112TH CONGRESS
1ST SESSION

S. 1614

To provide grants to State educational agencies and institutions of higher education to strengthen elementary and secondary computer science education, and for other purposes.

IN THE SENATE OF THE UNITED STATES

SEPTEMBER 22, 2011

Mr. CASEY introduced the following bill; which was read twice and referred to the Committee on Health, Education, Labor, and Pensions

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A BILL

To provide grants to State educational agencies and institutions of higher education to strengthen elementary and secondary computer science education, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the ''Computer Science Education Act of 2011''.

SEC. 2. FINDINGS.

The Congress finds the following:

(1) Computing technology, driven by breakthroughs in computer science, is an integral part of the culture of the United States and is reshaping how people interact.

(2) Computer science is transforming industry, creating new fields of commerce, driving innovation in all fields of science, and bolstering productivity in established economic sectors.

(3) Computer science underpins the information technology sector of the United States economy, which is a significant contributor to the economic output of the United States.

(4) The Bureau of Labor Statistics projects that from 2008 through 2018 more than 1,500,000 high-wage computing jobs will be created in the United States economy, making high-wage computing one of the fastest growing occupational fields.

(5) Computer science is critical for national security and for meeting the challenges that a modern society faces. Of the 14 Grand Challenges for Engineering determined by the National Academy of Engineering, 8 have a predominant or significant computer science component.

(6) Providing students with computer science education in elementary and secondary school is crit-

ical for student success in the 21st century and for strengthening the workforce.

(7) Elementary and secondary computer science education gives students a deeper knowledge of the fundamentals of computing, yielding critical thinking skills that will serve them throughout their lives in numerous fields.

(8) Computer science courses in elementary and secondary schools are fading from the national landscape at a time when they are most needed. The Computer Science Teachers Association (CSTA) has found that introductory secondary school computer science courses have decreased in number by 17 percent since 2005 and the number of Advanced Placement (AP) computer science courses has decreased by 33 percent.

(9) Significant disparities in access to computer science education exist for minorities. Research in the Los Angeles Unified School District, the second largest and one of the most diverse school districts in the United States, found college preparatory computer science courses were commonly missing in schools with high numbers of Latino and African-American students.

(10) According to the National Center for Women and Information Technology, women and certain racial minorities are underrepresented in computer science education. In 2008, 17 percent of AP computer science test takers were women, even though women represented 55 percent of all AP test takers. In 2008, only 4 percent of AP computer science test takers were African-Americans, even though African-Americans represented 7 percent of all AP test takers. Only 784 African-American students nationwide took the AP computer science exam in 2008.

(11) While some States, including Texas and Georgia, allow computer science courses to count toward a student's secondary school core graduation requirements, most States that have specific course requirements for graduation count computer science courses only as electives, chilling student interest in computer science courses.

(12) The CSTA has found that many States do not have a certification or licensure process for computer science teachers, and where processes do exist, such processes often have no connection to computer science content.

(13) The CSTA has developed model computer science teacher certification pathways for both new and experienced teachers.

(14) Computer science education has been encumbered by confusion regarding the related but distinct concepts of computer science education, technology education, and the use of technology in education.

(15) Computer science education courses have often been placed within the vocational education pathways in schools, creating a focus on applied information technology skills rather than a focus on developing core computer science knowledge.

(16) The Association for Computing Machinery and the CSTA have established a clear 4-part, grade-appropriate framework of standards for computer science education to guide State reform efforts.

(17) With the growing importance of computing in society, the need for students to understand the fundamentals of computing, and the significant challenges computer science education faces in elementary and secondary education, broad support for computer science education is needed to catalyze reform.

SEC. 3. STATE COMPREHENSIVE PLANNING GRANTS.

(a) PROGRAM AUTHORIZED.—The Secretary of Education shall award grants to State educational agencies to develop comprehensive plans to strengthen elementary and secondary computer science education in accordance with this section.

(b) OBJECTIVES.—A comprehensive plan developed under this section shall outline strategies for achieving the following objectives:

(1) Provide an engaging and rigorous computer science education intended to ensure students are prepared for the 21st century.

(2) Assess the State's needs for computer science education, particularly for underserved student populations.

(3) Ensure access to computer science courses, particularly at low-performing schools and for low-income students and students underrepresented in computing.

(4) Ensure that students are exposed to grade-appropriate computer science concepts in kindergarten through grade 12 and that computer science courses at the secondary level are viewed as part of the core curriculum students need to be ready for postsecondary education and careers.

