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IN THE SENATE OF THE UNITED STATES

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Received; read twice and referred to the Committee on Health, Education,
Labor, and Pensions

AN ACT

To establish and expand programs relating to science, mathematics, engineering, and technology 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,*

1 **SECTION 1. SHORT TITLE.**

2 This Act may be cited as the “National Science Edu-
3 cation Act”.

4 **SEC. 2. FINDINGS.**

5 Congress finds the following:

6 (1) As concluded in the report of the Com-
7 mittee on Science of the House of Representatives,
8 “Unlocking Our Future Toward a New National
9 Science Policy”, the United States must maintain
10 and improve its preeminent position in science and
11 technology in order to advance human under-
12 standing of the universe and all it contains, and to
13 improve the lives, health, and freedoms of all people.

14 (2) It is estimated that more than half of the
15 economic growth of the United States today results
16 directly from research and development in science
17 and technology. The most fundamental research is
18 responsible for investigating our perceived universe,
19 to extend our observations to the outer limits of
20 what our minds and methods can achieve, and to
21 seek answers to questions that have never been
22 asked before. Applied research continues the process
23 by applying the answers from basic science to the
24 problems faced by individuals, organizations, and
25 governments in the everyday activities that make our
26 lives more livable. The scientific-technological sector

1 of our economy, which has driven our recent eco-
2 nomic boom and led the United States to the longest
3 period of prosperity in history, is fueled by the work
4 and discoveries of the scientific community.

5 (3) The effectiveness of the United States in
6 maintaining this economic growth will be largely de-
7 termined by the intellectual capital of the United
8 States. Education is critical to developing this re-
9 source.

10 (4) The education program of the United States
11 needs to provide for 3 different kinds of intellectual
12 capital. First, it needs scientists, mathematicians,
13 and engineers to continue the research and develop-
14 ment that are central to the economic growth of the
15 United States. Second, it needs technologically pro-
16 ficient workers who are comfortable and capable
17 dealing with the demands of a science-based, high-
18 technology workplace. Last, it needs scientifically lit-
19 erate voters and consumers to make intelligent deci-
20 sions about public policy.

21 (5) Student performance on the recent Third
22 International Mathematics and Science Study high-
23 lights the shortcomings of current K–12 science and
24 mathematics education in the United States, par-
25 ticularly when compared to other countries. We must

1 expect more from our Nation's educators and stu-
2 dents if we are to build on the accomplishments of
3 previous generations. New methods of teaching
4 science, mathematics, engineering, and technology
5 are required, as well as better curricula and im-
6 proved training of teachers.

7 (6) Science is more than a collection of facts,
8 theories, and results. It is a process of inquiry built
9 upon observations and data that leads to a way of
10 knowing and explaining in logically derived concepts
11 and theories. Mathematics is more than procedures
12 to be memorized. It is a field that requires rea-
13 soning, understanding, and making connections in
14 order to solve problems. Engineering is more than
15 just designing and building. It is the process of mak-
16 ing compromises to optimize design and assessing
17 risks so that designs and products best solve a given
18 problem. Technology is more than using computer
19 applications, the Internet, and programming. Tech-
20 nology is the innovation, change, or modification of
21 the natural environment, based on scientific, mathe-
22 matical, and engineering principles.

23 (7) Students should learn science primarily by
24 doing science. Science education ought to reflect the
25 scientific process and be object-oriented, experiment-

1 centered, and concept-based. Students should learn
2 mathematics with understanding that numeric sys-
3 tems have intrinsic properties that can represent ob-
4 jects and systems in real life, and can be applied in
5 solving problems. Engineering education should re-
6 flect the realities of real world design, and should in-
7 volve hands-on projects and require students to
8 make trade-offs based upon evidence. Students
9 should learn technology as both a tool to solve other
10 problems and as a process by which people adapt the
11 natural world to suit their own purposes. Computers
12 represent a particularly useful form of technology,
13 enabling students and teachers to acquire data,
14 model systems, visualize phenomena, communicate
15 and organize information, and collaborate with oth-
16 ers in powerful new ways. A background in the ba-
17 sics of information technology is essential for success
18 in the modern workplace and the modern world.

19 (8) Children are naturally curious and inquisi-
20 tive. To successfully tap into these innate qualities,
21 education in science, mathematics, engineering, and
22 technology must begin at an early age and continue
23 throughout the entire school experience.

