division Director, EHR/DUE
Undergraduate STEM Education Interagency Working Group Co-Lead
We want to make sure that we are exciting young people around math and science and technology and computer science. We don't want our kids just to be consumers of the amazing things that science generates; we want them to be producers as well. And we want to make sure that those who historically have not participated in the sciences as robustly — girls, members of minority groups here in this country — that they are encouraged as well. We've got to make sure that we're training great calculus and biology teachers, and encouraging students to keep up with their physics and chemistry classes…. It means teaching proper research methods and encouraging young people to challenge accepted knowledge.

President Barack Obama
National Academy of Sciences
April 2013

Priority Areas
• P-12 STEM education
• Undergraduate education
• Graduate education
• Broadening participation
• Public engagement
• Coordination and evaluation
# Members of the Committee on STEM Education

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<thead>
<tr>
<th>U.S. Department of Agriculture</th>
<th>U.S. Department of the Interior</th>
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<tr>
<td>U.S. Department of Commerce</td>
<td>U.S. Department of Transportation</td>
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<td>U.S. Department of Defense</td>
<td>Environmental Protection Agency</td>
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<td>U.S. Department of Education</td>
<td>Office of Science and Technology Policy, Executive Office of the President</td>
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<td>U.S. Department of Energy</td>
<td>National Aeronautics and Space Administration</td>
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<td>U.S. Department of Health and Human Services</td>
<td>National Science Foundation</td>
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<td>U.S. Department of Homeland Security</td>
<td>Smithsonian Institution</td>
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Directorate for Education and Human Resources

The National Science and Technology Council’s Committee on STEM Education
Formed February 2011

Coordination of STEM Activities and Programs
Work across agencies and with OMB to review and ensure efforts are not duplicative

Develop, implement, and update a 5-year STEM education strategic plan (once every five years)

Report to Congress every year with the President’s budget a description of STEM education programs and activities with levels of funding in the budget, an evaluation of the levels of duplication and fragmentation, and progress toward implementing the goals of the Strategic Plan
Co-STEM Organization

**FC-STEM**
*Federal Coordination in STEM Education (subcommittee)*
Responsible for the implementation of the 5-Year Federal STEM Education Strategic Plan
Provides annual reports to Co-STEM

**Co-Chairs**
OSTP: Jo Handelsman
NSF: France Córdova

**IWG**
*Interagency Working Groups*
Meet monthly
Work aligns with STEM Education CAP Goal
Provides quarterly reports to FC-STEM

**IWG: P-12 STEM Education**
Co-Leads: Department of Ed, NSF

**IWG: Engagement**
Co-Leads: Smithsonian, NASA

**IWG: Undergraduate Education**
Co-Leads: NSF, Department of Energy

**IWG: Broadening Participation**
Co-Leads: NSF, NIH

**IWG: Graduate Education**
Co-Leads: NSF, NIH

**IWG: Coordination Objectives**
Lead: FC-STEM

**FI-STEM**
*Federal Investment in STEM Education (Fast-track Action Committee)*
Purpose to design and conduct an inventory of current Federal investments in STEM education
Through May 2013, to be re-chartered as appropriate

**Directorate for Education and Human Resources**
Cross Agency Priority Goal

**STEM Education CAP Goal Statement**

*Improve science, technology, engineering, and mathematics (STEM) education by implementing the Federal STEM Education 5-Year Strategic Plan*

CAP Goal Objectives align with the five priority areas and two coordination objectives outlined in the Strategic Plan

**Vision**

*The Federal STEM Education 5-Year Strategic Plan sets out ambitious national goals to drive Federal investment in five priority STEM education areas toward which significant progress will require improved coherence and coordination across Federal agencies with STEM assets and expertise and STEM education resources*
CoSTEM, FC-STEM, and CAP Goal Organization Chart

**National Science Technology Council’s Committee of STEM Education (CoSTEM)**
- Co-Chairs: France Cordera (NSF) and Jo Handelsman (OSTP)
- Executive Secretary: Susan Camarena (NSF/OSTP)

**Federal Coordination in STEM Education (FC-STEM) Task Force**
- Co-Chairs: Joan Ferrini-Mundy (NSF) and Donald James (NASA)
- Executive Secretary: Layne Scherer (NSF)

**Cross Agency Priority (CAP) Goal on STEM Education**
- Goal Co-Leads: Joan Ferrini-Mundy (NSF) and Jo Handelsman (OSTP)
- Deputy Goal Co-Leads: Nafeesa Owens (NSF) and Danielle Carnival (OSTP)

Below, the 6 FC-STEM Interagency Working Groups, who report their activities quarterly to FC-STEM through the CAP Goal Report:

- **IWG: P-12 STEM Instruction (CAP SubGoal 1)**
  - Co-Leads:
    - Department of Education
    - NSF

- **IWG: Engagement (CAP SubGoal 2)**
  - Co-Leads:
    - Smithsonian
    - NASA

- **IWG: Undergraduate STEM Education (CAP SubGoal 3)**
  - Co-Leads:
    - NSF
    - Department of Energy

- **IWG: Underrepresented Groups/Broadening Participation (CAP SubGoal 4)**
  - Co-Leads:
    - NSF
    - HHS (NIH)