(5) Ensure that teachers have the appropriate background, skills, and access to resources to teach computer science.

(c) CONTENTS OF COMPREHENSIVE PLANS.—A State educational agency that receives a grant under subsection (a) shall develop a comprehensive plan that meets the objectives described in subsection (b) and includes the following:

(1) An assessment of elementary and secondary computer science education in such State.

(2) Proposals to improve elementary and secondary computer science education in such State through the development and implementation of—

(A) challenging and grade-appropriate academic content standards for computer science at elementary and secondary education levels;

(B) grade-appropriate assessments of computer science learning;

(C) programs to increase access to computer science courses for students at low-performing schools and students underrepresented in computing;

(D) improved computer science teacher certification or licensure requirements and processes;

(E) professional development programs for computer science teachers; and

(F) programs for ensuring that computer science courses at the secondary education level are considered an integral part of the curriculum students need to be well prepared for higher education and employment.

(d) CONSULTATION.—In developing a comprehensive plan under this section, a State educational agency shall collaborate with representatives of institutions of higher education, with other interested parties, and, where they exist in such State, with State P–16 or P–20 councils.

(e) DURATION OF GRANTS.—The Secretary shall award each grant under subsection (a) for a period of 2 years.

(f) FUNDING STRUCTURE.—

(1) IN GENERAL.—The Secretary shall award a grant to each State educational agency that applies for a grant under this section in an amount that bears the same relation to the total amount available for all such grants as the number of low-income children served by the State educational agency bears to the total number of low-income children served by all of the State educational agencies that apply for such grants.

(2) COUNTING LOW-INCOME CHILDREN.—

(A) CATEGORIES OF CHILDREN.—The number of low-income children to be counted for purposes of this section is the aggregate of—

(i) the number of children aged 5 to 17, inclusive, in the State from families below the poverty level, as determined by the Secretary on the basis of the most recent satisfactory data;

(ii) the number of children (determined for either the preceding year or for the second preceding year, as the Secretary finds appropriate) aged 5 to 17, inclusive, in the State in institutions for neglected and delinquent children (other than such institutions operated by the United States); and

(iii) the number of children aged 5 to 17, inclusive, in the State from families above the poverty level as determined under section 1124(c)(4)(A) of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 6333(c)(4)(A)).

(B) METHODOLOGY.—In making computations under subparagraph (A), the Secretary shall use the methodology described in paragraphs (3) through (5) of section 1124(c) of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 6333(c)).

(3) MINIMUM GRANT.—Notwithstanding paragraph (1), each State educational agency approved by the Secretary to receive a grant under this section shall receive a minimum grant of $250,000.

SEC. 4. IMPLEMENTATION GRANTS.

(a) PROGRAM AUTHORIZED.—The Secretary shall award grants to State educational agencies in accordance with this section to implement computer science education improvements proposed in comprehensive plans that meet the requirements of subsections (b) and (c) of section 3.

(b) BENCHMARKS.—Each State educational agency applying for a grant under this section shall—

(1) develop quantifiable benchmarks for the activities supported under such grant, which may include benchmarks for increasing—

(A) student knowledge and competency of grade-appropriate computer science concepts;

(B) the number of students that take computer science courses;

(C) the diversity of students who take computer science courses;

(D) the number of students who plan to pursue postsecondary computer science degrees;

(E) the diversity of students who plan to pursue postsecondary computer science degrees; and

(F) the number of teachers who are certified to teach computer science; and

(2) submit such quantifiable benchmarks to the Secretary for approval.

(c) ACTIVITIES.—Grant funds received under this section shall be used by each State educational agency for the development and implementation of—

(1) challenging and grade-appropriate academic content standards for computer science;

(2) grade-appropriate assessments of computer science learning;

(3) programs to increase access to computer science courses for students at low-performing schools and students underrepresented in computing;

(4) improved computer science teacher certification requirements and processes;

(5) professional development programs for computer science teachers;

(6) programs for ensuring that computer science courses at the secondary level are considered an integral part of the curriculum students need to be well prepared for higher education and employment;

(7) effective computer science curricula;

(8) computer science distance learning programs; and

(9) such other activities that strengthen computer science education and that such State educational agency considers appropriate.

(d) ADMINISTRATIVE EXPENSES.—A State educational agency may use not more than 5 percent of a grant received under this section for administrative expenses.