24 (9) Teachers provide the essential connection
25 between students and the content they are learning.

1 Prospective teachers need to be identified and re-
2 cruited by presenting to them a career that is re-
3 spected by their peers, is financially and intellectu-
4 ally rewarding, contains sufficient opportunities for
5 advancement, and has continuing access to profes-
6 sional development.

7 (10) Teachers need to have incentives to remain
8 in the classroom and improve their practice, and
9 training of teachers is essential if the results are to
10 be good. Teachers need to be knowledgeable of their
11 content area, of their curriculum, of up-to-date re-
12 search in teaching and learning, and of techniques
13 that can be used to connect that information to their
14 students in their classroom.

15 **SEC. 3. DUPLICATION OF PROGRAMS.**

16 (a) IN GENERAL.—The Director of the National
17 Science Foundation shall review the education programs
18 of the National Science Foundation that are in operation
19 as of the date of enactment of this Act to determine
20 whether any of such programs duplicate the programs au-
21 thorized in this Act.

22 (b) IMPLEMENTATION.—(1) As programs authorized
23 in this Act are implemented, the Director shall terminate
24 any existing duplicative program or merge the duplicative
25 program into a program authorized in this Act.

1 (2) The Director shall not establish any new program
2 that duplicates a program that has been implemented pur-
3 suant to this Act.

4 (c) REPORT.—(1) The Director of the Office of
5 Science and Technology Policy shall review the education
6 programs of the National Science Foundation to ensure
7 compliance with the provisions of this section.

8 (2) Not later than one year after the date of the en-
9 actment of this Act, the Director of the Office of Science
10 and Technology Policy shall complete a report on the re-
11 view carried out under this subsection and shall submit
12 the report to the Committee on Science, the Committee
13 on Education and the Workforce, and the Committee on
14 Appropriations of the House of Representatives.

15 (3) Beginning one year after the date of enactment
16 of this Act, the Director of the Office of Science and Tech-
17 nology Policy, shall, as part of the annual budget submis-
18 sion to Congress, submit an updated version of the report
19 required by paragraph (2).

20 **SEC. 4. MASTER TEACHER GRANT PROGRAM.**

21 (a) DEFINITIONS.—In this section—

22 (1) The term “sponsoring school” means an ele-
23 mentary or secondary school that employs a teacher
24 who is participating in a program funded in accord-
25 ance with this section.

1 (2) The term “nonclassroom time” means time
2 during regular school hours that is not utilized by a
3 master teacher for instructing elementary or sec-
4 ondary school children in the classroom.

5 (3) The term “master teacher” means a mathe-
6 matics or science teacher who works to improve the
7 instruction of mathematics or science in kinder-
8 garten through 9th grade through—

9 (A) participating in the development or re-
10 vision of science, mathematics, engineering, or
11 technology curricula;

12 (B) serving as a mentor to mathematics or
13 science teachers at the sponsoring school or
14 other schools;

15 (C) coordinating and assisting teachers in
16 the use of hands-on inquiry materials, equip-
17 ment, and supplies, and when appropriate, su-
18 pervising acquisition and repair of such mate-
19 rials;

20 (D) providing in-classroom teaching assist-
21 ance to mathematics or science teachers; and

22 (E) providing professional development, in-
23 cluding for the purposes of training other mas-
24 ter teachers, to mathematics and science teach-
25 ers.

1 (4) The term “mathematics or science teacher”
2 means a teacher of mathematics, science, engineer-
3 ing, or technology in an elementary or secondary
4 school.

5 (b) PROGRAM AUTHORIZED.—(1) The Director of the
6 National Science Foundation shall establish a program to
7 award competitive, merit-reviewed grants to institutions of
8 higher education (or consortia thereof) to train master
9 teachers and assist elementary and secondary schools to
10 design and implement master teacher programs.

11 (2) Institutions of higher education receiving grants
12 under this section shall offer programs to train master
13 teachers. As part of such programs, a grantee shall—

14 (A) recruit and select teachers to receive train-
15 ing;

16 (B) ensure that training covers both content
17 and pedagogy;

18 (C) ensure that participating teachers have
19 mentors; and

20 (D) assist participating teachers with the devel-
21 opment and implementation of master teacher pro-
22 grams at their sponsoring schools.

