

112TH CONGRESS
1ST SESSION

H. R. 3014

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 HOUSE OF REPRESENTATIVES

SEPTEMBER 22, 2011

Mr. POLIS (for himself, Mr. FILNER, Mr. LANGEVIN, and Mr. REYES) introduced the following bill; which was referred to the Committee on Education and the Workforce

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 certification proc-
23 esses do exist, such processes often have no connec-
24 tion to computer 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 four-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 underrepresented
15 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 level are con-
5 sidered an integral part of the curriculum stu-
6 dents need to be well prepared for higher edu-
7 cation 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 two
15 years.

16 (f) FUNDING STRUCTURE.—

17 (1) IN GENERAL.—The Secretary shall award
18 grants under subsection (a) proportionally among
19 the State educational agencies that apply for grant
20 funding under this section based on the number of
21 low-income children served by the State educational
22 agency compared to the total number of low-income
23 children served by all of the State educational agen-
24 cies that apply for grant funding under this section.

25 (2) COUNTING LOW-INCOME CHILDREN.—

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

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

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

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

24 (B) METHODOLOGY.—In making computa-
25 tions under subparagraph (A), the Secretary

1 shall use the methodology described in para-
2 graphs (3) through (5) of section 1124(c) of the
3 Elementary and Secondary Education Act of
4 1965 (20 U.S.C. 6333(c)).

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

9 (g) AUTHORIZATION OF APPROPRIATIONS.—There is
10 authorized to be appropriated such sums as necessary,
11 subject to the availability of appropriations, to carry out
12 this section.

13 **SEC. 4. IMPLEMENTATION GRANTS.**

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

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

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

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

1 (B) the number of students that take com-
2 puter science courses;

3 (C) the diversity of students who take com-
4 puter science courses;

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

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

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

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

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

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

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

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

24 (4) improved computer science teacher certifi-
25 cation requirements and processes;

1 (5) professional development programs for com-
2 puter science teachers;

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

8 (7) effective computer science curricula;

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

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

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

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

24 (f) NON-FEDERAL SHARE.—

1 (1) IN GENERAL.—Each State educational
2 agency receiving a grant under this section shall
3 provide a non-Federal share, in cash or in-kind, of
4 the funding for the activities described in subsection
5 (c) of not less than 20 percent of the total cost of
6 such activities in any fiscal year.

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

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

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

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

1 (1) award grants for a fiscal year on a competi-
2 tive basis among State educational agencies that
3 meet the requirements for funding under this sec-
4 tion; and

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

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

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

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

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

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

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

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

19 (5) not later than two years after the date of
20 the submission of the report required under para-
21 graph (4), and biennially thereafter until the State
22 educational agency no longer receives grant funding
23 under this section, submit to the Secretary an up-
24 date of such report.

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

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

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

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

15 (b) MEMBERSHIP.—The Commission shall consist of
16 not more than 20 members and shall include at least one
17 of each of the following:

- 18 (1) A State education official.
- 19 (2) An expert in computer science.
- 20 (3) A representative of an elementary or sec-
21 ondary computer science education practitioner orga-
22 nization.
- 23 (4) An elementary or secondary computer
24 science teacher.

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

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

5 (c) REVIEW.—The Commission shall—

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

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

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

15 (1) recommendations on best practices for com-
16 puter science instruction, teacher preparation, and
17 professional development;

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

25 (3) recommendations for expanding capacity—

1 (A) to help students understand computer
2 science, the job opportunities available to those
3 who pursue computer science education, and
4 the importance of computer science in the econ-
5 omy;

6 (B) to strengthen computer science edu-
7 cation in the elementary and secondary public
8 education system in the United States; and

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

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

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

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

19 (b) ELIGIBLE ACTIVITIES.—A grant received under
20 subsection (a) shall be used to carry out at least one of
21 the following activities:

22 (1) Development of courses for undergraduate
23 students that—

1 (A) prepare such students to teach com-
2 puter science at the elementary and secondary
3 level;

4 (B) address content and pedagogy in com-
5 puter science education; and

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

9 (2) Development and support of mentoring pro-
10 grams to support computer science teachers who are
11 new to the profession.