(e) PARTNERSHIPS.—In performing the activities required under subsection (c), each State educational agency shall partner with institutions of higher education and local educational agencies, and may partner with nonprofit organizations, businesses, and other State educational agencies.

(f) NON-FEDERAL SHARE.—

(1) IN GENERAL.—Each State educational agency receiving a grant under this section shall provide a non-Federal share, in cash or in kind, of

the funding for the activities described in subsection (c) of not less than 20 percent of the total cost of such activities in any fiscal year.

(2) FINANCIAL HARDSHIP WAIVER.—The Secretary may reduce or waive the requirement to provide a non-Federal share under paragraph (1) for a State educational agency if such State educational agency demonstrates a need for such waiver or reduction due to extreme financial hardship.

(g) DURATION OF GRANTS.—The Secretary shall award each grant under subsection (a) for a period of 5 years.

(h) SUBSEQUENT GRANTS.—At the end of the 5-year period for a grant, the grant recipient may apply for an additional grant under this section by submitting an updated comprehensive plan that meets the requirements of subsections (b) and (c) of section 3. In considering an application for a subsequent grant under this section, the Secretary shall take into consideration the reports filed under subsection (l).

(i) COMPETITIVE BASIS; PRIORITY.—The Secretary shall—

(1) award grants for a fiscal year on a competitive basis among State educational agencies that

meet the requirements for funding under this section; and

(2) give priority to State educational agency proposals that include an emphasis on serving low-performing schools and on increasing participation in computer science by students underrepresented in computing.

(j) FUNDING PRIORITY.—In allocating grant funds received under this section, a State educational agency shall give priority to proposals that include an emphasis on serving low-performing schools and on increasing participation in computer science by students underrepresented in computing.

(k) SUPPLEMENT, NOT SUPPLANT.—Funds made available to carry out this section shall be used to supplement, and not supplant, other Federal and State funds available to carry out the activities described in this section.

(l) REPORTS.—Each State educational agency receiving a grant under this section shall—

(1) measure the progress of such State educational agency in achieving the benchmarks developed under subsection (b)(1);

(2) collect data relating to student-related benchmarks developed under subsection (b)(1) in a

form that is disaggregated by student race, ethnicity, gender, disability status, migrant status, English proficiency status, and low-income status, except that such disaggregation shall not be required when the number of students in a category is insufficient to yield statistically reliable results or the results would reveal personally identifiable information about an individual student;

(3) collect such other performance information as the Secretary may reasonably require for the national evaluation conducted under section 7;

(4) submit a report to the Secretary addressing each item in paragraphs (1) through (3) not later than 4 years after the date on which the State educational agency receives an initial grant under this section; and

(5) not later than 2 years after the date of the submission of the report required under paragraph (4), and biennially thereafter until the State educational agency no longer receives grant funding under this section, submit to the Secretary an update of such report.

(m) GUIDANCE.—The Secretary shall provide guidance to State educational agencies regarding acceptable data sources and methodologies for—

(1) establishing performance benchmarks; and

(2) measuring progress by State educational agencies receiving grants under this section.

SEC. 5. COMMISSION ON COMPUTER SCIENCE EDUCATION.

(a) COMMISSION.—Not later than 90 days after the date of the enactment of this Act, the Secretary shall establish a Commission, to be known as the ''Blue Ribbon Commission on Computer Science Education'' (in this section referred to as the ''Commission''), to provide recommendations for expanding and improving computer science education.

(b) MEMBERSHIP.—The Commission shall consist of not more than 20 members and shall include not less than 1 of each of the following:

(1) A State education official.

(2) An expert in computer science.

(3) A representative of an elementary or secondary computer science education practitioner organization.

(4) An elementary or secondary computer science teacher.

(5) A social scientist with expertise on equity issues in the field of computer science.

(6) A representative of the computing industry or an industry that depends on computing services.

(c) REVIEW.—The Commission shall—

(1) review the state of elementary and secondary computer science education; and

(2) review the state of computer science teacher certification requirements.

(d) REPORT.—Not later than 270 days after the date on which the Commission is established, the Commission shall submit to Congress and the Secretary a report containing the results of the review under subsection (c). Such report shall include—

(1) recommendations on best practices for computer science instruction, teacher preparation, and professional development;

(2) recommendations on best practices for computer science teacher certification, including recommendations on achieving congruence between State computer science teacher certification standards and the content of teacher preparation programs offered by institutions of higher education; and

(3) recommendations for expanding capacity—

(A) to help students understand computer science, the job opportunities available to those who pursue computer science education, and

the importance of computer science in the economy;

(B) to strengthen computer science education in the elementary and secondary public education system in the United States; and

(C) to increase participation in computer science among students underrepresented in computing.

