

Calendar No. 440

115TH CONGRESS }
2d Session }

SENATE

{ REPORT
{ 115-263

CYBER SCHOLARSHIP OPPORTUNITIES ACT
OF 2017

R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND
TRANSPORTATION

ON

S. 754



JUNE 5, 2018.—Ordered to be printed

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED FIFTEENTH CONGRESS

SECOND SESSION

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CYBER SCHOLARSHIP OPPORTUNITIES ACT OF 2017

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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 S. 754]

[Including cost estimate of the Congressional Budget Office]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 754) to support meeting our Nation's growing cybersecurity workforce needs by expanding the cybersecurity education pipeline, having considered the same, reports favorably thereon with an amendment (in the nature of a substitute) and recommends that the bill (as amended) do pass.

PURPOSE OF THE BILL

The purpose of S. 754, the Cyber Scholarship Opportunities Act of 2017, is to support the growing need for cybersecurity professionals by updating and enhancing the National Science Foundation's (NSF) CyberCorps Scholarship for Service Program (Program).

BACKGROUND AND NEEDS

The Committee has conducted oversight of the cybersecurity threat and related technical skills gap, holding hearings and passing legislation in both the 114th and 115th Congresses. In 2014, then-Committee Chairman Rockefeller and Ranking Member Thune sponsored the Cybersecurity Enhancement Act of 2014 (Act of 2014),¹ which authorized the Program. The Program provides grants to universities to award scholarships to cybersecurity students contingent upon a recipient agreeing to work for Federal or

¹ Pub. L. 113-274, 128 Stat. 2971.

State government in a cybersecurity field for a period equal to the length of the scholarship.

Government and private sector cybersecurity workforces face shortages due to increasing demand. A 2015 Cisco cybersecurity report found that the global shortage of cybersecurity professionals is more than 1 million,² and a 2015 study by Cybersecurity and IT Security Certifications and Training ((ISC)2),³ a certification organization for cybersecurity professionals, found that the information security workforce shortfall is widening.

SUMMARY OF PROVISIONS

The Act would support and expand the U.S. cybersecurity workforce by updating and enhancing the Program. The bill would establish a pilot program under the Program to provide scholarships to students pursuing associates degrees or specialized certifications in cybersecurity who either have bachelor's degrees or are veterans of the armed forces. The bill also would require the NSF, in coordination with the Office of Personnel Management (OPM), to assess the benefits and feasibility of providing CyberCorps scholarships directly to community college students. It also would expand eligible job placements to State, local, or tribal government-affiliated critical infrastructure non-profit organizations, while prioritizing the placement of at least 80 percent of scholarship recipients at Federal agencies in line with the original intent of the Program.

In addition, the bill would require the NSF, in coordination with the OPM, to evaluate and disseminate public information and resources about CyberCorps job hiring and retention for potential applicants to the Program. The bill would require the NSF to report to Congress at least once every 3 years on the results of its evaluation and any recent statistics about the size, composition, and educational requirements of the Federal cyber workforce. The bill also would authorize the NSF to award grants under the Program to improve cybersecurity education at the K-12 level to cultivate the next generation of cybersecurity professionals.

Finally, the bill would amend the existing Robert Noyce Teacher Scholarship Program (Robert Noyce Program), which awards grants to recruit, train, and provide scholarships to science, technology, engineering, and math (STEM) students and professionals in exchange for service as STEM teachers at the K-12 level. The bill would specifically add the field of cybersecurity to the list of qualifying teachers and professionals.

LEGISLATIVE HISTORY

Senator Kaine (for himself and Senators Wicker and Murray) introduced S. 754 on March 28, 2017. Chairman Thune, Ranking Member Nelson, and Senator Perdue also cosponsored the bill.

On March 22, 2017, the Committee held a hearing focused on the impacts of emerging technologies on cybersecurity, which included a discussion of the cybersecurity workforce.

² Cisco, "Mitigating the Cybersecurity Skills Shortage: Top Insights and Actions from Cisco Security Advisory Services," 2015, at <http://www.cisco.com/c/dam/en/us/products/collateral/security/cybersecurity-talent.pdf>.

