

Education and Workforce Development in the FY 2014 Budget

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INTRODUCTION

The President's FY 2014 budget once again recognizes the central role of science, technology, engineering, and mathematics (STEM) to the ongoing economic recovery and to the nation's future prosperity. Focusing on investments in education and training to fuel discovery and innovation, the budget reflects those priorities and tough choices to limit spending. The President's budget seeks a balanced approach: fiscal constraint and deficit reduction on the one hand and investment for economic recovery on the other.

The FY 2014 budget demonstrates several bold moves towards the President's priorities, including: 1) increasing accessibility and affordability of a university education; 2) encouraging college completion; and 3) increasing the number of high quality STEM teachers and graduates. To accomplish these priorities, the budget proposes bold strategies and consolidations to better manage science education and training of future scientists and engineers. Significant realignment of program responsibilities, the elimination of redundant programs, and increased consolidation are designed to respond to a STEM education and training system that appear confusing and uncoordinated to many observers.

The President has requested a reorganization of STEM education programs. The aim is to impact federal investments in four areas: K-12 instruction; undergraduate education; graduate fellowships; and outside-the-classroom educational activities. The proposal will impact 114 STEM educational programs across 11 agencies. The Department of Education is central to this reorganization, as are the National Science Foundation and the Smithsonian Institution. Approximately \$180 million will be redirected to these agencies from consolidated programs.

The budget continues to emphasize STEM education and advanced learning technologies at every level and for all segments of society; encourages productive research institutions; builds capacity for robust information, transportation, and energy infrastructure; promotes institutional collaborations to achieve U.S. health, energy, climate change, and global development policy objectives; and rewards entrepreneurship and innovation.

The Department of Education and the National Science Foundation (NSF) play central roles in this work. In addition, funding for STEM education and workforce development is also directed by the Departments of Energy, Agriculture, Defense, and Labor; the National Institutes of Health; and the National Aeronautics and Space Administration. This chapter highlights the major investments the FY 2014 budget makes in these departments and agencies, with special emphasis on the development and evaluation of scalable innovations, dissemination of evidence-based models that work, and preparation of both the teachers and workers of the future.

Throughout this chapter, *double digit* increases or decreases are italicized.

DEPARTMENT OF EDUCATION (ED)

The FY 2014 ED budget proposes a 4.6 percent increase above that enacted for FY 2012. The budget provides \$71.2 billion in discretionary funding for the department, a \$3.1 billion *increase* above that enacted for FY 2012. This funding builds on K-12 reform programs and supports efforts towards reaching the President's 2020 college completion goal.

The proposal seeks to ensure that every student in America is prepared for college and a career. A central focus is improving student learning outcomes in mathematics and science, and on preparing students for science, technology, engineering, and mathematics (STEM) career opportunities. New initiatives this year emphasize preschool activities to prepare four-year-olds for learning. The budget also includes college cost reforms to improve access, retention, and graduation rates for all students. Preparing 100,000 "high quality" STEM teachers continues to be a budgetary focus.

Other ED requests include:

\$14.5 billion to **College- and Career-Ready Students** programs. The program enables states to develop broader and more accurate measures of

school performance that encompass student achievement, student growth, and school progress. States that reach targets would be eligible for additional Title I awards. This request is the same as that enacted for FY 2012.

The **Race to the Top** program will focus on supporting efforts to tackle college costs and raise completion levels, while driving innovation and college access through a companion **First in the World Fund** that encourages college completion, research and dissemination on successful strategies, and better leveraging of campus-based aid programs.

The FY 2014 request of \$29.9 billion for **Pell Grants** represents a *decrease* of over \$10 billion from that enacted for FY 2012.

A request for \$150 million renews an effort to create the **Advanced Research Projects Agency-Education**, modeled after similar approaches in the departments of Defense and Energy. **Investing in Innovation (i3)** will support up to \$65 million for the Advanced Research Projects Agency-Education. The request of \$215 million represents an *increase* of 31% above that enacted for FY 2012.

\$839.9 million to **Federal TRIO Programs** to support Upward Bound, Talent Search, Veterans Upward Bound, Upward Bound Math-Science, McNair Postbaccalaureate Achievement, and Educational Opportunity Services. This request is the same as that enacted for FY 2012.

