

116TH CONGRESS
2D SESSION

S. 4972

To direct the Director of the National Science Foundation to support STEM education and workforce development research focused on rural areas, and for other purposes.

IN THE SENATE OF THE UNITED STATES

DECEMBER 8, 2020

Mr. WICKER (for himself and Ms. ROSEN) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

A BILL

To direct the Director of the National Science Foundation to support STEM education and workforce development research focused on rural areas, 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 “Rural STEM Edu-
5 cation Act”.

6 **SEC. 2. FINDINGS.**

7 Congress finds the following:

8 (1) The supply of STEM workers is not keeping
9 pace with the rapidly evolving needs of the public

1 and private sector, resulting in a deficit often re-
2 ferred to as a STEM skills shortage.

3 (2) According to the Bureau of Labor Statis-
4 tics, the United States will need 1,000,000 more
5 STEM professionals than the United States is on
6 track to produce in the coming decade.

7 (3) Many STEM occupations offer higher
8 wages, more opportunities for advancement, and a
9 higher degree of job security than non-STEM jobs.

10 (4) The 60,000,000 individuals in the United
11 States who live in rural settings are significantly
12 under-represented in STEM.

13 (5) According to the National Center for Edu-
14 cation Statistics, 9,000,000 students in the United
15 States, an amount equal to nearly 20 percent of the
16 total population of students in kindergarten through
17 grade 12, attend rural schools, and for reasons rang-
18 ing from teacher quality to shortages of resources,
19 these students often have fewer opportunities for
20 high-quality STEM learning than their peers in the
21 Nation's urban and suburban schools.

22 (6) Rural areas represent one of the most
23 promising, yet underutilized, opportunities for
24 STEM education to impact workforce development
25 and regional innovation, including agriculture.

1 (7) The study of agriculture, food, and natural
 2 resources involves biology, engineering, physics,
 3 chemistry, mathematics, geology, computer science,
 4 and other scientific fields.

5 (8) It is estimated that by 2020 that there will
 6 be a projected 1,000,000 more computing jobs than
 7 applicants who can fill them. To meet this demand,
 8 rural students must acquire computing skills
 9 through exposure to computer science learning in
 10 prekindergarten through grade 12 and in informal
 11 learning settings.

12 (9) More than 293,000,000 individuals in the
 13 United States use high-speed broadband to work,
 14 learn, access healthcare, and operate their busi-
 15 nesses, while 19,000,000 individuals in the United
 16 States still lack access to high-speed broadband.
 17 Rural areas are hardest hit, with over 26 percent of
 18 individuals in rural areas in the United States lack-
 19 ing access to high-speed broadband compared to 1.7
 20 percent of individuals in urban areas in the United
 21 States.

22 **SEC. 3. NATIONAL SCIENCE FOUNDATION RURAL STEM AC-**
 23 **TIVITIES.**

24 (a) PREPARING RURAL STEM EDUCATORS.—

1 (1) IN GENERAL.—The Director shall provide
2 grants on a merit-reviewed, competitive basis to in-
3 stitutions of higher education or nonprofit organiza-
4 tions (or a consortium thereof) for research and de-
5 velopment to advance innovative approaches to sup-
6 port and sustain high-quality STEM teaching in
7 rural schools.

8 (2) USE OF FUNDS.—

9 (A) IN GENERAL.—Grants awarded under
10 this subsection shall be used for the research
11 and development activities referred to in para-
12 graph (1), which may include—

13 (i) engaging rural educators of stu-
14 dents in prekindergarten through grade 12
15 in professional learning opportunities to
16 enhance STEM knowledge, including com-
17 puter science, and develop best practices;

18 (ii) supporting research on effective
19 STEM teaching practices in rural settings,
20 including the use of rubrics and mastery-
21 based grading practices to assess student
22 performance when employing the transdis-
23 ciplinary teaching approach for STEM dis-
24 ciplines;

1 (iii) designing and developing pre-
2 service and in-service training resources to
3 assist such rural educators in adopting
4 transdisciplinary teaching practices across
5 STEM courses;

6 (iv) coordinating with local partners
7 to adapt STEM teaching practices to lever-
8 age local natural and community assets in
9 order to support in-place learning in rural
10 areas;

11 (v) providing hands-on training and
12 research opportunities for rural educators
13 described in clause (i) at Federal labora-
14 tories, institutions of higher education, or
15 in industry;

16 (vi) developing training and best prac-
17 tices for educators who teach multiple
18 grade levels within a STEM discipline;

19 (vii) designing and implementing pro-
20 fessional development courses and experi-
21 ences, including mentoring, for rural edu-
22 cators described in clause (i) that combine
23 face-to-face and online experiences; and

1 (viii) any other activity the Director
 2 determines will accomplish the goals of this
 3 subsection.

