

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

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.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE.**

4 This Act may be cited as the “Computer Science
5 Education Act of 2011”.

6 **SEC. 2. FINDINGS.**

7 The Congress finds the following:

1 (1) Computing technology, driven by break-
2 throughs in computer science, is an integral part of
3 the culture of the United States and is reshaping
4 how people interact.

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

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

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

18 (5) Computer science is critical for national se-
19 curity and for meeting the challenges that a modern
20 society faces. Of the 14 Grand Challenges for Engi-
21 neering determined by the National Academy of En-
22 gineering, 8 have a predominant or significant com-
23 puter science component.

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

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

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

8 (8) Computer science courses in elementary and
9 secondary schools are fading from the national land-
10 scape at a time when they are most needed. The
11 Computer Science Teachers Association (CSTA) has
12 found that introductory secondary school computer
13 science courses have decreased in number by 17 per-
14 cent since 2005 and the number of Advanced Place-
15 ment (AP) computer science courses has decreased
16 by 33 percent.

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

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

13 (11) While some States, including Texas and
14 Georgia, allow computer science courses to count to-
15 ward a student's secondary school core graduation
16 requirements, most States that have specific course
17 requirements for graduation count computer science
18 courses only as electives, chilling student interest in
19 computer science courses.

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

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

4 (14) Computer science education has been en-
5 cumbered by confusion regarding the related but dis-
6 tinct concepts of computer science education, tech-
7 nology education, and the use of technology in edu-
8 cation.

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

14 (16) The Association for Computing Machinery
15 and the CSTA have established a clear 4-part,
16 grade-appropriate framework of standards for com-
17 puter science education to guide State reform ef-
18 forts.

19 (17) With the growing importance of computing
20 in society, the need for students to understand the
21 fundamentals of computing, and the significant chal-
22 lenges computer science education faces in elemen-
23 tary and secondary education, broad support for
24 computer science education is needed to catalyze re-
25 form.

1 **SEC. 3. STATE COMPREHENSIVE PLANNING GRANTS.**

2 (a) PROGRAM AUTHORIZED.—The Secretary of Edu-
3 cation shall award grants to State educational agencies to
4 develop comprehensive plans to strengthen elementary and
5 secondary computer science education in accordance with
6 this section.

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

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

13 (2) Assess the State's needs for computer
14 science education, particularly for underserved stu-
15 dent populations.

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

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

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

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

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

11 (2) Proposals to improve elementary and sec-
12 ondary computer science education in such State
13 through the development and implementation of—

14 (A) challenging and grade-appropriate aca-
15 demic content standards for computer science
16 at elementary and secondary education levels;

17 (B) grade-appropriate assessments of com-
18 puter science learning;

19 (C) programs to increase access to com-
20 puter science courses for students at low-per-
21 forming schools and students underrepresented
22 in computing;

23 (D) improved computer science teacher
24 certification or licensure requirements and proc-
25 esses;

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

3 (F) programs for ensuring that computer
4 science courses at the secondary education level
5 are considered an integral part of the cur-
6 rriculum students need to be well prepared for
7 higher education and employment.

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

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

16 (f) FUNDING STRUCTURE.—

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

1 (2) COUNTING LOW-INCOME CHILDREN.—

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

6 (i) the number of children aged 5 to
7 17, inclusive, in the State from families
8 below the poverty level, as determined by
9 the Secretary on the basis of the most re-
10 cent satisfactory data;

11 (ii) the number of children (deter-
12 mined for either the preceding year or for
13 the second preceding year, as the Secretary
14 finds appropriate) aged 5 to 17, inclusive,
15 in the State in institutions for neglected
16 and delinquent children (other than such
17 institutions operated by the United
18 States); and

19 (iii) the number of children aged 5 to
20 17, inclusive, in the State from families
21 above the poverty level as determined
22 under section 1124(c)(4)(A) of the Ele-
23 mentary and Secondary Education Act of
24 1965 (20 U.S.C. 6333(c)(4)(A)).

1 (B) METHODOLOGY.—In making computa-
2 tions under subparagraph (A), the Secretary
3 shall use the methodology described in para-
4 graphs (3) through (5) of section 1124(c) of the
5 Elementary and Secondary Education Act of
6 1965 (20 U.S.C. 6333(c)).

7 (3) MINIMUM GRANT.—Notwithstanding para-
8 graph (1), each State educational agency approved
9 by the Secretary to receive a grant under this sec-
10 tion shall receive a minimum grant of \$250,000.

