Calendar No. 195

114TH CONGRESS *1st Session*	SENATE	REPORT 114–115

STEM EDUCATION ACT OF 2015

R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ON

H. R. 1020

AUGUST 4, 2015.—Ordered to be printed

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED FOURTEENTH CONGRESS

FIRST SESSION

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Mr. THUNE, from the Committee on Commerce, Science, and Transportation, submitted the following

R E P O R T

[To accompany H. R. 1020]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (H.R. 1020) to define STEM education to include computer science, and to support existing STEM education programs at the National Science Foundation, having considered the same, reports favorably thereon without amendment and recommends that the bill do pass.

PURPOSE OF THE BILL

The purpose of H.R. 1020, the STEM Education Act of 2015, is to define STEM education to include computer science, and to support existing STEM education programs at the National Science Foundation (NSF).

BACKGROUND AND NEEDS

A science, technology, engineering, and mathematics (STEM)-educated workforce is necessary to maintain U.S. economic competitiveness and innovation in a 21st century global marketplace. Unfortunately, the United States lags behind many other nations when it comes to STEM education assessment. American students ranked 20th in science and 27th in math among the top 34 developed countries of the world in the most recent 2012 Programme for International Student Assessment.[1] Manufacturers, high-tech companies, and small businesses across all sectors often struggle to find workers with the necessary technical and critical problem-solv-

[1] Organization of Economic Development, Programme for International Student Assessment 2012 (2014), available at: http://www.oecd.org/pisa/keyfindings/pisa-2012-results.htm.

ing skills to fill in-demand STEM jobs, including those related to computer science. The Bureau of Labor Statistics projects that employment in computer systems design and related services will grow 3.9 percent annually from 2010 to 2020, compared with 2.6 percent for professional, scientific, and technical services and 1.3 percent for all industries.[2] By 2020, more than 50 percent of STEM jobs are projected to be in computer science-related fields.[3] If current trends continue, 1.4 million computer science-related jobs will be available over the next 10 years, but only 400,000 computer science graduates will be added with the skills to apply for those jobs.[4]

The STEM Education Act of 2015 would enhance the number of computer science-educated workers by making clear that computer science is included in STEM education grants, fellowships, and other activities at the NSF, the Department of Energy (DOE), the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), the National Institute of Standards and Technology (NIST), and the Environmental Protection Agency (EPA). The bill also would encourage a more STEM-literate workforce by continuing to support informal STEM education. Finally, the bill would increase the number of expert math and science teachers by enabling individuals to pursue existing teaching fellowships earlier in their training, and by making clear that computer science is an eligible subject area in an existing NSF teacher scholarship program.

SUMMARY OF PROVISIONS

H.R. 1020 would define the term "STEM education" to explicitly include computer science for purposes of carrying out STEM education activities at the NSF, the DOE, NASA, NOAA, and the EPA. The bill would direct the NSF to continue to award competitive merit-reviewed grants to support research and development relating to STEM education in informal learning environments outside of the classroom. The bill would amend the NSF's Noyce Master Teaching Fellowship program to allow teachers with a bachelor's degree in pursuit of a master's degree to participate in the program. The bill also would clarify that computer science teachers are eligible for the NSF's Noyce Teacher Scholarship Program.

LEGISLATIVE HISTORY

The bill was introduced on February 20, 2015, by Chairman Smith of the Committee on Science, Space, and Technology of the House of Representatives, along with Representatives Esty, Comstock, Lipinski, Moolenaar, Hultgren, Bucshon, and Collins. The bill passed the House of Representatives on February 25, 2015, by a vote of 412-8, and was referred to the Committee on Commerce, Science, and Transportation of the Senate. H.R. 1020 is substantially similar to H.R. 5031, which passed the House of Representa-

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[2] Lauren Csorny, Bureau of Labor Statistics, Careers in the Gowning Field of Information Technology Services, Beyond the Numbers, April 2013, available at: http://www.bls.gov/opub/btn/volume-2/careers-in-growing-field-of-information-technology-services.htm.

[3] Id.

[4] Emily Richards and Dave Terkanian, Bureau of Labor Statistics, Occupational Employment Projections to 2022, Monthly Labor Review, December 2013, available http://www.bls.gov/opub/mlr/2013/article/occupational-employment-projections-to-2022.htm.

tives by voice vote on July 14, 2014. There were no hearings held on H.R. 1020 in the 114th Congress, but in the 113th Congress, the Committee on Science, Space, and Technology of the House of Representatives held a hearing to review the Obama administration's proposed consolidation and re-organization of Federal STEM programs, and a hearing on STEM education initiatives developed and conducted by private organizations.