(e) TERMINATION.—The Commission shall terminate on the date that is 30 days after the date of the submission of the report required under subsection (d).

SEC. 6. MODEL TEACHER PREPARATION PROGRAMS.

(a) MODEL TEACHER PREPARATION PROGRAMS.—The Secretary may award grants to institutions of higher education to improve computer science teacher training.

(b) ELIGIBLE ACTIVITIES.—A grant received under subsection (a) shall be used to carry out not less than 1 of the following activities:

(1) Development of courses for undergraduate students that—

(A) prepare such students to teach computer science at the elementary and secondary level;

(B) address content and pedagogy in computer science education; and

(C) engage teacher education and other relevant departments at such institution of higher education.

(2) Development and support of mentoring programs to support computer science teachers who are new to the profession.

(c) DURATION OF GRANTS.—Each grant awarded by the Secretary under this section shall be for a period of 5 years.

(d) LIMITATIONS.—The Secretary may not award grants under this section before the earlier of the date of the submission of the report of the Blue Ribbon Commission on Computer Science Education required under section 5(d), or the date that is 1 year after the date of the enactment of this Act. The Secretary shall consider such report, if available, in awarding grants under this section.

SEC. 7. NATIONAL EVALUATION.

(a) IN GENERAL.—Not earlier than 4 years after the date of the enactment of this Act, the Secretary shall contract with an independent organization for a comprehensive, scientifically valid, and quantitative evaluation of the performance and effectiveness of the activities funded by grants received under this Act in improving the availability and quality of computer science education, the overall participation rate of students in computer science courses,

and the participation rate of students underrepresented in computing in computer science courses.

(b) REPORTING REQUIREMENTS.—

(1) INITIAL REPORT.—Not later than 5 years after the date of the enactment of this Act, the Secretary shall submit to Congress a report on the results of the evaluation described in subsection (a).

(2) REPORT UPDATES.—Not later than 2 years after the date on which the Secretary submits the report required under paragraph (1), and biennially thereafter, the Secretary shall submit to Congress an update of such report.

SEC. 8. DEFINITIONS.

In this Act:

(1) COMPUTER SCIENCE.—The term ''computer science'' means the study of computers and algorithmic processes and includes the study of computing principles, computer hardware and software design, computer applications, and the impact of computers on society.

(2) COMPUTER SCIENCE EDUCATION.—The term ''computer science education'' includes computing education in any of the following:

(A) Software design.

(B) Hardware design.

(C) Creation of digital artifacts.

(D) Abstraction.

(E) Logic.

(F) Algorithm development and implementation.

(G) Programming paradigms and languages.

(H) Theoretical foundations.

(I) Networks.

(J) Graphics.

(K) Databases and information retrieval.

(L) Information security and privacy.

(M) Artificial intelligence.

(N) The relationship between computing and mathematics.

(O) The limits of computation.

(P) Applications in information technology and information systems.

(Q) The social impacts of computing.

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

(4) LOCAL EDUCATIONAL AGENCY.—The term ''local educational agency''—

(A) subject to subparagraph (B), has the meaning given that term in section 9101 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 7801); and

(B) includes any charter school (as defined in section 5210 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 7221i)) that constitutes a local educational agency under State law.

(5) SECRETARY.—The term ''Secretary'' means the Secretary of Education.

(6) STATE EDUCATIONAL AGENCY.—The term ''State educational agency'' has the meaning given that term in section 9101 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 7801).

(7) STATE P–16 OR P–20 COUNCIL.—The term ''State P–16 or P–20 council'' means a body of public officials and public and private sector leaders that—

(A) is established by a State executive order, statute, or voluntary agreement and may be regularly chaired or co-chaired by the Governor of the State;

(B) sets formal aligned expectations for a seamless system of education from the earliest

years of a child's development through the kindergarten through grade 12 system and into and through postsecondary education;

(C) acts as a venue for collaboration across early learning, including preschool through the first 4 years of higher education or through doctoral and professional schools; and

(D) receives State, foundation, business, or other funding to carry out the body's agenda.

(8) STUDENTS UNDERREPRESENTED IN COMPUTING.—The term ''students underrepresented in computing''—

(A) means populations historically underrepresented in computer science disciplines; and

(B) includes females, racial minorities, and low-income students.

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