4 (B) RURAL STEM COLLABORATIVE.—The
 5 Director shall establish a pilot program of re-
 6 gional cohorts in rural areas that will provide
 7 peer support, mentoring, and hands-on research
 8 experiences for rural STEM educators of stu-
 9 dents in prekindergarten through grade 12, in
 10 order to build an ecosystem of cooperation
 11 among educators, researchers, academia, and
 12 local industry.

13 (b) BROADENING PARTICIPATION OF RURAL STU-
 14 DENTS IN STEM.—

15 (1) IN GENERAL.—The Director shall provide
 16 grants on a merit-reviewed, competitive basis to in-
 17 stitutions of higher education or nonprofit organiza-
 18 tions (or a consortium thereof) for—

19 (A) research and development of program-
 20 ming to identify the barriers rural students face
 21 in accessing high-quality STEM education; and

22 (B) development of innovative solutions to
 23 improve the participation and advancement of
 24 rural students in prekindergarten through
 25 grade 12 in STEM studies.

1 (2) USE OF FUNDS.—

2 (A) IN GENERAL.—Grants awarded under
3 this subsection shall be used for the research
4 and development activities referred to in para-
5 graph (1), which may include—

6 (i) developing partnerships with com-
7 munity colleges to offer advanced STEM
8 course work, including computer science, to
9 rural high school students;

10 (ii) supporting research on effective
11 STEM practices in rural settings;

12 (iii) implementing a school-wide
13 STEM approach;

14 (iv) improving the National Science
15 Foundation’s Advanced Technology Edu-
16 cation program’s coordination and engage-
17 ment with rural communities;

18 (v) collaborating with existing commu-
19 nity partners and networks, such as the
20 Cooperative Extension System services and
21 extramural research programs of the De-
22 partment of Agriculture and youth serving
23 organizations like 4–H, after school STEM
24 programs, and summer STEM programs,

1 to leverage community resources and de-
2 velop place-based programming;

3 (vi) connecting rural school districts
4 and institutions of higher education, to im-
5 prove precollegiate STEM education and
6 engagement;

7 (vii) supporting partnerships that
8 offer hands-on inquiry-based science activi-
9 ties, including coding, and access to lab re-
10 sources for students studying STEM in
11 prekindergarten through grade 12 in a
12 rural area;

13 (viii) evaluating the role of broadband
14 connectivity and its associated impact on
15 the STEM and technology literacy of rural
16 students;

17 (ix) building capacity to support ex-
18 tracurricular STEM programs in rural
19 schools, including mentor-led engagement
20 programs, STEM programs held during
21 nonschool hours, STEM networks, maker-
22 spaces, coding activities, and competitions;
23 and

1 (x) any other activity the Director de-
2 termines will accomplish the goals of this
3 subsection.

4 (c) APPLICATION.—An applicant seeking a grant
5 under subsection (a) or (b) shall submit an application at
6 such time, in such manner, and containing such informa-
7 tion as the Director may require. The application may in-
8 clude the following:

9 (1) A description of the target population to be
10 served by the research activity or activities for which
11 such grant is sought.

12 (2) A description of the process for recruitment
13 and selection of students, educators, or schools from
14 rural areas to participate in such activity or activi-
15 ties.

16 (3) A description of how such activity or activi-
17 ties may inform efforts to promote the engagement
18 and achievement of rural students in prekindergarten
19 through grade 12 in STEM studies.

20 (4) In the case of a proposal consisting of a
21 partnership or partnerships with one or more rural
22 schools and one or more researchers, a plan for es-
23 tablishing a sustained partnership that is jointly de-
24 veloped and managed, draws from the capacities of
25 each partner, and is mutually beneficial.

1 (d) PARTNERSHIPS.—In awarding grants under sub-
2 section (a) or (b), the Director shall—

3 (1) encourage applicants which, for the purpose
4 of the activity or activities funded through the grant,
5 include or partner with a nonprofit organization or
6 an institution of higher education (or a consortium
7 thereof) that has extensive experience and expertise
8 in increasing the participation of rural students in
9 prekindergarten through grade 12 in STEM;

10 (2) encourage applicants which, for the purpose
11 of the activity or activities funded through the grant,
12 include or partner with a consortium of rural schools
13 or rural school districts; and

14 (3) encourage applications which, for the pur-
15 pose of the activity or activities funded through the
16 grant, include commitments from school principals
17 and administrators to making reforms and activities
18 proposed by the applicant a priority.