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

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

23 **SEC. 7. NATIONAL EVALUATION.**

24 (a) IN GENERAL.—Not earlier than four years after
25 the date of the enactment of this Act, the Secretary shall

1 contract with an independent organization for a com-
2 prehensive, scientifically valid, and quantitative evaluation
3 of the performance and effectiveness of the activities fund-
4 ed by grants received under this Act in improving the
5 availability and quality of computer science education, the
6 overall participation rate of students in computer science
7 courses, and the participation rate of students underrep-
8 resented in computing in computer science courses.

9 (b) REPORTING REQUIREMENTS.—

10 (1) INITIAL REPORT.—Not later than five years
11 after the date of the enactment of this Act, the Sec-
12 retary shall submit to Congress a report on the re-
13 sults of the evaluation described in subsection (a).

14 (2) REPORT UPDATES.—Not later than two
15 years after the date on which the Secretary submits
16 the report required under paragraph (1), and bienni-
17 ally thereafter, the Secretary shall submit to Con-
18 gress an update of such report.

19 **SEC. 8. DEFINITIONS.**

20 In this Act:

21 (1) COMPUTER SCIENCE.—The term “computer
22 science” means the study of computers and algo-
23 rithmic processes and includes the study of com-
24 puting principles, computer hardware and software

1 design, computer applications, and the impact of
2 computers on society.

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

6 (A) Software design.

7 (B) Hardware design.

8 (C) Creation of digital artifacts.

9 (D) Abstraction.

10 (E) Logic.

11 (F) Algorithm development and implemen-
12 tation.

13 (G) Programming paradigms and lan-
14 guages.

15 (H) Theoretical foundations.

16 (I) Networks.

17 (J) Graphics.

18 (K) Databases and information retrieval.

19 (L) Information security and privacy.

20 (M) Artificial intelligence.

21 (N) The relationship between computing
22 and mathematics.

23 (O) The limits of computation.

24 (P) Applications in information technology
25 and information systems.

1 (Q) The social impacts of computing.

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

6 (4) LOCAL EDUCATIONAL AGENCY.—The term
7 “local educational agency”—

8 (A) subject to subparagraph (B), has the
9 meaning given that term in section 9101(26) of
10 the Elementary and Secondary Education Act
11 of 1965 (20 U.S.C. 7801(26)); and

12 (B) includes any charter school (as defined
13 in section 5210(1) of the Elementary and Sec-
14 ondary Education Act of 1965 (20 U.S.C.
15 7221i(1))) that constitutes a local educational
16 agency under State law.

17 (5) SECRETARY.—The term “Secretary” means
18 the Secretary of Education.

19 (6) STATE EDUCATIONAL AGENCY.—The term
20 “State educational agency” has the meaning given
21 that term in section 9101(41) of the Elementary
22 and Secondary Education Act of 1965 (20 U.S.C.
23 7801(41)).

24 (7) STATE P-16 OR P-20 COUNCIL.—The term
25 “State P-16 or P-20 council” means a body of pub-

1 lic officials and public and private sector leaders
2 that—

3 (A) is established by a State executive
4 order, statute, or voluntary agreement and may
5 be regularly chaired or co-chaired by the Gov-
6 ernor of the State;

7 (B) sets formal aligned expectations for a
8 seamless system of education from the earliest
9 years of a child’s development through the kin-
10 dergarten through grade 12 system and into
11 and through postsecondary education;

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

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

18 (8) STUDENTS UNDERREPRESENTED IN COM-
19 PUTING.—The term “students underrepresented in
20 computing”—

21 (A) means populations historically under-
22 represented in computer science disciplines; and

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

○