107TH CONGRESS
1ST SESSION

H. R. 100

IN THE SENATE OF THE UNITED STATES

JULY 31, 2001

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.

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

SECTION 1. SHORT TITLE.

This Act may be cited as the ''National Science Education Act''.

SEC. 2. FINDINGS.

Congress finds the following:

(1) As concluded in the report of the Committee on Science of the House of Representatives, ''Unlocking Our Future Toward a New National Science Policy'', the United States must maintain and improve its preeminent position in science and technology in order to advance human understanding of the universe and all it contains, and to improve the lives, health, and freedoms of all people.

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

of our economy, which has driven our recent economic boom and led the United States to the longest period of prosperity in history, is fueled by the work and discoveries of the scientific community.

(3) The effectiveness of the United States in maintaining this economic growth will be largely determined by the intellectual capital of the United States. Education is critical to developing this resource.

(4) The education program of the United States needs to provide for 3 different kinds of intellectual capital. First, it needs scientists, mathematicians, and engineers to continue the research and development that are central to the economic growth of the United States. Second, it needs technologically proficient workers who are comfortable and capable dealing with the demands of a science-based, high-technology workplace. Last, it needs scientifically literate voters and consumers to make intelligent decisions about public policy.

(5) Student performance on the recent Third International Mathematics and Science Study highlights the shortcomings of current K–12 science and mathematics education in the United States, particularly when compared to other countries. We must

expect more from our Nation's educators and students if we are to build on the accomplishments of previous generations. New methods of teaching science, mathematics, engineering, and technology are required, as well as better curricula and improved training of teachers.

(6) Science is more than a collection of facts, theories, and results. It is a process of inquiry built upon observations and data that leads to a way of knowing and explaining in logically derived concepts and theories. Mathematics is more than procedures to be memorized. It is a field that requires reasoning, understanding, and making connections in order to solve problems. Engineering is more than just designing and building. It is the process of making compromises to optimize design and assessing risks so that designs and products best solve a given problem. Technology is more than using computer applications, the Internet, and programming. Technology is the innovation, change, or modification of the natural environment, based on scientific, mathematical, and engineering principles.

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

centered, and concept-based. Students should learn mathematics with understanding that numeric systems have intrinsic properties that can represent objects and systems in real life, and can be applied in solving problems. Engineering education should reflect the realities of real world design, and should involve hands-on projects and require students to make trade-offs based upon evidence. Students should learn technology as both a tool to solve other problems and as a process by which people adapt the natural world to suit their own purposes. Computers represent a particularly useful form of technology, enabling students and teachers to acquire data, model systems, visualize phenomena, communicate and organize information, and collaborate with others in powerful new ways. A background in the basics of information technology is essential for success in the modern workplace and the modern world.

(8) Children are naturally curious and inquisitive. To successfully tap into these innate qualities, education in science, mathematics, engineering, and technology must begin at an early age and continue throughout the entire school experience.

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

Prospective teachers need to be identified and recruited by presenting to them a career that is respected by their peers, is financially and intellectually rewarding, contains sufficient opportunities for advancement, and has continuing access to professional development.

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

SEC. 3. DUPLICATION OF PROGRAMS.

(a) IN GENERAL.—The Director of the National Science Foundation shall review the education programs of the National Science Foundation that are in operation as of the date of enactment of this Act to determine whether any of such programs duplicate the programs authorized in this Act.

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

(2) The Director shall not establish any new program that duplicates a program that has been implemented pursuant to this Act.

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

(2) Not later than one year after the date of the enactment of this Act, the Director of the Office of Science and Technology Policy shall complete a report on the review carried out under this subsection and shall submit the report to the Committee on Science, the Committee on Education and the Workforce, and the Committee on Appropriations of the House of Representatives.

(3) Beginning one year after the date of enactment of this Act, the Director of the Office of Science and Technology Policy, shall, as part of the annual budget submission to Congress, submit an updated version of the report required by paragraph (2).

SEC. 4. MASTER TEACHER GRANT PROGRAM.

(a) DEFINITIONS.—In this section—

(1) The term ''sponsoring school'' means an elementary or secondary school that employs a teacher who is participating in a program funded in accordance with this section.

(2) The term ''nonclassroom time'' means time during regular school hours that is not utilized by a master teacher for instructing elementary or secondary school children in the classroom.

(3) The term ''master teacher'' means a mathematics or science teacher who works to improve the instruction of mathematics or science in kindergarten through 9th grade through—

(A) participating in the development or revision of science, mathematics, engineering, or technology curricula;

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

(C) coordinating and assisting teachers in the use of hands-on inquiry materials, equipment, and supplies, and when appropriate, supervising acquisition and repair of such materials;

(D) providing in-classroom teaching assistance to mathematics or science teachers; and

(E) providing professional development, including for the purposes of training other master teachers, to mathematics and science teachers.