\$149.7 million to the **Effective Teaching and Learning: STEM** program, a redesign of the Mathematics and Science Partnerships (MSP) program. The program will provide competitive grants to states alone or in partnership with other entities to improve teaching and learning of STEM subjects, especially in high need schools. Funds would support professional development, implementation of high-quality curriculum and assessments, and creation of integrated data management systems in support of assessment and curriculum development. The FY 2013 request is the same as that enacted for MSP in FY 2012.

\$30.9 million for **Graduate Assistance in Areas of National Need** scholarships and fellowships. This request is the same level as the enacted for FY 2012.

\$671.1 million for the **Institutes for Education Sciences** and its four centers: the National Center for Education Research, the National Center

for Education Statistics, the National Center for Education Evaluation and Regional Assistance, and the National Center for Special Education Research. The FY 2014 request represents an *increase* of \$77.4 million above that enacted for FY 2012.

Better data across education and human service programs, including \$85 million, a \$47 million *increase* over the 2012 enacted level, for **Statewide Data Systems**; early childhood data systems so that states can use data for research and evaluation; postsecondary data; and research and evaluation of federal student aid.

NATIONAL SCIENCE FOUNDATION (NSF)

The President's FY 2014 budget supports NSF's strategic plan, *Transform the Frontiers, Innovate for Society, and Perform as a Model Organization*. NSF supports fundamental research and education across all fields of science and engineering in order to "expand the frontiers of knowledge, lay the foundation for economic growth and job creation, and educate a globally competitive workforce." NSF budget priorities in STEM education include the multi-agency program reorganization described above, in which NSF would be a major player. In the FY 2014 budget NSF focuses its reorganization efforts on undergraduate education and expanding its role in graduate education. The total budget request for all NSF STEM education programs (K-12, undergraduate, graduate, and outreach and informal education) is \$1.2 billion, an 8 percent *increase* above that enacted for FY 2012.

Education and workforce development support is available in all seven NSF directorates. The Directorate for Education and Human Resources (EHR) is the lead unit, providing funding for R&D in STEM education and workforce development. In the FY 2014 proposal the Division of Graduate Education will lead the STEM Professional Workforce Preparation component of EHR's core R&D activity. The President's FY 2014 request of \$880.2 million for EHR represents an *increase* of 10.9 percent above that enacted for FY 2012.

NSF programs include the following:

- The new **National Graduate Research Fellowship** program (\$325.1 million) builds on and expands NSF's previous **Graduate Research**

Fellowship program to allow fellows to gain specialized experiences and training in key STEM areas. An increase of approximately 700 fellows is expected, bringing the total number of new fellows awarded in FY 2014 to 2,700 as a result of the consolidation across other agencies.

- The **NSF Research Traineeships** program (\$55 million) focuses training on strategically identified research areas, leveraging NSF’s traineeship and research investments. Building on previous investments, particularly the Integrative Graduate Education and Research Traineeship program, it will encourage innovation and design of graduate programs to support opportunities within specific disciplines.
- Catalyzing Advances in Undergraduate STEM Education** (\$123.1 million) is a new agency-wide program to maximize the impact of NSF’s ongoing investments in undergraduate education by improving STEM learning and learning environments; broadening participation in STEM and increasing institutional capacity; and building the STEM workforce for the future. The **Climate Change Education** (\$5.5 million) initiative has been redirected to this program.
- The **Research Experiences for Undergraduates Sites and Supplements** program will receive additional funding to support enhanced research experiences for students during their first two years of college as recommended by the President’s Council of Advisors on Science and Technology (PCAST) report, *Engage to Excel: Producing One Million Additional College Graduates with Degrees in Science, Technology, Engineering, and Mathematics*. The proposed \$79.1 million would be an *increase* of 27 percent over that enacted for FY 2012.

The **Division of Research on Learning in Formal and Informal Settings (DRL)** provides strategic direction and program guidance for the STEM Learning component of EHR’s Core R&D activity. The President’s FY 2014 request of \$277.9 million represents an *increase* of 2.0 percent above the enacted FY 2012 budget and includes:

- STEM-C**, a newly formalized collaboration between the Division of Research and Learning (DRL) and the **Computer and Information Science and Engineering Directorate** combines the former **Math**

and Science Partnership and the **Computing Education for the 21st Century** program. Total funding for this program is \$73.6 million.

- \$60.4 million for **Research on Education and Learning (REAL)**, an *increase* of 10.5 percent above that enacted for FY 2012.
- \$47.8 million for **Advancing Informal STEM Learning**, formerly the Informal Science Education program, a *decrease* of 22.1 percent from that enacted for FY 2012.
- \$102.5 million for the **Discovery Research K-12** program, an *increase* of 3.3 percent from that enacted for FY 2012.