11 **SEC. 4. IMPLEMENTATION GRANTS.**

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

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

19 (1) develop quantifiable benchmarks for the ac-
20 tivities supported under such grant, which may in-
21 clude benchmarks for increasing—

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

24 (B) the number of students that take com-
25 puter science courses;

1 (C) the diversity of students who take com-
2 puter science courses;

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

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

7 and

8 (F) the number of teachers who are cer-
9 tified to teach computer science; and

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

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

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

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

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

22 (4) improved computer science teacher certifi-
23 cation requirements and processes;

24 (5) professional development programs for com-
25 puter science teachers;

1 (6) programs for ensuring that computer
2 science courses at the secondary level are considered
3 an integral part of the curriculum students need to
4 be well prepared for higher education and employ-
5 ment;

6 (7) effective computer science curricula;

7 (8) computer science distance learning pro-
8 grams; and

9 (9) such other activities that strengthen com-
10 puter science education and that such State edu-
11 cational agency considers appropriate.

12 (d) ADMINISTRATIVE EXPENSES.—A State edu-
13 cational agency may use not more than 5 percent of a
14 grant received under this section for administrative ex-
15 penses.

16 (e) PARTNERSHIPS.—In performing the activities re-
17 quired under subsection (c), each State educational agency
18 shall partner with institutions of higher education and
19 local educational agencies, and may partner with nonprofit
20 organizations, businesses, and other State educational
21 agencies.

22 (f) NON-FEDERAL SHARE.—

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

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

4 (2) FINANCIAL HARDSHIP WAIVER.—The Sec-
5 retary may reduce or waive the requirement to pro-
6 vide a non-Federal share under paragraph (1) for a
7 State educational agency if such State educational
8 agency demonstrates a need for such waiver or re-
9 duction due to extreme financial hardship.

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

13 (h) SUBSEQUENT GRANTS.—At the end of the 5-year
14 period for a grant, the grant recipient may apply for an
15 additional grant under this section by submitting an up-
16 dated comprehensive plan that meets the requirements of
17 subsections (b) and (c) of section 3. In considering an ap-
18 plication for a subsequent grant under this section, the
19 Secretary shall take into consideration the reports filed
20 under subsection (l).

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

23 (1) award grants for a fiscal year on a competi-
24 tive basis among State educational agencies that

1 meet the requirements for funding under this sec-
2 tion; and

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

8 (j) FUNDING PRIORITY.—In allocating grant funds
9 received under this section, a State educational agency
10 shall give priority to proposals that include an emphasis
11 on serving low-performing schools and on increasing par-
12 ticipation in computer science by students underrep-
13 resented in computing.

14 (k) SUPPLEMENT, NOT SUPPLANT.—Funds made
15 available to carry out this section shall be used to supple-
16 ment, and not supplant, other Federal and State funds
17 available to carry out the activities described in this sec-
18 tion.

19 (l) REPORTS.—Each State educational agency receiv-
20 ing a grant under this section shall—

21 (1) measure the progress of such State edu-
22 cational agency in achieving the benchmarks devel-
23 oped under subsection (b)(1);

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

1 form that is disaggregated by student race, eth-
2 nicity, gender, disability status, migrant status,
3 English proficiency status, and low-income status,
4 except that such disaggregation shall not be required
5 when the number of students in a category is insuf-
6 ficient to yield statistically reliable results or the re-
7 sults would reveal personally identifiable information
8 about an individual student;

9 (3) collect such other performance information
10 as the Secretary may reasonably require for the na-
11 tional evaluation conducted under section 7;

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

17 (5) not later than 2 years after the date of the
18 submission of the report required under paragraph
19 (4), and biennially thereafter until the State edu-
20 cational agency no longer receives grant funding
21 under this section, submit to the Secretary an up-
22 date of such report.

23 (m) GUIDANCE.—The Secretary shall provide guid-
24 ance to State educational agencies regarding acceptable
25 data sources and methodologies for—

- 1 (1) establishing performance benchmarks; and
- 2 (2) measuring progress by State educational
- 3 agencies receiving grants under this section.

4 **SEC. 5. COMMISSION ON COMPUTER SCIENCE EDUCATION.**

5 (a) COMMISSION.—Not later than 90 days after the
6 date of the enactment of this Act, the Secretary shall es-
7 tablish a Commission, to be known as the “Blue Ribbon
8 Commission on Computer Science Education” (in this sec-
9 tion referred to as the “Commission”), to provide rec-
10 ommendations for expanding and improving computer
11 science education.

12 (b) MEMBERSHIP.—The Commission shall consist of
13 not more than 20 members and shall include not less than
14 1 of each of the following:

- 15 (1) A State education official.
- 16 (2) An expert in computer science.
- 17 (3) A representative of an elementary or sec-
18 ondary computer science education practitioner orga-
19 nization.
- 20 (4) An elementary or secondary computer
21 science teacher.
- 22 (5) A social scientist with expertise on equity
23 issues in the field of computer science.
- 24 (6) A representative of the computing industry
25 or an industry that depends on computing services.