- **IWG: Graduate STEM Education (CAP SubGoal 5)**
  - Co-Leads:
    - NSF
    - HHS (NIH)

- **IWG: Coordination Objectives (CAP SubGoal 6 and 7)**
  - Lead:
    - FC-STEM
# Federal STEM Education 5-Year Strategic Plan: Priorities and Strategic Objectives

<table>
<thead>
<tr>
<th>P-12 Teacher Education</th>
<th>100,000 new K-12 STEM teachers by 2020 and support existing STEM teacher workforce</th>
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<tbody>
<tr>
<td>Undergraduate Education</td>
<td>Graduate 1 million additional students with degrees in STEM fields over a decade</td>
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<td>Graduate Education</td>
<td>Provide basic research expertise, professional development, and specialized skills development to graduate-trained STEM professionals</td>
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<td>Broadening Participation</td>
<td>Increase number of underrepresented minorities graduating in STEM and improve women’s participation where they are significantly underrepresented</td>
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<td>Public Engagement</td>
<td>Support a 50% increase in the number of youth who have authentic STEM experiences each year</td>
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<td>Coordination Objectives</td>
<td>Build new models for leveraging assets and expertise Build and use evidence-based approaches</td>
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Directorate for Education and Human Resources
## Strategic Objectives: Undergraduate Education

<table>
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<tr>
<th>Co-Leads: NSF and DoE</th>
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<tr>
<td>Implementation of evidence-based instructional practices and innovations</td>
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<td>Improve STEM education at 2-year colleges and transfer to 4-year colleges</td>
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<td>Support the development of university-industry partnerships to provide relevant and authentic experiences</td>
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<td>Address high failure rates in introductory undergraduate mathematics</td>
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<td>Co-Leads: NSF and NIH</td>
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<tr>
<td>Recognize and provide financial support to students of high potential</td>
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<td>Provide opportunities for fellows’ preparation in areas critical to the Nation</td>
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<td>Combine and enhance mechanisms that evaluate the impact of fellowships to inform future federal investments</td>
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<td>Co-Leads: NSF and NIH</td>
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<tr>
<td>Be more responsive to rapidly changing demographics</td>
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<td>Focus investments on developing and testing strategies for improving preparation for higher education</td>
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<td>Invest in efforts to create campus climates that are effective in improving success for students from under-represented groups</td>
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<tr>
<td>Strategic Objectives: Engagement</td>
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<tr>
<td><strong>Co-Leads: Smithsonian and NASA</strong></td>
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<td>Provide access to scientific and engineering assets of the federal government</td>
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<td>Integrate STEM into school-readiness and after-school programs</td>
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<td>Improve empirical understanding of how authentic STEM experiences influence learning or interest</td>
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Strategic Objectives: P-12 STEM Instruction

Co-Leads: Department of Education and NSF

Support teacher preparation efforts that encourage use of evidence-based STEM learning opportunities

Increase and improve authentic STEM experiences for teachers
## Strategic Objective: Coordination

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<td><strong>Build new models for leveraging assets and expertise</strong></td>
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<td><strong>Build and use evidence-based approaches</strong></td>
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<td><strong>Implement a concept of lead and collaborating agencies to leverage capabilities across agencies to ensure the most significant impact of Federal STEM education investments.</strong></td>
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<tr>
<td><strong>Conduct STEM education research and evaluation to build evidence about promising practices and program effectiveness, use across agencies, and share with the public to improve the impact of the Federal STEM education investment.</strong></td>
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*Directorate for Education and Human Resources*
Federal STEM Education 5-year Strategic Plan: Enhance STEM Experience of Undergraduate Students

Impact Statement: Graduate one million additional students in STEM fields over the next 10 years.

Summary of Strategic Objectives:
- Identify and broaden evidence based instructional practices and innovations
- Improve support of STEM education at 2 year colleges; create bridges between 2 and 4 year institutions
- Support development of partnerships to provide relevant authentic STEM experiences
- Address problem of excessively high failure rates in introductory math courses
Undergraduate IWG 2015 Highlights

- Released public brief on Federal Investment in STEM Education and the goals, knowledge base, and gaps in undergraduate STEM education
- Identification of Common Indicator Metrics, such as data from the National Center for Science and Engineering Statistics, in order to measure progress of the IWG
  - Added two new items on undergraduate mathematics instruction in 2009 High School Longitudinal Survey second follow up.
  - Almost 20,000 downloads of Reaching Students to support widespread use of evidence-based practices
- Launched NRC studies on:
  - Course-based research
  - Indicators for undergraduate STEM education
  - Measuring intra- and interpersonal skills that enhance college success
- MSI community college event with 14 federal agencies
- First Community College Innovation Challenge
Upcoming Undergraduate IWG Activities

• Launch searchable web-based undergraduate portal to find:
  o Federally funded opportunities for STEM undergraduate students
  o Programs supporting STEM undergraduate students
• Undergraduate STEM Symposium in late Spring
• Federal Playbook in late Spring
NSF Staff Contributions

• Align solicitations focused on undergraduate education with the undergrad strategic objectives
  – Contribute to the knowledge-base to advance the objectives
  – Build on the resources generated by the IWG

• Spread the word about the portal and eventually the playbook (e.g., REU PIs.)

• Recommend PIs with expertise for our summit

• Follow our progress on performance.gov and share your good ideas with us