

INNOVATIONS IN MENTORING, TRAINING, AND APPRENTICESHIPS ACT

SEPTEMBER 25, 2018.—Committed to the Committee of the Whole House on the
State of the Union and ordered to be printed

Mr. SMITH of Texas, from the Committee on Science, Space, and
Technology, submitted the following

R E P O R T

[To accompany H.R. 5509]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science, Space, and Technology, to whom was referred the bill (H.R. 5509) to direct the National Science Foundation to provide grants for research about STEM education approaches and the STEM-related workforce, and for other purposes, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

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The amendment is as follows:
Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the “Innovations in Mentoring, Training, and Apprenticeships Act”.

SEC. 2. FINDINGS.

Congress finds the following:

- (1) To remain competitive in the global economy, foster greater innovation, and provide a foundation for shared prosperity, the United States needs a workforce with the right mix of skills to meet the diverse needs of the economy.
- (2) Evidence indicates that the returns on investments in technical skills in the labor market are strong when students successfully complete their training and gain credentials sought by employers.
- (3) The responsibility for developing and sustaining a skilled technical workforce is fragmented across many groups, including educators; students; workers; employers; Federal, State, and local governments; labor organizations; and civic associations. Such groups need to be able to coordinate and cooperate successfully with each other.
- (4) Coordination among students, community colleges, secondary and post-secondary institutions, and employers would improve educational outcomes.
- (5) Promising experiments currently underway may guide innovation and reform, but scalability of some of those experiments has not yet been tested.
- (6) Evidence suggests that integration of academic education, technical training, and hands-on work experience improves outcomes and return on investment for students in secondary and post-secondary education and for skilled technical workers in different career stages.
- (7) Outcomes show that mentoring can increase STEM student engagement and the rate of completion of STEM post-secondary degrees.

SEC. 3. NATIONAL SCIENCE FOUNDATION STEM INNOVATION AND APPRENTICESHIP GRANTS.

(a) ESTABLISHMENT.—The Director of the National Science Foundation shall award competitive grants to eligible applicants in accordance with this section.

(b) COORDINATION.—In carrying out this section, the Director shall consult and cooperate with the programs and policies of other relevant Federal agencies to avoid duplication with, and enhance the effectiveness of, the provision of grants under this section.

(c) GRANTS FOR ASSOCIATE DEGREE PROGRAMS IN STEM FIELDS.—

(1) IN GENERAL.—The Director of the National Science Foundation shall award competitive grants to community colleges to develop or improve associate degree and certificate programs in STEM fields in which there is significant workforce demand in the region of the community college receiving the award and a need to strengthen the global competitiveness of affected companies.

(2) APPLICATION.—In considering applications for grants under paragraph (1), the Director shall prioritize—

(A) applicants that consist of a partnership between the applying community college and individual employers or an employer consortia, or industry or sector partnerships, and may include a university or other organization with demonstrated expertise in academic program development;

(B) applications that demonstrate current and future workforce demand in occupations directly related to the proposed associate degree or certificate program.

(C) applications that include commitments by the partnering employers or employer consortia, or industry or sector partnerships to offer apprenticeships, internships or other applied learning opportunities to students enrolled in the proposed associate degree program; and

(D) applications that include outreach plans and goals for recruiting and enrolling women and other historically underrepresented individuals in STEM studies and careers in the proposed associate degree program.

(3) FUNDING.—The National Science Foundation shall devote not less than \$20,000,000 to awards described in this subsection, which shall include not less than \$5,000,000 for each of fiscal years 2018 through 2021, subject to the availability of appropriations, to come from amounts made available for the Education and Human Resources Directorate. This subsection shall be carried out using funds otherwise appropriated by law after the date of enactment of this Act.

(d) GRANTS FOR STEM DEGREE APPLIED LEARNING OPPORTUNITIES.—

(1) IN GENERAL.—The Director of the National Science Foundation shall award competitive grants to universities partnering with employers or employer consortia, or industry or sector partnerships that commit to offering apprenticeships, internships, research opportunities, or applied learning experiences to enrolled university students in identified four-year STEM degree programs.