On May 20, 2015, the Committee on Commerce, Science, and Transportation of the Senate held an Executive Session to consider H.R. 1020, and ordered the bill to be reported to the Senate favorably without amendment by voice vote.

ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

H.R. 1020—STEM Education Act of 2015

H.R. 1020 would require the National Science Foundation (NSF) to continue to award grants in support of STEM (science, technology, engineering, and mathematics) education. The National Science Foundation Act of 1950 permanently authorizes and directs the NSF to provide grant opportunities for scientific research as part of its mission and purpose. The legislation also would expand eligibility for certain scholarship programs and teaching fellowships to include computer science teachers and educators who hold bachelor's degrees.

Based on information from the NSF, CBO estimates that implementing the legislation would have a minimal impact on the agency's workload and would have no significant impact on the federal budget. Enacting the legislation would not affect direct spending or revenues; therefore, pay-as-you-go procedures do not apply.

H.R. 1020 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act and would benefit public universities and research centers in STEM fields. Any cost incurred by those entities, including matching contributions, would be incurred voluntarily.

The CBO staff contact for this estimate is Marin Burnett. The estimate was approved by H. Samuel Papenfuss, Deputy Assistant Director for Budget Analysis.

REGULATORY IMPACT

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported:

NUMBER OF PERSONS COVERED

The bill would not subject any individuals or businesses to additional regulations. It would support fellowships, scholarships, and grant programs using existing resources and funds, with the potential for more individuals at the bachelor's education level and in the field of computer science to participate.

ECONOMIC IMPACT

The bill would make changes to existing fellowships, scholarships, and research grant programs supported by current Federal resources. The new recipients of the fellowships, scholarships, and grant awards would benefit economically from these programs. In addition, an enhanced STEM-educated workforce encouraged under the bill would contribute to U.S. economic competitiveness in the global marketplace.

PRIVACY

The bill would have no adverse impact on the personal privacy of individuals.

PAPERWORK

The bill would not increase paperwork requirements for private individuals, businesses, or the Federal Government. The changes under the bill relating to existing STEM education activities and teaching fellowship and scholarship programs would result in minimal administrative burden to the covered agencies.

CONGRESSIONALLY DIRECTED SPENDING

In compliance with paragraph 4(b) of rule XLIV of the Standing Rules of the Senate, the Committee provides that no provisions contained in the bill, as reported, meet the definition of congressionally directed spending items under the rule.

SECTION-BY-SECTION ANALYSIS

Section 1. Short title.

This section would establish the short title as the "STEM Education Act of 2015."

Section 2. Definition of STEM education.

This section would define the term "STEM education" as meaning education in the subjects of science, technology, engineering, and mathematics, including computer science, for purposes of carrying out STEM education activities at the NSF, the DOE, NASA, NOAA, NIST, and the EPA. The Committee notes that there are many STEM-related functions and career opportunities that derive from one or more of the subjects listed in the definition of STEM education, such as statistics, life sciences, biotechnology, environmental sciences, and cybersecurity, and that new STEM-related career fields will continue to emerge and grow over time.

Section 3. Informal STEM education.

This section would direct the NSF to continue competitively awarded merit-reviewed grants to support research and development into innovative out-of-school STEM learning and emerging STEM learning environments, and research that advances the field of informal STEM education. Activities supported by grants under this section must include research and development that improves the understanding of learning and engagement, as well as the design and testing of innovative STEM learning models, programs,

and other resources to improve STEM learning outcomes and increase engagement for K–12 students, teachers, and the general public.

Section 4. Noyce Scholarship Program amendments.

This section would amend the NSF Noyce Master Teaching Fellowship program to allow participants with a bachelor's degree working toward a master's degree to participate in the program. This section also would add computer science teachers to the current list of mathematics and science teachers under the Noyce Teacher Scholarship Program.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new material is printed in italic, existing law in which no change is proposed is shown in roman):

NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT OF 2002

[116 Stat. 3034]

SEC. 10. ROBERT NOYCE TEACHER SCHOLARSHIP PROGRAM.