19 (e) EVALUATIONS.—All proposals for grants under
20 subsections (a) and (b) shall include an evaluation plan
21 that includes the use of outcome-oriented measures to as-
22 sess the impact and efficacy of the grant. Each recipient
23 of a grant under this section shall include results from
24 these evaluative activities in annual and final projects.

25 (f) ACCOUNTABILITY AND DISSEMINATION.—

1 (1) EVALUATION REQUIRED.—The Director
2 shall evaluate the portfolio of grants awarded under
3 subsections (a) and (b). Such evaluation shall—

4 (A) use a common set of benchmarks and
5 tools to assess the results of research conducted
6 under such grants and identify best practices;
7 and

8 (B) to the extent practicable, integrate the
9 findings of research resulting from the activity
10 or activities funded through such grants with
11 the findings of other research on rural student's
12 pursuit of degrees or careers in STEM.

13 (2) REPORT ON EVALUATIONS.—Not later than
14 180 days after the completion of the evaluation
15 under paragraph (1), the Director shall submit to
16 Congress and make widely available to the public a
17 report that includes—

18 (A) the results of the evaluation; and

19 (B) any recommendations for administra-
20 tive and legislative action that could optimize
21 the effectiveness of the grants awarded under
22 this section.

23 (g) REPORT BY COMMITTEE ON EQUAL OPPORTUNI-
24 TIES IN SCIENCE AND ENGINEERING.—

1 (1) IN GENERAL.—As part of the first report
 2 required by section 36(e) of the Science and Engi-
 3 neering Equal Opportunities Act (42 U.S.C.
 4 1885c(e)) transmitted to Congress after the date of
 5 enactment of this Act, the Committee on Equal Op-
 6 portunities in Science and Engineering shall in-
 7 clude—

8 (A) a description of past and present poli-
 9 cies and activities of the Foundation to encour-
 10 age full participation of students in rural com-
 11 munities in science, mathematics, engineering,
 12 and computer science fields; and

13 (B) an assessment of trends in participa-
 14 tion of rural students in prekindergarten
 15 through grade 12 in Foundation activities, and
 16 an assessment of the policies and activities of
 17 the Foundation, along with proposals for new
 18 strategies or the broadening of existing success-
 19 ful strategies towards facilitating the goals of
 20 this Act.

21 (2) TECHNICAL CORRECTION.—

22 (A) IN GENERAL.—Section 313 of the
 23 American Innovation and Competitiveness Act
 24 (Public Law 114–329) is amended by striking
 25 “Section 204(e) of the National Science Foun-

1 dation Authorization Act of 1988” and insert-
 2 ing “Section 36(e) of the Science and Engineer-
 3 ing Equal Opportunities Act”.

4 (B) APPLICABILITY.—The amendment
 5 made by paragraph (1) shall take effect as if
 6 included in the enactment of section 313 of the
 7 American Innovation and Competitiveness Act
 8 (Public Law 114–329).

9 (h) COORDINATION.—In carrying out this section, the
 10 Director shall, for purposes of enhancing program effec-
 11 tiveness and avoiding duplication of activities, consult, co-
 12 operate, and coordinate with the programs and policies of
 13 other relevant Federal agencies.

14 **SEC. 4. OPPORTUNITIES FOR ONLINE EDUCATION.**

15 (a) IN GENERAL.—The Director shall award competi-
 16 tive grants to institutions of higher education or nonprofit
 17 organizations (or a consortium thereof, which may include
 18 a private sector partner) to conduct research on online
 19 STEM education courses for rural communities.

20 (b) RESEARCH AREAS.—The research areas eligible
 21 for funding under this section shall include—

22 (1) evaluating the learning and achievement of
 23 rural students in prekindergarten through grade 12
 24 in STEM subjects;

1 (2) understanding how computer-based and on-
 2 line professional development courses and mentor ex-
 3 periences can be integrated to meet the needs of
 4 educators of rural students in prekindergarten
 5 through grade 12;

6 (3) combining computer-based and online
 7 STEM education and training with apprenticeships,
 8 mentoring, or other applied learning arrangements;

9 (4) leveraging online programs to supplement
 10 STEM studies for rural students that need physical
 11 and academic accommodation; and

12 (5) any other activity the Director determines
 13 will accomplish the goals of this section.