(2) APPLICATION.—In considering applications for grants under paragraph (1), the Director shall prioritize—

(A) applicants that consist of a partnership between—

- (i) the applying university; and
 - (ii) individual employers or an employer consortia, or industry or sector partnerships;
- (B) applications that demonstrate current and future workforce demand in occupations directly related to selected STEM fields; and
- (C) applications that include outreach plans and goals for recruiting and enrolling women and other populations historically underrepresented in STEM.
- (3) FUNDING.—The National Science Foundation shall devote not less than \$10,000,000 to awards described in this subsection, which shall include not less than \$2,500,000 for each of fiscal years 2018 through 2021, subject to the availability of appropriations, to come from amounts made available for the Education and Human Resources Directorate. This subsection shall be carried out using funds otherwise appropriated by law after the date of enactment of this Act.
- (e) GRANTS FOR COMPUTER-BASED AND ONLINE STEM EDUCATION COURSES.—
 - (1) IN GENERAL.—The Director of the National Science Foundation shall award competitive grants to institutions of higher education or nonprofit organizations to conduct research on student outcomes and determine best practices and scalability of computer-based and online courses for technical skills training.
 - (2) RESEARCH AREAS.—The research areas eligible for funding under this subsection may include—
 - (A) post-secondary courses for technical training for STEM occupations;
 - (B) improving high-school level vocational training in STEM subjects;
 - (C) encouraging and sustaining interest and achievement levels in STEM subjects among women and other populations historically underrepresented in STEM studies and careers; and
 - (D) combining computer-based and online STEM education and training with traditional mentoring and other mentoring arrangements, apprenticeships, internships, and other applied learning opportunities.
 - (3) FUNDING.—The National Science Foundation shall devote not less than \$10,000,000 to awards described in this subsection, which shall include not less than \$2,500,000 for each of fiscal years 2018 through 2021, subject to the availability of appropriations, to come from amounts made available for the Education and Human Resources Directorate. This subsection shall be carried out using funds otherwise appropriated by law after the date of enactment of this Act.

SEC. 4. RESEARCH ON EFFICIENCY OF SKILLED TECHNICAL LABOR MARKETS.

- (a) EFFICIENCY OF SKILLED TECHNICAL LABOR MARKETS.—The Directorate of Social, Behavioral & Economic Sciences of the National Science Foundation, in coordination with the Secretary of Labor, shall support research that improves the efficiency of skilled technical labor markets in the United States, including research on labor market analysis innovations, data and information sciences, electronic information tools and methodologies, and metrics.
- (b) COMPARISON OF UNITED STATES WORKFORCE.—
 - (1) RESEARCH.—The National Science Foundation shall commission research that compares and contrasts skilled technical workforce development between the United States and other developed countries, including the diversity of skilled technical and professional workforces, to the extent feasible.
 - (2) REPORT.—Not later than 3 years after the date of enactment of this Act, the Director of the National Science Foundation shall submit to Congress a report on the results of the study under paragraph (1).
- (c) SKILLED TECHNICAL WORKFORCE.—
 - (1) REVIEW.—The National Center for Science and Engineering Statistics of the National Science Foundation shall consult and coordinate with other relevant Federal statistical agencies to explore the feasibility of expanding its surveys to include the collection of objective data on the skilled technical workforce.
 - (2) REPORT.—Not later than 1 year after the date of enactment of this Act, the Director of the National Science Foundation shall submit to Congress a report containing the progress made in expanding the National Center for Science and Engineering Statistics surveys to include the skilled technical workforce. Such report shall include a plan for multi-agency collaboration in order to effect data collection and reporting of data on the skilled technical workforce.

SEC. 5. SPENDING LIMITATION.

No additional funds are authorized to be appropriated to carry out this Act and the amendments made by this Act, and this Act and such amendments shall be carried out using amounts otherwise available for such purpose.

SEC. 6. EVALUATION AND REPORT.**(a) EVALUATION.—**

(1) **IN GENERAL.**—Not later than 2 years after the date of enactment of this Act, the Director of the Foundation shall evaluate the grants and programs provided under this Act.

(2) **REQUIREMENTS.**—In conducting the evaluation under paragraph (1), the Director shall use a common set of benchmarks and assessment tools to identify best practices and materials developed or demonstrated by the research conducted pursuant to such grants and programs.