1 (c) REVIEW.—The Commission shall—

2 (1) review the state of elementary and sec-
3 ondary computer science education; and

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

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

11 (1) recommendations on best practices for com-
12 puter science instruction, teacher preparation, and
13 professional development;

14 (2) recommendations on best practices for com-
15 puter science teacher certification, including rec-
16 ommendations on achieving congruence between
17 State computer science teacher certification stand-
18 ards and the content of teacher preparation pro-
19 grams offered by institutions of higher education;
20 and

21 (3) recommendations for expanding capacity—

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

1 the importance of computer science in the econ-
2 omy;

3 (B) to strengthen computer science edu-
4 cation in the elementary and secondary public
5 education system in the United States; and

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

9 (e) TERMINATION.—The Commission shall terminate
10 on the date that is 30 days after the date of the submis-
11 sion of the report required under subsection (d).

12 **SEC. 6. MODEL TEACHER PREPARATION PROGRAMS.**

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

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

19 (1) Development of courses for undergraduate
20 students that—

21 (A) prepare such students to teach com-
22 puter science at the elementary and secondary
23 level;

24 (B) address content and pedagogy in com-
25 puter science education; and

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

4 (2) Development and support of mentoring pro-
5 grams to support computer science teachers who are
6 new to the profession.

7 (c) DURATION OF GRANTS.—Each grant awarded by
8 the Secretary under this section shall be for a period of
9 5 years.

10 (d) LIMITATIONS.—The Secretary may not award
11 grants under this section before the earlier of the date of
12 the submission of the report of the Blue Ribbon Commis-
13 sion on Computer Science Education required under sec-
14 tion 5(d), or the date that is 1 year after the date of the
15 enactment of this Act. The Secretary shall consider such
16 report, if available, in awarding grants under this section.

17 **SEC. 7. NATIONAL EVALUATION.**

18 (a) IN GENERAL.—Not earlier than 4 years after the
19 date of the enactment of this Act, the Secretary shall con-
20 tract with an independent organization for a comprehen-
21 sive, scientifically valid, and quantitative evaluation of the
22 performance and effectiveness of the activities funded by
23 grants received under this Act in improving the availability
24 and quality of computer science education, the overall par-
25 ticipation rate of students in computer science courses,

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

3 (b) REPORTING REQUIREMENTS.—

4 (1) INITIAL REPORT.—Not later than 5 years
5 after the date of the enactment of this Act, the Sec-
6 retary shall submit to Congress a report on the re-
7 sults of the evaluation described in subsection (a).

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

13 **SEC. 8. DEFINITIONS.**

14 In this Act:

15 (1) COMPUTER SCIENCE.—The term “computer
16 science” means the study of computers and algo-
17 rithmic processes and includes the study of com-
18 puting principles, computer hardware and software
19 design, computer applications, and the impact of
20 computers on society.

21 (2) COMPUTER SCIENCE EDUCATION.—The
22 term “computer science education” includes com-
23 puting education in any of the following:

24 (A) Software design.

25 (B) Hardware design.

- 1 (C) Creation of digital artifacts.
- 2 (D) Abstraction.
- 3 (E) Logic.
- 4 (F) Algorithm development and implemen-
- 5 tation.
- 6 (G) Programming paradigms and lan-
- 7 guages.
- 8 (H) Theoretical foundations.
- 9 (I) Networks.
- 10 (J) Graphics.
- 11 (K) Databases and information retrieval.
- 12 (L) Information security and privacy.
- 13 (M) Artificial intelligence.
- 14 (N) The relationship between computing
- 15 and mathematics.
- 16 (O) The limits of computation.
- 17 (P) Applications in information technology
- 18 and information systems.
- 19 (Q) The social impacts of computing.
- 20 (3) INSTITUTION OF HIGHER EDUCATION.—The
- 21 term “institution of higher education” has the
- 22 meaning given that term in section 101(a) of the
- 23 Higher Education Act of 1965 (20 U.S.C. 1001(a)).
- 24 (4) LOCAL EDUCATIONAL AGENCY.—The term
- 25 “local educational agency”—

1 (A) subject to subparagraph (B), has the
2 meaning given that term in section 9101 of the
3 Elementary and Secondary Education Act of
4 1965 (20 U.S.C. 7801); and

5 (B) includes any charter school (as defined
6 in section 5210 of the Elementary and Sec-
7 ondary Education Act of 1965 (20 U.S.C.
8 7221i)) that constitutes a local educational
9 agency under State law.

10 (5) SECRETARY.—The term “Secretary” means
11 the Secretary of Education.

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

16 (7) STATE P-16 OR P-20 COUNCIL.—The term
17 “State P-16 or P-20 council” means a body of pub-
18 lic officials and public and private sector leaders
19 that—

20 (A) is established by a State executive
21 order, statute, or voluntary agreement and may
22 be regularly chaired or co-chaired by the Gov-
23 ernor of the State;

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

1 years of a child’s development through the kin-
2 dergarten through grade 12 system and into
3 and through postsecondary education;

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

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

10 (8) STUDENTS UNDERREPRESENTED IN COM-
11 PUTING.—The term “students underrepresented in
12 computing”—

13 (A) means populations historically under-
14 represented in computer science disciplines; and

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

○