[42 U.S.C. 1862n-1]

* * * * * * *

(i) DEFINITIONS.—In this section—

(1) the term "cost of attendance" has the meaning given such term in section 472 of the Higher Education Act of 1965 (20 U.S.C. 1087ll);

(2) the term "eligible entity" means—

(A) an institution of higher education; or

(B) an institution of higher education that receives grant funds on behalf of a consortium of institutions of higher education;

(3) the term "fellowship" means an award to an individual under section 10A;

(4) the term "high need local educational agency" has the meaning given such term in section 201 of the Higher Education Act of 1965 (20 U.S.C. 1021);

(5) the term "mathematics and science teacher" means a science, *computer science,* technology, engineering, or mathematics teacher at the elementary school or secondary school level;

(6) the term "scholarship" means an award under subsection (c);

(7) the term "science, technology, engineering, or mathematics professional" means a person who holds a baccalaureate, master's, or doctoral degree in science, technology, engineering, or mathematics, and is working in or had a career in such field or a related area; and

(8) the term "stipend" means an award under subsection (d).

* * * * * * *

SEC. 10A. NATIONAL SCIENCE FOUNDATION TEACHING FELLOWSHIPS AND MASTER TEACHING FELLOWSHIPS.

[42 U.S.C. 1862n-1a]

(a) IN GENERAL.—

(1) GRANTS.—

(A) IN GENERAL.—As part of the Robert Noyce Teacher Scholarship Program established under section 10, the Director shall establish a separate program to award grants to eligible entities to enable such entities to administer fellowships in accordance with this section.

(B) DEFINITIONS.—The terms used in this section have the meanings given the terms in section 10.

(2) FELLOWSHIPS.—Fellowships under this section shall be available only to—

(A) science, technology, engineering, or mathematics professionals, including retiring professionals in those fields, who shall be referred to as "National Science Foundation Teaching Fellows" and who, in the first year of the fellowship, are enrolled in a master's degree program leading to teacher certification or licensing; and

(B) mathematics and science teachers, who shall be referred to as "National Science Foundation Master Teaching Fellows" and who possess a master's *or bachelor's* degree in their field.

(b) ELIGIBILITY.—In order to be eligible to receive a grant under this section, an eligible entity shall enter into a partnership that shall include—

(1) a department within an institution of higher education participating in the partnership that provides an advanced program of study in mathematics and science;

(2)(A) a school or department within an institution of higher education participating in the partnership that provides a teacher preparation program; or

(B) a 2-year institution of higher education that has a teacher preparation offering or a dual enrollment program with an institution of higher education participating in the partnership;

(3) not less than 1 high need local educational agency and a public school or a consortium of public schools served by the agency; and

(4) 1 or more nonprofit organizations that have a demonstrated record of capacity to provide expertise or support to meet the purposes of this section.

(c) USE OF GRANTS.—Grants awarded under this section shall be used by the eligible entity (and participating institutions of higher education of the consortium, if applicable) to develop and implement a program for National Science Foundation Teaching Fellows or National Science Foundation Master Teaching Fellows, through—

(1) administering fellowships in accordance with this section, including providing the teaching fellowship salary supplements described in subsection (f);

(2) in the case of National Science Foundation Teaching Fellowships—

(A) offering academic courses and clinical teaching experiences leading to a master's degree and designed to prepare individuals to teach in elementary schools and secondary schools, including such preparation as is necessary to meet the requirements for certification or licensing; and

(B) offering programs both during and after matriculation in the program for which the fellowship is received to enable fellows to become highly effective mathematics and science teachers, including mentoring, training, induction, and professional development activities, to fulfill the service requirements of this section, including the requirements of subsection (e), and to exchange ideas with others in their fields; **[**and**]**

(3) in the case of National Science Foundation Master Teaching Fellowships *for teachers with master's degrees in their field—*

(A) offering academic courses and leadership training to prepare individuals to become master teachers in elementary schools and secondary schools; and

(B) offering programs both during and after matriculation in the program for which the fellowship is received to enable fellows to become highly effective mathematics and science teachers, including mentoring, training, induction, and professional development activities, to fulfill the service requirements of this section, including the requirements of subsection (e), and to exchange ideas with others in their fields**[**.**]***; and*

(4) in the case of National Science Foundation Master Teaching Fellowships for teachers with bachelor's degrees in their field and working toward a master's degree—

(A) offering academic courses leading to a master's degree and leadership training to prepare individuals to become master teachers in elementary and secondary schools; and

(B) offering programs both during and after matriculation in the program for which the fellowship is received to enable fellows to become highly effective mathematics and science teachers, including mentoring, training, induction, and professional development activities, to fulfill the service requirements of this section, including the requirements of subsection (e), and to exchange ideas with others in their fields.