14 (c) EVALUATIONS.—All proposals for grants under
 15 this section shall include an evaluation plan that includes
 16 the use of outcome-oriented measures to assess the impact
 17 and efficacy of the grant. Each recipient of a grant under
 18 this section shall include results from these evaluative ac-
 19 tivities in annual and final projects.

20 (d) ACCOUNTABILITY AND DISSEMINATION.—

21 (1) EVALUATION REQUIRED.—The Director
 22 shall evaluate the portfolio of grants awarded under
 23 this section. Such evaluation shall—

24 (A) use a common set of benchmarks and
 25 tools to assess the results of research conducted

1 under such grants and identify best practices;
2 and

3 (B) to the extent practicable, integrate
4 findings from activities carried out pursuant to
5 research conducted under this section, with re-
6 spect to the pursuit of careers and degrees in
7 STEM, with those activities carried out pursu-
8 ant to other research on serving rural students
9 and communities.

10 (2) REPORT ON EVALUATIONS.—Not later than
11 180 days after the completion of the evaluation
12 under paragraph (1), the Director shall submit to
13 Congress and make widely available to the public a
14 report that includes—

15 (A) the results of the evaluation; and

16 (B) any recommendations for administra-
17 tive and legislative action that could optimize
18 the effectiveness of the grants awarded under
19 this section.

20 (e) COORDINATION.—In carrying out this section, the
21 Director shall, for purposes of enhancing program effec-
22 tiveness and avoiding duplication of activities, consult, co-
23 operate, and coordinate with the programs and policies of
24 other relevant Federal agencies.

1 **SEC. 5. NATIONAL ACADEMY OF SCIENCES EVALUATION.**

2 (a) STUDY.—Not later than 12 months after the date
3 of enactment of this Act, the Director shall enter into an
4 agreement with the National Academy of Sciences under
5 which the National Academy agrees to conduct an evalua-
6 tion and assessment that—

7 (1) evaluates the quality and quantity of cur-
8 rent Federal programming and research directed at
9 examining STEM education for students in pre-
10 kindergarten through grade 12 and workforce devel-
11 opment in rural areas;

12 (2) in coordination with the Federal Commu-
13 nications Commission, assesses the impact the scar-
14 city of broadband connectivity in rural communities
15 has on STEM and technical literacy for students in
16 prekindergarten through grade 12 in rural areas;

17 (3) assesses the core research and data needed
18 to understand the challenges rural areas are facing
19 in providing quality STEM education and workforce
20 development; and

21 (4) makes recommendations for action at the
22 Federal, State, and local levels for improving STEM
23 education, including online STEM education, for
24 students in prekindergarten through grade 12 and
25 workforce development in rural areas.

1 (b) REPORT TO DIRECTOR.—The agreement entered
2 into under subsection (a) shall require the National Acad-
3 emy of Sciences, not later than 24 months after the date
4 of enactment of this Act, to submit to the Director a re-
5 port on the study conducted under such subsection, includ-
6 ing the National Academy’s findings and recommenda-
7 tions.

8 **SEC. 6. GAO REVIEW.**

9 Not later than 3 years after the date of enactment
10 of this Act, the Comptroller General of the United States
11 shall conduct a study on the engagement of rural popu-
12 lations in Federal STEM programs and submit to Con-
13 gress a report that includes—

14 (1) an assessment of how Federal STEM edu-
15 cation programs are serving rural populations;

16 (2) a description of initiatives carried out by
17 Federal agencies that are targeted at supporting
18 STEM education in rural areas;

19 (3) an assessment of what is known about the
20 impact and effectiveness of Federal investments in
21 STEM education programs that are targeted to
22 rural areas; and

23 (4) an assessment of challenges that State and
24 Federal STEM education programs face in reaching
25 rural population centers.

1 **SEC. 7. CAPACITY BUILDING THROUGH EPSCOR.**

2 Section 517(f)(2) of the America COMPETES Reau-
3 thorization Act of 2010 (42 U.S.C. 1862p–9(f)(2)) is
4 amended—

5 (1) in subparagraph (A), by striking “and” at
6 the end; and

7 (2) by adding at the end the following:

8 “(C) to increase the capacity of rural com-
9 munities to provide quality STEM education
10 and STEM workforce development program-
11 ming to students and teachers; and”.