The **Division of Human Resource Development (HRD)** invests in agency-wide efforts to broaden participation of underrepresented minorities and minority-serving institutions, women, and persons with disabilities by building institutional capacity and conducting research on mechanisms and models for achieving these goals. The President's FY 2014 HRD request of \$130.3 million represents a slight *increase* above that enacted for FY 2012 and includes:

- \$74.8 for **Learning and Learning Environments**, a *decrease* of 5.1 percent from that enacted for FY 2012.
- \$20.2 for **Centers for Research Excellence in Science and Technology**, a *decrease* of 16.5 percent from that enacted for FY 2012.

The **Division of Graduate Education (DGE)** invests in graduate students and programs to prepare the next generation of leaders in STEM. The budget proposal increases the DGE role in program and project evaluation to determine impacts of innovations, varied approaches to graduate education, and monitoring and tracking NSF investments in STEM workforce development. The President's FY 2014 request of \$245.1 million for DGE is an *increase* of 3.7 percent above that enacted for FY 2012 and includes:

- \$23.9 million for the **Project and Program Evaluation** program, an *increase* of 33.1 percent from that enacted for FY 2012.
- \$162.5 million for the **National Graduate Research Fellowships**, a 48.3 percent *increase* from that enacted for FY 2012.

The **Division of Undergraduate Education (DUE)** portfolio anchors NSF investments in innovative and effective science and mathematics learning environments. The President's FY 2014 request of \$226.9 million for DUE represents an *increase* of 19.1 percent above that enacted for FY 2012 and includes:

- **Learning and Learning Environments** at \$102.0 million, a 43.3 percent *increase*.
- **Core Research** at \$5 million.
- **Advanced Technological Education** at \$64.0 million.
- \$60.8 million for the **Robert Noyce Scholarship Program**, a 10.9 percent *increase*.

The budget also includes:

\$13.3 million for the **Tribal Colleges and Universities Program**.

\$7.8 million for the **Alliances for Graduate Education and the Professoriate Program**.

\$1.2 million for the **ADVANCE** program.

\$31.9 million for the **Historically Black Colleges and Universities Program**.

\$45.6 million for the **Louis Stokes Alliances for Minority Participation** program.

\$4.8 million for the **Excellence Awards in Science and Engineering** program, a 6 percent decrease from FY 2012.

DEPARTMENT OF ENERGY (DOE)

DOE education activities are administered through the **Office of Science Workforce Development for Teachers and Scientists (WDTS)** program. WDTS supports activities that engage students and professionals in STEM education to ensure DOE has a sustained pipeline of skilled and diverse workers to support its mission, administer its programs, and conduct its research. The DOE FY 2014 budget request would fund the program with

\$16.6 million, a *decrease* of 11 percent from that enacted in FY 2012.

DEPARTMENT OF LABOR (DOL)

The President's FY 2014 funding of the **Workforce Innovation Fund**, would grow to \$150 million, an increase of 67 percent above that enacted for FY 2012. The President's FY 2014 budget launches the **Community College to Career Fund**, requesting \$8 billion, for a program jointly administered by DOL and the Department of Education to support state and community college partnerships with businesses to build the skills of American workers. The fund will replace the **Trade Adjustment Assistance Community College and Career Training Grants**, for which FY 2014 is the final year of funding.

DEPARTMENT OF DEFENSE (DOD)

DOD education activities are administered through its **National Defense Education Program** within the basic research program. The FY 2014 request would increase funding for the **National Security Science and Engineering Faculty Fellowship** program, which would *increase* by 44 percent, and the **Science, Mathematics and Research for Transformation Scholarships** program, which would *increase* by 12 percent. A new **HBCU and Minority Institutions** program would fund research and educational capacity building with a proposed \$30.9 million. The President's FY 2014 budget request of \$115.2 million for NDEP represents an *increase* of 28 percent over that enacted for FY 2012.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

NASA's Office of Education coordinates the efforts of Mission Directorates and NASA Centers to inspire the nation's K-12 learners and educators. The FY 2014 request would *decrease* the **National Space Grant College and Fellowship** program by 40 percent, the **Experimental Program to Stimulate Competitive Research** program by 51 percent, and the **STEM Education and Accountability** program by 38 percent. The **Minority University Research and Education Program** will see no change from FY 2012. The President's FY 2014 request of \$94.2 million for these programs represents an overall *decrease* of 32 percent from that enacted for FY 2012.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

The President's budget again seeks to eliminate the **Environmental Education** program in order to focus limited resources on other programs, initiatives and activities. The program would receive a *decrease* of \$9.7 million below FY 2012 enacted levels. Funding for EPA's **Science to Achieve Results, Greater Research Opportunities** and **Nanotechnology** fellowships, \$16.4 million in FY 2012, would be *consolidated* into the NSF **National Graduate Research Fellowship** program.