(d) SELECTION PROCESS.—

(1) MERIT REVIEW.—Grants shall be awarded under this section on a competitive, merit-reviewed basis.

(2) APPLICATIONS.—An eligible entity desiring a grant under this section shall submit an application to the Director at such time, in such manner, and containing such information as the Director may require. The application shall include, at a minimum—

(A) in the case of an applicant that is submitting an application on behalf of a consortium of institutions of higher education, a description of the participating institutions of higher education and the roles and responsibilities of each such institution;

(B) a description of the program that the applicant intends to operate, including the number of fellowships the applicant intends to award, the type of activities proposed for the recruitment of students to the program, and the amount of the teaching fellowship salary supplements to be provided in accordance with subsection (f);

(C) evidence that the applicant has the capability to administer the program in accordance with the provisions of this section, which may include a description of any existing programs at the applicant eligible entity (and participating institutions of higher education of the consortium, if applicable) that are targeted to the education of mathematics and science teachers and the number of teachers graduated annually from such programs;

(D) in the case of National Science Foundation Teaching Fellowships, a description of—

(i) the selection process that will be used in awarding fellowships, including a description of the rigorous measures to be used, including the rigorous, nationally recognized assessments to be used, in order to determine whether individuals applying for fellowships have advanced content knowledge of science, technology, engineering, or mathematics;

(ii) the academic courses and clinical teaching experiences described in subsection (c)(2)(A), including—

(I) a description of an educational program that will enable a student to obtain a master's degree and teacher certification or licensing within 1 year; and

(II) evidence of agreements between the applicant and the schools or local educational agencies that are identified as the locations at which clinical teaching experiences will occur;

(iii) a description of the programs described in subsection (c)(2)(B), including activities to assist individuals in fulfilling their service requirements under this section;

(E) evidence that the eligible entity will provide the teaching supplements required under subsection (f); and

(F) a description of the process the applicant will use to fulfill the requirements of section 10(f).

(3) CRITERIA.—In evaluating the applications submitted under paragraph (2), the Director shall consider, at a minimum—

(A) the ability of the applicant (and participating institutions of higher education of the consortium, if applicable) to effectively carry out the program and to meet the requirements of subsection (f);

(B) the extent to which the mathematics, science, or engineering faculty and the education faculty at the eligible entity (and participating institutions of higher education of the consortium, if applicable) have worked or will work collaboratively to design new or revised curricula that recognizes the specialized pedagogy required to teach science,

technology, engineering, and mathematics effectively in elementary schools and secondary schools;

(C) the extent to which the applicant (and participating institutions of higher education of the consortium, if applicable) is committed to making the program a central organizational focus;

(D) the degree to which the proposed programming will enable participants to become highly effective mathematics and science teachers and prepare such participants to assume leadership roles in their schools, in addition to their regular classroom duties, including serving as mentor or master teachers, developing curriculum, and assisting in the development and implementation of professional development activities;

(E) the number and quality of the individuals that will be served by the program; and

(F) in the case of the National Science Foundation Teaching Fellowship, the ability of the applicant (and participating institutions of higher education of the consortium, if applicable) to recruit individuals who would otherwise not pursue a career in teaching and individuals identified in section 33 or 34 of the Science and Engineering Equal Opportunities Act (42 U.S.C. 1855a or 1855b).

(4) SELECTION OF FELLOWS.—

(A) In general. Individuals shall be selected to receive fellowships under this section primarily on the basis of—

(i) professional achievement;

(ii) academic merit;

(iii) content knowledge of science, technology, engineering, or mathematics, as demonstrated by their performance on an assessment in accordance with paragraph (2)(D)(i); and

(iv) in the case of National Science Foundation Master Teaching Fellows, demonstrated success in improving student academic achievement in science, technology, engineering, or mathematics.

(B) PROMOTING PARTICIPATION OF CERTAIN INDIVIDUALS.—Among individuals demonstrating equivalent qualifications, consideration may be given to the goal of promoting the participation of individuals identified in section 33 or 34 of the Science and Engineering Equal Opportunities Act (42 U.S.C. 1885a or 1885b).

(e) DUTIES OF NATIONAL SCIENCE FOUNDATION TEACHING FELLOWS AND MASTER TEACHING FELLOWS.—A National Science Foundation Teaching Fellow or a National Science Foundation Master Teaching Fellow, while fulfilling the service obligation under ⟦subsection (g)⟧ *subsection (h)* and in addition to regular classroom activities, shall take on a leadership role within the school or local educational agency in which the fellow is employed, as defined by the partnership according to such fellow's expertise, including serving as a mentor or master teacher, developing curricula, and assisting in the development and implementation of professional development activities.