23 (3) Grants awarded under this section may be used
24 to—

1 (A) develop and implement professional develop-
2 ment programs to train elementary or secondary
3 school teachers to become master teachers and to
4 train existing master teachers;

5 (B) provide stipends and reimbursement for
6 travel to allow teachers to participate in professional
7 development programs in the summer and through-
8 out the year;

9 (C) provide guidance to sponsoring schools to
10 enable them to develop and implement a plan for the
11 use of master teachers;

12 (D) support participating teachers during the
13 summer in research programs conducted at institu-
14 tions of higher education, private entities, or govern-
15 ment facilities;

16 (E) provide educational materials and equip-
17 ment to master teachers;

18 (F) provide computer equipment and network
19 connectivity necessary to enable master teachers to
20 collaborate with other master teachers, to access
21 educational materials available online, and to com-
22 municate with scientists or other mentors at remote
23 locations; and

24 (G) fund any other activities the Director deter-
25 mines will accomplish the goals of this section.

1 (c) SELECTION PROCESS.—(1) An institution of
2 higher education seeking funding under this section shall
3 submit an application at such time, in such manner, and
4 containing such information as the Director may require.
5 The application shall include, at a minimum—

6 (A) a description of which classroom subjects
7 and grade levels the training will address;

8 (B) a description of the activities to be carried
9 out, including—

10 (i) how such activities will be aligned with
11 State and local standards and with other activi-
12 ties that promote student achievement in math-
13 ematics and science; and

14 (ii) how such activities will be based on a
15 review of relevant research and why such activi-
16 ties are expected to strengthen the quality of
17 mathematics and science instruction;

18 (C) a description of how the applicant will en-
19 sure the active participation of its mathematics,
20 science, or engineering departments in the develop-
21 ment and implementation of the program;

22 (D) an explanation of how the program will en-
23 sure that teachers are given instruction in both con-
24 tent and pedagogy;

1 (E) a description of how the applicant will re-
2 cruit teachers to participate in the program and the
3 criteria that will be used to select the participants;

4 (F) a description of the type and amount of any
5 financial assistance that will be provided to teachers
6 to enable them to participate; and

7 (G) a description of how the applicant will work
8 with schools to ensure the success of the partici-
9 pating teachers.

10 (2) In evaluating the applications submitted under
11 this subsection, the Director shall consider, at a
12 minimum—

13 (A) the ability of the applicant to effectively
14 carry out the proposed program;

15 (B) the experience the applicant has in devel-
16 oping and implementing high-quality professional de-
17 velopment programs for mathematics or science
18 teachers; and

19 (C) the extent to which the applicant is com-
20 mitted to making the program a central organiza-
21 tional focus.

22 (3) In evaluating the applications submitted under
23 this subsection, the Director shall give priority to those
24 applications that demonstrate the greatest participation of
25 mathematics, science, or engineering departments.

1 (d) TEACHER ELIGIBILITY.—(1) To be eligible to
2 participate in a program funded under this section, a
3 mathematics or science teacher shall submit to the Direc-
4 tor, at such time and in such manner as the Director may
5 require, an assurance executed by the sponsoring school,
6 that, after completing the program funded by this section,
7 the participating teacher will be provided sufficient non-
8 classroom time to serve as a master teacher. A copy of
9 this assurance must be submitted to the institution of
10 higher education as part of the teacher’s application to
11 participate in the master teacher program.

12 (2) No funds authorized by this section may be used
13 to train any teacher who has not complied with paragraph
14 (1).

15 (e) ACCOUNTABILITY AND DISSEMINATION.—(1) The
16 Director shall evaluate the activities carried out under this
17 section. At a minimum such evaluations shall use a com-
18 mon set of benchmarks and assessment tools to identify
19 best practices and materials developed and demonstrated
20 with funds provided under this section.

21 (2) The results of the evaluations required under this
22 subsection shall be made available to the public, including
23 through the National Science, Mathematics, Engineering,
24 and Technology Education Digital Library, and shall be
25 provided to the Committee on Science of the House of

1 Representatives and the Committee on Health, Education,
2 Labor, and Pensions of the Senate.

3 (3) Materials developed under the program estab-
4 lished under this section that are demonstrated to be effec-
5 tive shall be made available through the National Science,
6 Mathematics, Engineering, and Technology Education
7 Digital Library.