DEPARTMENT OF AGRICULTURE (USDA)

The USDA Research, Education, and Economics area includes intramural and competitive grant programs to build research and institutional capacity and endowment funds with targeted missions. These include the **Agricultural Research Service** and the **National Institute of Food and Agriculture** programs. The FY 2014 budget request of \$1.1 billion for these programs represents a *decrease* of 4 percent over that enacted for FY 2012.

NATIONAL INSTITUTES OF HEALTH (NIH)

NIH education and training activities are distributed throughout the individual institutes. The President's budget would continue to support 4,320 **Ruth Kirschstein National Research Service Award** trainees, and would provide a 4 percent stipend increase.

The FY 2014 proposal eliminates the **Science Education Partnership Awards** (SEPA) program, \$15.4 million in FY 2102, and the **Office of Science Education** (OSE), \$2.2 million in FY 2012. Both programs will be consolidated outside NIH. The **Minority Biomedical Research Support** program will be eliminated.

The National Institute of General Medical Sciences **Division of Training, Workforce Development, and Diversity** (TWD), created in FY 2013, leads efforts related to research training, and is the institute's focal point for facilitating the development of a diverse and inclusive biomedical research workforce. The FY 2014 budget request of \$593.4 million for TWD programs represents a *decrease* of 7 percent from that enacted for FY 2012.

The President's proposal is seeking support for two new Common Fund initiatives: the **Increasing the Diversity of the NIH-Funded Workforce** program is seeking \$32.3 million, and the **Strengthening the Biomedical Research Workforce** program is seeking \$6.9 million.

FY 2014 SUMMARY AND INTERPRETATIONS

The most dramatic proposal in the President's FY 2014 budget is the restructuring of STEM education. The Administration seeks to consolidate or end 114 STEM education programs in 11 agencies, ostensibly to bring more coherence to federal investment by eliminating activities perceived to be duplicative and/or overlapping.

Insufficient details make it difficult to assess of the likelihood of achieving program coherence as a result of the proposed actions. However, our review of the FY 2014 proposal suggests a number of systemic problems and challenges.

The Department of Education will be given a lead role in K-12 STEM education. It appears the department has neither the capacity to carry out this expanded role nor sufficiently robust ties to the STEM and STEM education communities.

The challenges facing STEM education are systemic in nature and require non-linear interactions among actors at all levels of education and beyond: school leaders and teachers; community organizations; college, university, industry and government scientists and engineers; as well as an equally diverse informal STEM education community.

Capacity is critical for sustainable reform, thus a major emphasis on producing the next generation of teachers. Also critical are efforts to build capacity among the current teacher corps, and such efforts require appropriate investment in professional development for current teachers. The logic model of the reorganization does not show how local STEM community assets would be mobilized to connect the pre-collegiate efforts to college-level improvements that are essential to desired outcomes.

NSF's investments in STEM education research could point the way, but only if the research questions are heavily drawn from the practice community, if implementation research is included, and if there are experiments on better ways to communicate and incorporate what is

learned into practice.

Mission agencies, which have provided compelling context and immersion in real-world, real-time problem solving, would see major aspects of their STEM education programs ended or re-directed to other agencies. Yet the receiving agencies lack meaningful connections to the mission content and R&D communities involved in the work.

Still other FY 2014 proposals seem to run counter to publically-stated values, such as proposals to cut programs intended to increase STEM access for underrepresented groups.

The President's FY 2014 proposals cross jurisdictional lines of Congressional committees and thus reduce the chance that the whole plan will be enacted as proposed. A greater threat is that proposed program elimination in some agencies will be accepted while expansion within another agency will not be, resulting in a net loss of support for STEM education.

Transferring program funding without also providing adequate human capacity to manage it may mean scarce resources are wasted, rather than invested in ways that can make a real difference. While fully accepting the goal of wise and coherent investment, it is important to urge a discussion that includes more nuanced ecosystems perspectives on how the parts can be aligned in ways to get more benefit from the dollars available.