(b) **REPORT ON EVALUATIONS.**—Not later than 180 days after the completion of the evaluation under subsection (a), the Director of the Foundation shall submit to Congress and make widely available to the public a report that includes—

(1) the results of the evaluation; and

(2) any recommendations for administrative and legislative action that could optimize the effectiveness of the grants and programs under this Act.

(c) **CONSULTATION.**—In carrying out this section, the Director of the Foundation shall consult the programs and policies of other relevant Federal agencies to avoid duplication with, and enhance the effectiveness of, the grants and programs under this Act.

SEC. 7. DEFINITIONS.

In this Act:

(1) **STEM.**—The term “STEM” means science, technology, engineering, and mathematics, including computer science.

(2) **COMMUNITY COLLEGE.**—The term “community college” has the meaning given the term “junior and community college” in section 312 of the Higher Education Act of 1965 (20 U.S.C. 1058).

(3) **INSTITUTION OF HIGHER EDUCATION.**—The term “institution of higher education” has the meaning given such term in section 101(a) of the Higher Education Act of 1965 (20 U.S.C. 1001(a)).

(4) **REGION.**—The term “region” means a labor market area, as such term is defined in section 3 of the Workforce Innovation and Opportunity Act (29 U.S.C. 3102).

(5) **SKILLED TECHNICAL WORKFORCE.**—The term “skilled technical workforce” means workers with high school diplomas and two-year technical training or certifications who employ significant levels of STEM knowledge in their jobs.

(6) **UNIVERSITY.**—The term “university” means a 4-year institution of higher education, as defined in section 101(a) of the Higher Education Act of 1965 (20 U.S.C. 1001(a)).

COMMITTEE STATEMENT AND VIEWS**PURPOSE AND SUMMARY**

H.R. 5509, the “Innovations in Mentoring, Training and Apprenticeships Act,” was introduced by Majority Leader Kevin McCarthy and co-sponsored by Chairman Lamar Smith. The purpose of H.R. 5509 is to direct the National Science Foundation (NSF) to offer competitively awarded grants to community colleges and four-year institutions to develop and improve science, technology, engineering, mathematics and computer science (STEM) courses and degrees. These programs will combine formal education with applied learning experiences, such as apprenticeships and internships, by partnering with regional employers needing to fill skilled and technical STEM jobs. The bill also calls for NSF to measure student outcomes and determine best practices of distance learning and simulated work environment courses for technical skills training.

H.R. 5509 directs NSF to conduct research examining how different regions of the United States and other developed nations are cultivating and sustaining their skilled technical workforces and to report back to Congress with the results. It also requires NSF to conduct research on labor market analysis innovations, and to examine the capability of NSF to survey the skilled technical workforce.

BACKGROUND AND NEED FOR LEGISLATION

In June 2017, the President issued Executive Order 13801, *Expanding Apprenticeships in America*. The order called for America's education systems and workforce development programs to be reformed to meet today's rapidly changing economy. The order stated that it is more important than ever to prepare workers to fill both existing and newly created jobs and to prepare workers for the jobs of the future.

According to the National Science Board's report, *Science and Engineering Indicators 2018*, the number of U.S. jobs that require STEM skills has grown nearly 34 percent over the past decade. The report also concludes that the demand for a STEM-proficient workforce is expected to continue to increase and our ability to meet that demand will be essential to the Nation's future economic competitiveness and national security.

To remain competitive, the Nation needs flexible STEM-capable workers at every education level. The STEM workforce is broad and diverse, ranging from certificate-level computer programmers to Ph.D.-level physicists.

Among the occupations that are essential to future competitiveness are those that require technical skills but do not require a four-year degree. The National Science Board identifies the "technical STEM workforce" as consisting of workers with high school diplomas and two-year technical training or certifications, who use significant levels of STEM knowledge in their jobs. In 2014, 16.1 million U.S. workers (11.9 percent of the total workforce) were employed in skilled technical occupations.

A significant proportion of STEM-degree students are not completing their degree or choose to pursue non-STEM employment. According to a recent report by ACT (formerly American College Testing), 38 percent of students who start with a STEM major do not graduate with one. For every two students graduating with a STEM degree, only one is employed in STEM. Advisor to the President, Ivanka Trump, has called this situation a "vocational crisis."