8 (f) AUTHORIZATION OF APPROPRIATIONS.—There
9 are authorized to be appropriated to the National Science
10 Foundation to carry out this section \$50,000,000 for each
11 of fiscal years 2002 through 2004.

12 **SEC. 5. DISSEMINATION OF INFORMATION ON REQUIRED**
13 **COURSE OF STUDY FOR CAREERS IN**
14 **SCIENCE, MATHEMATICS, ENGINEERING, AND**
15 **TECHNOLOGY EDUCATION.**

16 (a) IN GENERAL.—The Director of the National
17 Science Foundation shall, jointly with the Secretary of
18 Education, compile and disseminate information (includ-
19 ing through outreach, school counselor education, and vis-
20 iting speakers) regarding—

21 (1) typical standard prerequisites for middle
22 school and high school students who seek to enter a
23 course of study at an institution of higher education
24 in science, mathematics, engineering, or technology

1 education for purposes of teaching in an elementary
2 or secondary school; and

3 (2) the licensing requirements in each State for
4 science, mathematics, engineering, or technology ele-
5 mentary or secondary school teachers.

6 (b) LOCAL CONTROL.—Nothing in this section shall
7 be construed to authorize an officer or employee of the
8 Federal Government to direct, review, or control the in-
9 structional content, curriculum, or related activities of a
10 State or local educational agency or a school.

11 (c) AUTHORIZATION OF APPROPRIATIONS.—There
12 are authorized to be appropriated to the National Science
13 Foundation to carry out this section \$5,000,000 for each
14 of fiscal years 2002 through 2004.

15 **SEC. 6. REQUIREMENT TO CONDUCT STUDY EVALUATION.**

16 (a) STUDY REQUIRED.—The Director of the National
17 Science Foundation shall enter into an agreement with the
18 National Academies of Sciences and Engineering under
19 which the Academies shall review existing studies on the
20 effectiveness of technology in the classroom on learning
21 and student performance, using various measures of learn-
22 ing and teaching outcome including standardized tests of
23 student achievement, and explore the feasibility of one or
24 more methodological frameworks to be used in evaluations
25 of technologies that have different purposes and are used

1 by schools and school systems with diverse educational
2 goals. The study evaluation shall include, to the extent
3 available, information on the type of technology used in
4 each classroom, the reason that such technology works,
5 and the teacher training that is conducted in conjunction
6 with the technology.

7 (b) DEADLINE FOR COMPLETION.—The study eval-
8 uation required by subsection (a) shall be completed not
9 later than one year after the date of the enactment of this
10 Act.

11 (c) DEFINITION OF TECHNOLOGY.—In this section,
12 the term “technology” has the meaning given that term
13 in section 3113(11) of the Elementary and Secondary
14 Education Act of 1965 (20 U.S.C. 6813(11)).

15 (d) AUTHORIZATION OF APPROPRIATIONS.—There
16 are authorized to be appropriated to the National Science
17 Foundation for the purpose of conducting the study eval-
18 uation required by subsection (a), \$600,000.

19 **SEC. 7. SCIENCE, MATHEMATICS, ENGINEERING, AND**
20 **TECHNOLOGY BUSINESS EDUCATION CON-**
21 **ERENCE.**

22 (a) IN GENERAL.—Not later than 180 days after the
23 date of the enactment of this Act, the Director of the Na-
24 tional Science Foundation shall convene the first of an an-
25 nual 3- to 5-day conference for kindergarten through 12th

1 grade science, mathematics, engineering, and technology
2 education stakeholders, including—

3 (1) representatives from Federal, State, and
4 local governments, private industries, private busi-
5 nesses, and professional organizations;

6 (2) educators;

7 (3) science, mathematics, engineering, and tech-
8 nology educational resource providers;

9 (4) students; and

10 (5) any other stakeholders the Director deter-
11 mines would provide useful participation in the con-
12 ference.

13 (b) PURPOSES.—The purposes of the conference con-
14 vened under subsection (a) shall be to—

15 (1) identify and gather information on existing
16 science, mathematics, engineering, and technology
17 education programs and resource providers, includ-
18 ing information on distribution, partners, cost as-
19 sessment, and derivation;

20 (2) determine the extent of any existing coordi-
21 nation between providers of curricular activities, ini-
22 tiatives, and units; and

23 (3) identify the common goals and differences
24 among the participants at the conference.