³(ISC)2, "The 2015 (ISC)2 Information Security Workforce Study," April 2015, at <https://www.boozallen.com/content/dam/boozallen/documents/Viewpoints/2015/04/frostsullivan-ISC2-global-information-security-workforce-2015.pdf>.

On March 29, 2017, the Committee held a hearing focused on addressing the technical skills gap and steps taken by the industry to address this issue and to foster a competitive workforce, including a focus on the value of technical training across various industries.

On August 2, 2017, the Committee met in open Executive Session and, by voice vote, ordered the bill be reported favorably with an amendment (in the nature of a substitute).

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:

S. 754—Cyber Scholarship Opportunities Act of 2017

Summary: S. 754 would authorize the National Science Foundation (NSF) and the Office of Personnel Management (OPM) to develop and implement a pilot program at between 5 to 10 community colleges to provide scholarships to eligible students pursuing an associate’s degree in cybersecurity under the CyberCorps Scholarship-for-Service (CyberCorps SFS) program. The bill also would permanently extend support for cybersecurity education in primary and secondary schools, modify the evaluation and reporting requirements for the CyberCorps SFS program, and require the NSF and OPM to develop and maintain online resources for prospective scholarship recipients.

Based on information provided by the NSF on existing program costs, CBO estimates that implementing S. 754 would cost \$6 million over the 2018–2022 period; such spending would be subject to the availability of appropriated funds.

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

CBO estimates that enacting S. 754 would not increase net direct spending or on-budget deficits in any of the four consecutive 10-year periods beginning in 2028.

S. 754 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA) and would impose no costs on state, local, or tribal governments.

Estimated cost to the Federal Government: The estimated budgetary effect of S. 754 is shown in the following table. The costs of this legislation fall within budget function 250 (general space, science, and technology).

	By fiscal year, in millions of dollars—						
	2017	2018	2019	2020	2021	2022	2017–2022
INCREASE IN SPENDING SUBJECT TO APPROPRIATION							
Estimated Authorization Level	0	1	2	1	1	1	6
Estimated Outlays	0	1	2	1	1	1	6

BASIS OF ESTIMATE

Spending Subject to Appropriation

For this estimate, CBO assumes the legislation would be enacted at the beginning of fiscal year 2018 and that the estimated amounts will be appropriated each year.

Community College Pilot Program. Under current law, community college students are eligible for CyberCorps SFS scholarships if their college is a partner to a participating four-year institution that agrees to transfer scholarship recipients in order to complete a bachelor's degree. According to the NSF, the average annual award for those scholarship recipients is \$46,000 each year. For this estimate, CBO expects the pilot program would commence in 2018, span three years, and support a total of 30 students pursuing associate's degrees. Over the 2018–2022 period, CBO estimates that the community college pilot program would cost \$3 million. That amount includes administrative costs associated with the program. In 2016, the NSF spent \$6 million on the CyberCorps SFS program for students pursuing a master's or bachelor's degree in cybersecurity.

Evaluation and Reporting Requirements and Online Resources. S. 754 would require the NSF and OPM to evaluate and report information on the success of recruiting and job placement efforts related to scholarship recipients. The bill also would require the NSF and OPM to develop and maintain online resources on cybersecurity careers for prospective scholarship recipients. Based on an analysis of information provided by the NSF, CBO estimates that implementing those provisions would cost \$600,000 annually, and \$3 million over the 2018–2022 period.

Pay-As-You-Go considerations: None.

Increase in long-term direct spending and deficits: CBO estimates that enacting S. 754 would not increase net direct spending or on-budget deficits in any of the four consecutive 10-year periods beginning in 2028.

Intergovernmental and private-sector impact: S. 75 contains no intergovernmental or private-sector mandates as defined in UMRA and would impose no costs on state, local, or tribal governments.

Estimate prepared by: Federal costs: Janani Shankaran; Impact on state, local, and tribal governments: Jon Sperl; Impact on the private sector: Paige Piper/Bach.

Estimate approved by: H. Samuel Papenfuss, Deputy Assistant Director for Budget Analysis.