Apprenticeship and mentoring initiatives have been shown to improve the rate of degree completion in STEM fields for undergraduates at both four-year universities and community colleges.

Growing the Nation's STEM workforce and reducing barriers to participation will increase individual economic opportunity and support our nation's leadership in science and technology.

LEGISLATIVE HISTORY

On February 14, 2017, the Research and Technology Subcommittee of the House Committee on Science, Space, and Technology held a hearing entitled, "Strengthening U.S. Cybersecurity Capabilities." Witnesses were: Dr. Charles H. Romine, Director, Information Technology Lab, National Institute of Standards and Technology (NIST); Mr. Iain Mulholland, Industry Member, Center for Strategic and International Studies (CSIS) Cyber Policy Task Force; Chief Technology Officer, Security, VMware, Inc.; Dr. Diana Burley, Executive Director and Chair, Institute for Information Infrastructure Protection (I3P), Professor, Human and Organizational Learning, The George Washington University; and Mr. Gregory

Wilshusen, Director, Information Security Issues, U.S. Government Accountability Office (GAO).

On March 9, 2017, the Research and Technology Subcommittee of the House Committee on Science, Space, and Technology held a hearing entitled, “National Science Foundation Part I: Overview and Oversight.” Witnesses were: Dr. France Córdoba, Director, NSF; and Ms. Allison Lerner, Inspector General, NSF.

On March 21, 2017, the Research and Technology Subcommittee of the House Committee on Science, Space, and Technology held a hearing entitled, “National Science Foundation Part II: Future Opportunities and Challenges for Science.” Witnesses were: Dr. Joan Ferrini-Mundy, Acting Chief Operating Officer, NSF; Dr. Maria Zuber, Chair, National Science Board; Dr. Jeffrey Spies, Co-Founder and Chief Technology Officer, Center for Open Science and Assistant Professor, University of Virginia; and Dr. Keith Yamamoto, Vice Chancellor for Science Policy and Strategy, University of California, San Francisco.

On July 26, 2017, the Research and Technology Subcommittee of the House Committee on Science, Space, and Technology held a hearing entitled, “STEM and Computer Science Education: Preparing the 21st Century Workforce.” Witnesses were: Mr. James Brown, Executive Director, STEM Education Coalition; Mr. Pat Yongpradit, Chief Academic Officer, Code.org; Dr. A. Paul Alivisatos, Executive Vice Chancellor & Provost, Vice Chancellor for Research, and Professor of Chemistry and Materials Science & Engineering, University of California, Berkeley; and Mrs. Dee Mooney, Executive Director, Micron Technology Foundation.

On February 15, 2018, the Research and Technology Subcommittee of the House Committee on Science, Space, and Technology held a hearing entitled, “Mentoring, Training, and Apprenticeships for STEM Education and Careers.” The witnesses were: Dr. Victor R. McCrary, Vice President, Research and Economic Development and Professor of Chemistry, Morgan State University, Member, National Science Board and Chair, Task Force on the Skilled Technical Workforce; Dr. John Sands, Department Chair, Computer Integrated Technologies, Moraine Valley Community College, Director and Principal Investigator, Center for Systems Security and Information Assurance; Mr. Montez King, Executive Director, National Institute of Metalworking Skills; and Dr. John Bardo, President, Wichita State University.

On March 15, 2018, the House Committee on Science, Space, and Technology held a hearing entitled, “An Overview of the National Science Foundation Budget Proposal for Fiscal Year 2019.” Witnesses were: Dr. France Córdoba, Director, NSF; and Dr. Maria T. Zuber, Chair, National Science Board.

On April 17, 2018, the Committee on Science, Space, and Technology approved by voice vote H.R. 5509, Innovations in Mentoring, Training, and Apprenticeships Act, as amended.

COMMITTEE VIEWS

STEM workforce demand

The Committee understands that the demand for a STEM-proficient workforce is expected to continue to increase and our ability to meet it will be essential to the Nation’s future competitiveness

and national security. The legislation directs NSF to examine and support innovative workforce training approaches aimed at boosting STEM education and careers in order to meet current and future STEM professional and skilled technical workforce needs. The Committee intends that the initiatives supported by this legislation will leverage the hard work and ingenuity of women and men of all ages, education levels, geographic locations, and backgrounds to grow and meet the demand for a STEM-capable workforce.