1 (c) REPORT AND PUBLICATION.—At the conclusion
2 of the conference the Director shall—

3 (1) transmit to the Committee on Science of the
4 House of Representatives and to the Committee on
5 Commerce, Science, and Transportation of the Sen-
6 ate a report on the outcome and conclusions of the
7 conference, including an inventory of curricular ac-
8 tivities, initiatives, and units, the content of the con-
9 ference, and strategies developed that will support
10 partnerships and leverage resources; and

11 (2) ensure that a similar report is published
12 and distributed as widely as possible to stakeholders
13 in science, mathematics, engineering, and technology
14 education.

15 (d) AUTHORIZATION OF APPROPRIATIONS.—There
16 are authorized to be appropriated to the National Science
17 Foundation to carry out this section—

18 (1) \$300,000 for fiscal year 2002; and

19 (2) \$200,000 for each of fiscal years 2003 and
20 2004.

21 **SEC. 8. DISTANCE LEARNING GRANTS.**

22 (a) IN GENERAL.—The Director of the National
23 Science Foundation shall establish a program to award
24 competitive, merit-based grants to institutions of higher
25 education to provide distance learning opportunities in

1 mathematics or science to elementary or secondary school
2 students.

3 (b) USE OF FUNDS.—Grants awarded under this sec-
4 tion shall be used by institutions of higher education to
5 establish programs under which elementary or secondary
6 school students can participate in research activities in
7 mathematics or science occurring at the grantees' institu-
8 tion via the Internet.

9 (c) SELECTION PROCESS.—(1) An institution of
10 higher education seeking funding under this section shall
11 submit an application at such time, in such manner, and
12 containing such information as the Director may require.
13 The application shall include, at a minimum—

14 (A) a description of the research opportunities
15 that will be offered;

16 (B) a description of how the applicant will pub-
17 licize these research opportunities to schools and
18 teachers;

19 (C) a description of how the applicant will in-
20 volve teachers of participating students in the pro-
21 gram;

22 (D) a description of how students will be se-
23 lected to participate;

24 (E) a description of how the institution of high-
25 er education will ensure that the research is enhance-

1 ing the participants' education and will make it
2 more likely that the participants will continue their
3 studies in mathematics or science; and

4 (F) a description of how the funds will be
5 spent.

6 (2) In evaluating the applications submitted under
7 this subsection, the Director shall consider—

8 (A) the ability of the applicant to effectively
9 carry out the proposed program;

10 (B) the extent to which the proposed program
11 will enhance the participants' education and encour-
12 age them to continue the study of mathematics or
13 science; and

14 (C) the extent to which the proposed program
15 will provide opportunities that would not otherwise
16 be available to students.

17 (3) The Director shall ensure, to the extent prac-
18 ticable, that the program established under this section
19 serves students in a wide range of geographic areas and
20 in rural, suburban, and urban schools.

21 (d) AUTHORIZATION OF APPROPRIATIONS.—There
22 are authorized to be appropriated to the National Science
23 Foundation to carry out this section \$5,000,000 for each
24 of the fiscal years 2002 through 2004.

1 **SEC. 9. COORDINATION.**

2 In carrying out the activities authorized by this Act,
3 the Director of the National Science Foundation shall con-
4 sult and coordinate with the Secretary of Education to en-
5 sure close cooperation with programs authorized under the
6 Elementary and Secondary Education Act of 1965 (Public
7 Law 89–10).

8 **SEC. 10. DEFINITIONS.**

9 In this Act:

10 (1) The term “elementary school” has the
11 meaning given that term by section 14101(14) of
12 the Elementary and Secondary Education Act of
13 1965 (20 U.S.C. 8801(14)).

14 (2) The term “secondary school” has the mean-
15 ing given that term by section 14101(26) of the Ele-
16 mentary and Secondary Education Act of 1965 (20
17 U.S.C. 8801(26)).

18 (3) The term “institution of higher education”
19 has the meaning given that term by section 101 of
20 the Higher Education Act of 1965 (20 U.S.C.
21 1001).

Passed the House of Representatives July 30, 2001.

Attest:

JEFF TRANDAHL,

Clerk.