

[111H5929]

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(Original Signature of Member)

112TH CONGRESS  
1ST SESSION

**H. R.** \_\_\_\_\_

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

Mr. POLIS introduced the following bill; which was referred to the Committee  
on \_\_\_\_\_  
\_\_\_\_\_

**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.