STEM student retention

The Committee recognizes that, whether in technical schools, community colleges, or four-year university programs, it has been shown that STEM students are more likely to complete STEM degree studies and pursue STEM careers if they are engaged in an applied learning opportunity, such as an apprenticeship or internship. This point was further illustrated by witness testimony during the Committee's February 15, 2018, hearing entitled, "Mentoring, Training, and Apprenticeships for STEM Education and Careers." Through the competitive grant programs established in this act, the Committee intends for NSF to continue to encourage efforts to strengthen STEM education at all levels and foster interest in STEM careers through innovative partnerships between academic institutions and regional industry to offer these important opportunities.

Expanding apprenticeships in America

The Committee believes that the STEM research and apprenticeship programs authorized and implemented by this legislation complements initiatives being driven by President Trump in Executive Order 13801, *Expanding Apprenticeships in America*. Advisor to the President, Ivanka Trump, has indicated the President has a goal of five million apprenticeships and a unified approach to expanding this mode of training. The Committee intends for NSF to share their findings with other appropriate federal agencies, such as the Department of Labor and the Department of Education. The Committee believes that NSF research can help to better inform future federal investments in STEM workforce training programs across the federal government by increasing the understanding of the impact of these workforce training tools, the context in which they are most effective, and identifying the barriers that exist to their expansion and application.

SECTION-BY-SECTION

Section 1. Short title

This section establishes the short title for the bill as the "Innovations in Mentoring, Training, and Apprenticeships Act."

Section 2. Findings

This section contains findings regarding the importance of building and sustaining a STEM proficient workforce, notes that there is a high return on investments for technical skills sought by employers and that there is a shared responsibility for developing and sustaining a skilled technical workforce. The findings also note that although experiments and innovative programs are underway,

scalability has not been tested, and that integrating academic education, technical training, mentorship, and hands-on work experience improves outcomes.

Section 3. National Science Foundation STEM innovation and apprenticeship grants

This section directs NSF to award competitive grants to community colleges to develop or improve associate degree or certificate programs in an in-demand STEM field by partnering with regional employers to offer apprenticeships, internships, or other applied learning opportunities to enrolled students. This section instructs NSF to devote no less than \$20,000,000 to these awards, including no less than \$5,000,000 for each of fiscal years 2018 through 2021.

This section also directs NSF to award competitive grants to universities to partner with regional employers or employer consortia that commit to offering apprenticeships, internships, research opportunities, or applied learning experiences to university students enrolled in STEM baccalaureate degree programs. This section instructs NSF to devote no less than \$10,000,000 to these awards, including no less than \$2,500,000 for each of fiscal years 2018 through 2021.

Additionally, this section directs NSF to award competitive grants to conduct research on student outcomes and determine best practices for STEM education and technical skills education through distance learning or in a simulated work environment. This section instructs NSF to devote no less than \$10,000,000 to these awards, including no less than \$2,500,000 for each of fiscal years 2018 through 2021. Criteria for prioritizing and awarding such grants are also provided in this section.

Section 4. Research on efficiency of skilled technical labor markets

This section directs NSF to work with the Secretary of Labor to support research on labor market analysis innovation, data and information sciences, electronic information tools and metrics. NSF is also directed to conduct a study that compares and contrasts STEM skilled technical workforce development across the U.S. and in other developed nations. A report to Congress on the results of the study is due three years after enactment. Lastly, this section requires NSF to examine the feasibility of conducting a statistical survey of the skilled technical workforce. A report is due to Congress one year after enactment and will include a plan for multi-agency collaboration in order to effect data collection.

Section 5. Spending limitation

This section clarifies that no additional funds are authorized to be appropriated to carry out this Act and the amendments made by this Act. This Act must be carried out using amounts otherwise available.

Section 6. Evaluation and report

This section requires NSF's Director, two years after the date of enactment, to evaluate the grants and programs provided under this Act and report the findings to Congress no later than 180 days after completion.

Section 7. Definitions

This section defines the terms “STEM,” “community college,” “region,” and “skilled technical workforce.”