REGULATORY IMPACT STATEMENT

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

S. 754, as reported, would require the NSF, in coordination with the OPM, to develop and implement a pilot program consisting of not more than 10, but at least 5, community colleges to provide scholarships to eligible students. The bill also would require the NSF, in coordination with the OPM, to provide consolidated and

user-friendly online resources for prospective scholarship recipients and modify the reporting requirements concerning the success of participants in the Program. As a result, the number of persons impacted by this bill would increase based on the expanded opportunities for students to obtain information about and apply to participate in the Program. However, the number of people subject to mandates under the bill would not change significantly.

ECONOMIC IMPACT

S. 754 would positively impact the U.S. economy by addressing the labor shortage of cybersecurity professionals, whose mission is to safeguard and protect valuable data and assets in both the public and private sector. The bill would do so by expanding the opportunities to participate in the Program, which builds capacity in institutions of higher education and incentivizes students through scholarships to pursue cybersecurity careers.

PRIVACY

S. 754 is not expected to have an adverse impact on the personal privacy of individuals. While the bill would require the NSF, in coordination with the OPM, to report on the hiring and retention rates in the public sector of successful participants in the Program, it specifically would require that this information be made public in a manner that would protect the personally identifiable information of scholarship recipients.

PAPERWORK

S. 754 would require the NSF, in coordination with the OPM, to assess the potential benefits of providing scholarships through community colleges. The bill also would require the NSF, in coordination with the OPM, to evaluate and make public information on the success of individuals participating in the Program. The NSF, in coordination with the OPM, also would be required to report to Congress not less than every 3 years on its evaluation of public sector workforce hiring and retention under the Program and other Federal cyber workforce statistics.

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

Sec. 1. Short title.

This section would provide that the Act may be cited as the “Cyber Scholarship Opportunities Act of 2017.”

Sec. 2. Findings.

This section would find that a 2015 National Academy of Public Administration report indicated a critical shortage of cybersecurity

professionals,⁴ another 2015 study indicated that this shortage is growing, and the Program is successful in supporting cybersecurity capacity building.

Sec. 3. Community College Cyber Pilot Program and assessment.

This section would require the NSF, in coordination with the OPM, to carry out a pilot program as part of the Program to provide scholarships to at least 5 and not more than 10 community colleges for students pursuing associate degrees or certifications in cybersecurity who either have obtained bachelor's degrees or are veterans of the armed forces. The NSF, in coordination with the OPM, also would be required to assess the potential benefits and feasibility of providing scholarships to such students through community colleges.

Sec. 4. Federal Cyber Scholarship-For-Service Program updates.

This section would amend the Act of 2014 to update eligibility requirements, including defining cybersecurity proficiency according to the cybersecurity workforce framework developed by the National Institute of Standards and Technology under the National Initiative for Cybersecurity Education.

The section also would require the NSF, in coordination with the OPM, to evaluate and make public information on the following: the success of individuals participating in the Program, including job placement rates, locations, and durations; student salary ranges; and any remedial training needs. The NSF, in coordination with the OPM, also would be required to report to Congress not less than every 3 years on this information, as well as on the size, composition, and educational requirements of the Federal cybersecurity workforce. This section also would require the NSF, in coordination with the OPM, to provide user-friendly online resources for scholarship recipients, including job opportunities and a modernized view of cybersecurity careers.

The section would amend the Act of 2014 to clarify and expand acceptable job placements for students participating in the Program to include the following: Federal executive agencies; Congress, including any agency, entity, office, or commission established in the legislative branch; interstate agencies; State, local, and tribal governments; and State, local, and tribal government-affiliated non-profits that are considered to be critical infrastructure (as defined in section 1016(e) of the USA PATRIOT Act (42 U.S.C. 5195c(e))). The section also would prioritize placement of 80 percent of CyberCorps scholarship recipients in Federal executive agencies consistent with the original intent of the Program.

This section would authorize grants to improve cybersecurity education at the K-12 level in order to increase interest in cybersecurity careers, improve online behavior, improve methods of delivery for cybersecurity content, and promote cybersecurity teacher recruitment.

⁴ National Academy of Public Administration, *Increasing the Effectiveness of the Federal Role in Cybersecurity Education*, October 2015, at http://napawash.org/studies/academy-studies/increasing_effectiveness_of_federal_role_in_cybersecurity_education.pdf.

Sec. 5. Cybersecurity teaching.

This section would amend the Robert Noyce Program, authorized in the NSF Authorization Act of 2002, by adding the subject of cybersecurity to the current definition of “mathematics and science teacher.”