(4) The term ''mathematics or science teacher'' means a teacher of mathematics, science, engineering, or technology in an elementary or secondary school.

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

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

(A) recruit and select teachers to receive training;

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

(C) ensure that participating teachers have mentors; and

(D) assist participating teachers with the development and implementation of master teacher programs at their sponsoring schools.

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

(A) develop and implement professional development programs to train elementary or secondary school teachers to become master teachers and to train existing master teachers;

(B) provide stipends and reimbursement for travel to allow teachers to participate in professional development programs in the summer and throughout the year;

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

(D) support participating teachers during the summer in research programs conducted at institutions of higher education, private entities, or government facilities;

(E) provide educational materials and equipment to master teachers;

(F) provide computer equipment and network connectivity necessary to enable master teachers to collaborate with other master teachers, to access educational materials available online, and to communicate with scientists or other mentors at remote locations; and

(G) fund any other activities the Director determines will accomplish the goals of this section.

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

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

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

(i) how such activities will be aligned with State and local standards and with other activities that promote student achievement in mathematics and science; and

(ii) how such activities will be based on a review of relevant research and why such activities are expected to strengthen the quality of mathematics and science instruction;

(C) a description of how the applicant will ensure the active participation of its mathematics, science, or engineering departments in the development and implementation of the program;

(D) an explanation of how the program will ensure that teachers are given instruction in both content and pedagogy;

(E) a description of how the applicant will recruit teachers to participate in the program and the criteria that will be used to select the participants;

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

(G) a description of how the applicant will work with schools to ensure the success of the participating teachers.

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

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

(B) the experience the applicant has in developing and implementing high-quality professional development programs for mathematics or science teachers; and

(C) the extent to which the applicant is committed to making the program a central organizational focus.

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

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

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

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

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

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

(3) Materials developed under the program established under this section that are demonstrated to be effective shall be made available through the National Science, Mathematics, Engineering, and Technology Education Digital Library.

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

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

(a) IN GENERAL.—The Director of the National Science Foundation shall, jointly with the Secretary of Education, compile and disseminate information (including through outreach, school counselor education, and visiting speakers) regarding—

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

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

(2) the licensing requirements in each State for science, mathematics, engineering, or technology elementary or secondary school teachers.

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

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

SEC. 6. REQUIREMENT TO CONDUCT STUDY EVALUATION.

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

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

(b) DEADLINE FOR COMPLETION.—The study evaluation required by subsection (a) shall be completed not later than one year after the date of the enactment of this Act.

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

(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the National Science Foundation for the purpose of conducting the study evaluation required by subsection (a), $600,000.

SEC. 7. SCIENCE, MATHEMATICS, ENGINEERING, AND TECHNOLOGY BUSINESS EDUCATION CONFERENCE.

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

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

(1) representatives from Federal, State, and local governments, private industries, private businesses, and professional organizations;

(2) educators;

(3) science, mathematics, engineering, and technology educational resource providers;

(4) students; and

(5) any other stakeholders the Director determines would provide useful participation in the conference.

(b) PURPOSES.—The purposes of the conference convened under subsection (a) shall be to—

(1) identify and gather information on existing science, mathematics, engineering, and technology education programs and resource providers, including information on distribution, partners, cost assessment, and derivation;

(2) determine the extent of any existing coordination between providers of curricular activities, initiatives, and units; and

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

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

(1) transmit to the Committee on Science of the House of Representatives and to the Committee on Commerce, Science, and Transportation of the Senate a report on the outcome and conclusions of the conference, including an inventory of curricular activities, initiatives, and units, the content of the conference, and strategies developed that will support partnerships and leverage resources; and

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

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

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

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

SEC. 8. DISTANCE LEARNING GRANTS.

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

mathematics or science to elementary or secondary school students.

(b) USE OF FUNDS.—Grants awarded under this section shall be used by institutions of higher education to establish programs under which elementary or secondary school students can participate in research activities in mathematics or science occurring at the grantees' institution via the Internet.

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

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

(B) a description of how the applicant will publicize these research opportunities to schools and teachers;

(C) a description of how the applicant will involve teachers of participating students in the program;

(D) a description of how students will be selected to participate;

(E) a description of how the institution of higher education will ensure that the research is enhanc-

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

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

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

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

(B) the extent to which the proposed program will enhance the participants' education and encourage them to continue the study of mathematics or science; and

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

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

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

SEC. 9. COORDINATION.

In carrying out the activities authorized by this Act, the Director of the National Science Foundation shall consult and coordinate with the Secretary of Education to ensure close cooperation with programs authorized under the Elementary and Secondary Education Act of 1965 (Public Law 89–10).

SEC. 10. DEFINITIONS.

In this Act:

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

(2) The term ''secondary school'' has the meaning given that term by section 14101(26) of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 8801(26)).

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

Passed the House of Representatives July 30, 2001.

Attest: JEFF TRANDAHL,

Clerk.