EXPLANATION OF AMENDMENTS

An amendment offered by Representative Bonamici was adopted by the Committee. The amendment allows for “industry and sector partnerships” to be included as eligible entities for grants.

COMMITTEE CONSIDERATION

On April 17, 2018, the Committee met in open session and ordered reported favorably the bill, H.R. 5509, as amended, by voice vote, a quorum being present.

APPLICATION OF LAW TO THE LEGISLATIVE BRANCH

Section 102(b)(3) of Public Law 104–1 requires a description of the application of this bill to the legislative branch where the bill relates to the terms and conditions of employment or access to public services and accommodations. This bill directs the National Science Foundation to provide grants for research about STEM education approaches and the STEM-related workforce. As such this bill does not relate to employment or access to public services and accommodations.

Legislative branch employees and their families, to the extent that they are otherwise eligible for the benefits provided by this legislation, have equal access to its benefits.

STATEMENT OF OVERSIGHT FINDINGS AND RECOMMENDATIONS OF THE COMMITTEE

In compliance with clause 3(c)(1) of rule XIII and clause (2)(b)(1) of rule X of the Rules of the House of Representatives, the Committee’s oversight findings and recommendations are reflected in the descriptive portions of this report.

STATEMENT OF GENERAL PERFORMANCE GOALS AND OBJECTIVES

H.R. 5509, the Innovations in Mentoring, Training, and Apprenticeships Act, directs the National Science Foundation to provide grants for research about STEM education approaches and the STEM-related workforce.

DUPLICATION OF FEDERAL PROGRAMS

No provision of H.R. 5509 establishes or reauthorizes a program of the Federal Government known to be duplicative of another Federal program, a program that was included in any report from the Government Accountability Office to Congress pursuant to section 21 of Public Law 111–139, or a program related to a program identified in the most recent Catalog of Federal Domestic Assistance.

DISCLOSURE OF DIRECTED RULE MAKINGS

The Committee estimates that enacting H.R. 5509 does not direct the completion of any specific rule makings within the meaning of 5 U.S.C. 551.

FEDERAL ADVISORY COMMITTEE ACT

The Committee finds that the legislation does not establish or authorize the establishment of an advisory committee within the definition of 5 U.S.C. App., Section 5(b).

UNFUNDED MANDATE STATEMENT

Section 423 of the Congressional Budget and Impoundment Control Act (as amended by Section 101(a)(2) of the Unfunded Mandates Reform Act, P.L. 104–4) requires a statement as to whether the provisions of the reported include unfunded mandates. In compliance with this requirement the Committee has received a letter from the Congressional Budget Office included herein.

EARMARK IDENTIFICATION

H.R. 5509 does not include any congressional earmarks, limited tax benefits, or limited tariff benefits as defined in clause 9 of rule XXI.

COMMITTEE ESTIMATE

Clause 3(d)(2) of rule XIII of the Rules of the House of Representatives requires an estimate and a comparison by the Committee of the costs that would be incurred in carrying out H.R. 5509. However, clause 3(d)(3)(B) of that rule provides that this requirement does not apply when the Committee has included in its report a timely submitted cost estimate of the bill prepared by the Director of the Congressional Budget Office under section 402 of the Congressional Budget Act.

BUDGET AUTHORITY AND CONGRESSIONAL BUDGET OFFICE COST
ESTIMATE

With respect to the requirements of clause 3(c)(2) of rule XIII of the Rules of the House of Representatives and section 308(a) of the Congressional Budget Act of 1974 and with respect to requirements of clause 3(c)(3) of rule XIII of the Rules of the House of Representatives and section 402 of the Congressional Budget Act of 1974, the Committee has received the following cost estimate for H.R. 5509 from the Director of the Congressional Budget Office:

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, May 10, 2018.

Hon. LAMAR SMITH,
*Chairman, Committee on Science, Space, and Technology,
House of Representatives, Washington, DC.*

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the enclosed cost estimate for H.R. 5509, the Innovations in Mentoring, Training, and Apprenticeships Act.

If you wish further details on this estimate, we will be pleased to provide them. The CBO staff contact is Janani Shankaran.

Sincerely,

KEITH HALL,
Director.

Enclosure.