The section also would amend the Robert Noyce Program to add the field of cybersecurity to the definition of “science, technology, engineering, or mathematics professional.”

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

[Public Law 107-368; 116 Stat. 3034]

SEC. 10A. ROBERT NOYCE TEACHER SCHOLARSHIP PROGRAM.

(a) * * *

(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;]

(5) the term “mathematics and science teacher” means a science, technology, engineering, mathematics, or computer science, including cybersecurity, 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]

(7) the term “science, technology, engineering, or mathematics professional” means an individual who holds a baccalaureate, master’s, or doctoral degree in science, technology, engineering,

mathematics, or computer science, including cybersecurity, 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).

(j) MATHEMATICS AND SCIENCE SCHOLARSHIP GIFT FUND.—In accordance with section 11(f) of the National Science Foundation Act of 1950 (42 U.S.C. 1870(f)), the Director is authorized to accept donations from the private sector to supplement but not supplant scholarships, stipends, internships, or fellowships associated with programs under this section or section 10A.

(k) ASSESSMENT OF TEACHER SERVICE AND RETENTION.—Not later than 4 years after the date of enactment of the America COMPETES Act, the Director shall transmit to the Committee on Health, Education, Labor, and Pensions of the Senate and the Committee on Science and Technology of the House of Representatives a report on the effectiveness of the programs carried out under this section and section 10A. The report shall include the proportion of individuals receiving scholarships, stipends, or fellowships under the program who—

(1) fulfill the individuals’ service obligation required under this section or section 10A;

(2) remain in the teaching profession beyond the individuals’ service obligation; and

(3) remain in the teaching profession in a high need local educational agency beyond the individuals’ service obligation.

(l) EVALUATION.—Not less than 2 years after the date of enactment of the America COMPETES Act, the Director, in consultation with the Secretary of Education, shall conduct an evaluation to determine whether the scholarships, stipends, and fellowships authorized under this section and section 10A have been effective in increasing the numbers of high-quality mathematics and science teachers teaching in high need local educational agencies and whether there continue to exist significant shortages of such teachers in high need local educational agencies.

CYBERSECURITY ENHANCEMENT ACT OF 2014

[15 U.S.C. 7421 et seq.]

SEC. 302. FEDERAL CYBER SCHOLARSHIP-FOR-SERVICE PROGRAM.

[15 U.S.C. 7442]

(a) IN GENERAL.—The Director of the National Science Foundation, in coordination with the Director of the Office of Personnel Management and Secretary of Homeland Security, shall continue a Federal cyber scholarship-for-service program to recruit and train the next generation of information technology professionals, industrial control system security professionals, and security managers to meet the needs of the cybersecurity mission for Federal, State, local, and tribal governments.

(b) PROGRAM DESCRIPTION AND COMPONENTS.—The Federal Cyber Scholarship-for-Service Program shall—

(1) provide scholarships through qualified institutions of higher education, including community colleges, to students who are enrolled in programs of study at institutions of higher education leading to degrees or specialized program certifications in the cybersecurity field;

(2) provide the scholarship recipients with summer internship opportunities or other meaningful temporary appointments in the Federal information technology workforce; and

【(3) prioritize the employment placement of scholarship recipients in the Federal Government.】

(3) *prioritize the employment placement of at least 80 percent of scholarship recipients in an executive agency (as defined in section 105 of title 5, United States Code); and*

(4) *provide awards to improve cybersecurity education at the kindergarten through grade 12 level—*

(A) *to increase interest in cybersecurity careers;*

(B) *to help students practice correct and safe online behavior and understand the foundational principles of cybersecurity;*

(C) *to improve teaching methods for delivering cybersecurity content for kindergarten through grade 12 computer science curricula; and*

(D) *to promote teacher recruitment in the field of cybersecurity.*

(c) SCHOLARSHIP AMOUNTS.—Each scholarship under subsection (b) shall be in an amount that covers the student’s tuition and fees at the institution under subsection (b)(1) for not more than 3 years and provides the student with an additional stipend.