(f) TEACHING FELLOWSHIP SALARY SUPPLEMENTS.—

(1) IN GENERAL.—An eligible entity receiving a grant under this section shall provide salary supplements to individuals who participate in the program under this section during the period of their service obligation under subsection (g). A local educational agency through which the service obligation is fulfilled shall agree not to reduce the base salary normally paid to an individual solely because such individual receives a salary supplement under this subsection.

(2) AMOUNT AND DURATION.—

(A) AMOUNT.—Salary supplements provided under paragraph (1) shall be not less than $10,000 per year, except that, in the case of a National Science Foundation Teaching Fellow, while enrolled in the master's degree program as described in subsection (c)(2)(A), such fellow shall receive not more than the cost of attendance at such fellow's institution.

(B) SUPPORT WHILE ENROLLED IN MASTER'S DEGREE PROGRAM.—A National Science Foundation Teaching Fellow may receive a maximum of 1 year of fellowship support while enrolled in a master's degree program as described in subsection (c)(2)(A), except that if such fellow is enrolled in a part-time program, such amount shall be prorated according to the length of the program.

(C) DURATION OF SUPPORT.—An eligible entity receiving a grant under this section shall provide teaching fellowship salary supplements through the period of the fellow's service obligation under subsection (g).[1]

(g) SUPPORT FOR MASTER TEACHING FELLOWS WHILE ENROLLED IN A MASTER'S DEGREE PROGRAM.—A National Science Foundation Master Teacher Fellow may receive a maximum of 1 year of fellowship support while enrolled in a master's degree program as described in subsection (c)(4)(A), except that if such fellow is enrolled in a part-time program, such amount shall be prorated according to the length of the program.

[(g)**]***(h)* SERVICE OBLIGATION.—An individual awarded a fellowship under this section shall serve as a mathematics or science teacher in an elementary school or secondary school served by a high need local educational agency for—

(1) in the case of a National Science Foundation Teaching Fellow, 4 years, to be fulfilled within 6 years of completing the master's program described in subsection (c)(2)(A); and

(2) in the case of a National Science Foundation Master Teaching Fellow, 5 years, to be fulfilled within 7 years of the start of participation in the program under subsection (c)(3).

[(h)**]***(i)* MATCHING REQUIREMENT.—

(1) IN GENERAL.—An eligible entity receiving a grant under this section shall provide, from non-Federal sources, to carry out the activities supported by the grant—

(A) in the case of grants in an amount of less than $1,500,000, an amount equal to at least 30 percent of the amount of the grant, at least one half of which shall be in cash; and

[1] The references to subsection (g) in this subsection likely should be to subsection (h) because of the redesignation.

(B) in the case of grants in an amount of $1,500,000 or more, an amount equal to at least 50 percent of the amount of the grant, at least one half of which shall be in cash.

(2) WAIVER.—The Director may waive all or part of the matching requirement described in paragraph (1) for any fiscal year for an eligible entity receiving a grant under this section, if the Director determines that applying the matching requirement would result in serious hardship or inability to carry out the authorized activities described in this section.

[(i)]*(j)* CONDITIONS OF SUPPORT; COLLECTION FOR NONCOMPLIANCE; FAILURE TO COMPLETE SERVICE OBLIGATION; DATA COLLECTION.—

(1) IN GENERAL.—Except as provided in paragraph (2), subsections (e), (f), (g), and (h) of section 10 shall apply to eligible entities and recipients of fellowships under this section, as applicable, in the same manner as such subsections apply to eligible entities and recipients of scholarships and stipends under section 10, as applicable.

(2) AMOUNT OF REPAYMENT.—If a circumstance described in subparagraph (D) or (E) of section 10(g)(1) occurs after the completion of 1 year of a service obligation under this section—

(A) for a National Science Foundation Teaching Fellow, the total amount of fellowship award received by the individual under this section while enrolled in the master's degree program, reduced by one-fourth of the total amount for each year of service completed, plus one-half of the total teaching fellowship salary supplements received by such individual under this section, shall be repaid or such amount shall be treated as a loan to be repaid in accordance with section 10(g)(1)(C); and

(B) for a National Science Foundation Master Teaching Fellow, the total amount of teaching fellowship salary supplements received by the individual under this section, reduced by one-half, shall be repaid or such amount shall be treated as a loan to be repaid in accordance with section 10(g)(1)(C).

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