H.R. 5509—Innovations in Mentoring, Training, and Apprenticeships Act

Summary: H.R. 5509 would authorize the National Science Foundation (NSF) to award grants to community colleges, universities, and nonprofit organizations to develop and improve education and work opportunities in science, technology, engineering, and mathematics (STEM). The bill also would require the NSF to conduct research on the STEM and technical workforce in the United States. CBO estimates that implementing H.R. 5509 would cost \$29 million over the 2019–2023 period, assuming appropriation of the authorized and estimated amounts.

Enacting H.R. 5509 would not affect direct spending or revenues; therefore, pay-as-you-go procedures do not apply.

CBO estimates that enacting H.R. 5509 would not increase net direct spending or on-budget deficits in any of the four consecutive 10-year periods beginning in 2029.

H.R. 5509 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA).

Estimated cost to the Federal Government: The estimated budgetary effect of H.R. 5509 is shown in the following table. The costs of the legislation fall within budget function 250 (general science, space, and technology).

	By fiscal year, in millions of dollars—						
	2018	2019	2020	2021	2022	2023	2019–2023
INCREASES IN SPENDING SUBJECT TO APPROPRIATION							
STEM Grants:							
Authorization Level	10	10	10	10	0	0	30
Estimated Outlays	0	1	5	7	8	5	26
Other Provisions:							
Estimated Authorization Level	0	1	1	1	0	0	3
Estimated Outlays	0	1	1	1	0	0	3
Total:							
Estimated Authorization Level	10	11	11	11	0	0	33
Estimated Outlays	0	2	6	8	8	5	29

H.R. 5509 would effectively authorize the appropriation of \$10 million in 2018 for STEM grants. CBO does not estimate any outlays for that authorization because appropriations for 2018 have already been provided.

STEM = Science, Technology, Engineering, and Mathematics.

Basis of estimate: For this estimate, CBO assumes that H.R. 5509 will be enacted near the end of 2018. Section 5 of the bill states that no additional funds are authorized to be appropriated by H.R. 5509. In CBO's view, however, the bill effectively authorizes the appropriation of funding because even if additional funding was not provided specifically for those purposes, the agency would have to spend appropriated resources on the new activity instead of using those funds to carry out other statutory responsibilities.

STEM Grants. H.R. 5509 would establish a program through the NSF to award grants to community colleges with associate's degree programs in STEM, to universities that partner with employers to offer STEM work opportunities, and to nonprofits and postsecondary education institutions to expand online technical training. The NSF's Advanced Technological Education program is similar to the program proposed by the bill. In recent years, the NSF's spending for that program has been around \$65 million annually. Under

current law, no specific sums are authorized to be appropriated for that program after 2018.

H.R. 5509 would effectively authorize the appropriation of \$10 million annually over the 2018–2021 period for the grants. CBO does not estimate any outlays for the authorization for 2018 because appropriations for 2018 have already been provided. Based on historical spending patterns for similar programs, CBO estimates that implementing those provisions would cost \$26 million over the 2019–2023 period, assuming appropriation of the authorized amounts.

Other Provisions. Section 4 of the bill would require the NSF to conduct research and submit reports to the Congress on the STEM and technical workforce in the United States. Using information from the NSF, CBO estimates that the agency would need two additional employees, at an annual average cost of about \$320,000. Section 6 of H.R. 5509 would require the NSF to evaluate the grants provided under the bill. Based on the costs of similar evaluations, CBO estimates that provision would cost about \$2 million. In total, CBO estimates that the activities required by those sections would cost \$3 million over the 2019–2023 period; such spending would be subject to the availability of appropriated funds.

Pay-As-You-Go considerations: None.

Increase in long-term direct spending and deficits: CBO estimates that enacting H.R. 5509 would not increase net direct spending or on-budget deficits in any of the four consecutive 10-year periods beginning in 2029.

Mandates: H.R. 5509 contains no intergovernmental or private-sector mandates as defined in UMRA.

Estimate prepared by: Federal costs: Janani Shankaran; Mandates: Jon Sperl.

Estimate reviewed by: Kim P. Cawley, Chief, Natural and Physical Resources Cost Estimates Unit; H. Samuel Papenfuss, Deputy Assistant Director for Budget Analysis.