【(d) POST-AWARD EMPLOYMENT OBLIGATIONS.—Each scholarship recipient, as a condition of receiving a scholarship under the program, shall enter into an agreement under which the recipient agrees to work in the cybersecurity mission of a Federal, State, local, or tribal agency for a period equal to the length of the scholarship following receipt of the student’s degree.】

(d) *POST-AWARD EMPLOYMENT OBLIGATIONS.—Each scholarship recipient, as a condition of receiving a scholarship under the program, shall enter into an agreement under which the recipient agrees to work for a period equal to the length of the scholarship, following receipt of the student’s degree, in the cybersecurity mission of—*

(1) *an executive agency (as defined in section 105 of title 5, United States Code);*

(2) *Congress, including any agency, entity, office, or commission established in the legislative branch;*

(3) *an interstate agency;*

(4) *a State, local, or tribal government; or*

(5) *a State, local, or tribal government-affiliated non-profit that is considered to be critical infrastructure (as defined in section 1016(e) of the USA Patriot Act (42 U.S.C. 5195c(e))).*

(e) HIRING AUTHORITY.—

(1) APPOINTMENT IN EXCEPTED SERVICE.—Notwithstanding any provision of chapter 33 of title 5, United States Code, governing appointments in the competitive service, an agency shall appoint in the excepted service an individual who has completed the eligible degree program for which a scholarship was awarded.

(2) NONCOMPETITIVE CONVERSION.—Except as provided in paragraph (4), upon fulfillment of the service term, an employee appointed under paragraph (1) may be converted non-

competitively to term, career-conditional or career appointment.

(3) **TIMING OF CONVERSION.**—An agency may noncompetitively convert a term employee appointed under paragraph (2) to a career-conditional or career appointment before the term appointment expires.

(4) **AUTHORITY TO DECLINE CONVERSION.**—An agency may decline to make the noncompetitive conversion or appointment under paragraph (2) for cause.

(f) **ELIGIBILITY.**—To be eligible to receive a scholarship under this section, an individual shall—

(1) be a citizen or lawful permanent resident of the United States;

(2) demonstrate a commitment to a career in improving the security of information technology;

[(3) have demonstrated a high level of proficiency in mathematics, engineering, or computer sciences;]

(3) have demonstrated a high level of competency in relevant knowledge, skills, and abilities, as defined by the national cybersecurity awareness and education program under section 401;

[(4) be a full-time student in an eligible degree program at a qualified institution of higher education, as determined by the Director of the National Science Foundation; and]

(4) be a full-time student in an eligible degree program at a qualified institution of higher education, as determined by the Director of the National Science Foundation, except that in the case of a student who is enrolled in a community college, be a student pursuing a degree on a less than full-time basis, but not less than half-time basis; and

(5) accept the terms of a scholarship under this section.

(g) * * *

[(m) **EVALUATION AND REPORT.**—The Director of the National Science Foundation shall evaluate and report periodically to Congress on the success of recruiting individuals for scholarships under this section and on hiring and retaining those individuals in the public sector workforce.]

(m) **PUBLIC INFORMATION.**—

(1) **EVALUATION.**—*The Director of the National Science Foundation, in coordination with the Director of the Office of Personnel Management, shall periodically evaluate and make public, in a manner that protects the personally identifiable information of scholarship recipients, information on the success of recruiting individuals for scholarships under this section and on hiring and retaining those individuals in the public sector cyber workforce, including on—*

(A) placement rates;

(B) where students are placed, including job titles and descriptions;

(C) student salary ranges for students not released from obligations under this section;

(D) how long after graduation they are placed;

(E) how long they stay in the positions they enter upon graduation;

(F) how many students are released from obligations;
and

(G) what, if any, remedial training is required.

(2) *REPORTS.*—The Director of the National Science Foundation, in coordination with the Office of Personnel Management, shall submit, at least once every 3 years, to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report, including the results of the evaluation under paragraph (1) and any recent statistics regarding the size, composition, and educational requirements of the Federal cyber workforce.

(3) *RESOURCES.*—The Director of the National Science Foundation, in coordination with the Director of the Office of Personnel Management, shall provide consolidated and user-friendly online resources for prospective scholarship recipients, including, to the extent practicable—

(A) searchable, up-to-date, and accurate information about participating institutions of higher education and job opportunities related to the field of cybersecurity; and

(B) a modernized description of cybersecurity careers.