12 **SEC. 8. NIST ENGAGEMENT WITH RURAL COMMUNITIES.**

13 (a) MEP OUTREACH.—Section 25 of the National
14 Institute of Standards and Technology Act (15 U.S.C.
15 278k) is amended—

16 (1) in subsection (c)—

17 (A) in paragraph (6), by striking “commu-
18 nity colleges and area career and technical edu-
19 cation schools” and inserting the following:
20 “secondary schools (as defined in section 8101
21 of the Elementary and Secondary Education
22 Act of 1965 (20 U.S.C. 7801)), community col-
23 leges, and area career and technical education
24 schools, including those in underserved and
25 rural communities,”; and

26 (B) in paragraph (7)—

1 (i) by striking “and local colleges”
 2 and inserting the following: “local high
 3 schools and local colleges, including those
 4 in underserved and rural communities,”;
 5 and

6 (ii) by inserting “or other applied
 7 learning opportunities” after “apprentice-
 8 ships”; and

9 (2) in subsection (d)(3) by striking “, commu-
 10 nity colleges, and area career and technical edu-
 11 cation schools,” and inserting the following: “and
 12 local high schools, community colleges, and area ca-
 13 reer and technical education schools, including those
 14 in underserved and rural communities,”.

15 (b) RURAL CONNECTIVITY PRIZE COMPETITION.—

16 (1) PRIZE COMPETITION.—Pursuant to section
 17 24 of the Stevenson-Wydler Technology Innovation
 18 Act of 1980 (15 U.S.C. 3719), the Secretary of
 19 Commerce, acting through the Under Secretary of
 20 Commerce for Standards and Technology (referred
 21 to in this subsection as the “Secretary”), shall carry
 22 out a program to award prizes competitively to stim-
 23 ulate research and development of creative tech-
 24 nologies in order to deploy affordable and reliable

1 broadband connectivity to unserved rural commu-
2 nities.

3 (2) PLAN FOR DEPLOYMENT IN RURAL COMMU-
4 NITIES.—Each proposal submitted pursuant to para-
5 graph (1) shall include a plan for deployment of the
6 technology that is the subject of such proposal in an
7 unserved rural community.

8 (3) PRIZE AMOUNT.—In carrying out the pro-
9 gram under paragraph (1), the Secretary may award
10 not more than a total of \$5,000,000 to one or more
11 winners of the prize competition.

12 (4) REPORT.—Not later than 60 days after the
13 date on which a prize is awarded under the prize
14 competition, the Secretary shall submit to the rel-
15 evant committees of Congress a report that describes
16 the winning proposal of the prize competition.

17 (5) CONSULTATION.—In carrying out the pro-
18 gram under this subsection, the Secretary shall con-
19 sult with the Federal Communications Commission
20 and the heads of relevant departments and agencies
21 of the Federal Government.

22 **SEC. 9. NITR-D BROADBAND WORKING GROUP.**

23 Title I of the High-Performance Computing Act of
24 1991 (15 U.S.C. 5511 et seq.) is amended by adding at
25 the end the following:

1 **“SEC. 103. BROADBAND RESEARCH AND DEVELOPMENT**
2 **WORKING GROUP.**

3 “(a) IN GENERAL.—The Director shall establish a
4 broadband research and development working group to ad-
5 dress national research challenges and opportunities for
6 improving broadband access and adoption across the
7 United States.

8 “(b) ACTIVITIES.—The working group shall identify
9 and coordinate key research priorities for addressing
10 broadband access and adoption, including—

11 “(1) promising research areas;

12 “(2) requirements for data collection and shar-
13 ing;

14 “(3) opportunities for better alignment and co-
15 ordination across Federal agencies and external
16 stakeholders; and

17 “(4) input on the development of new Federal
18 policies and programs to enhance data collection and
19 research.

20 “(c) COORDINATION.—The working group shall co-
21 ordinate, as appropriate, with the Rural Broadband Inte-
22 gration Working Group established under section 6214 of
23 the Agriculture Improvement Act of 2018 (Public Law
24 115–334), the National Institute of Food and Agriculture
25 of the Department of Agriculture, and the Federal Com-
26 munications Commission.

1 “(d) REPORT.—The working group shall report to
2 Congress on their activities as part of the annual report
3 submitted under section 101(a)(2)(D).

4 “(e) SUNSET.—The authority to carry out this sec-
5 tion shall terminate on the date that is 5 years after the
6 date of enactment of the Rural STEM Education Act.”.

7 **SEC. 10. DEFINITIONS.**

8 In this Act:

9 (1) DIRECTOR.—The term “Director” means
10 the Director of the National Science Foundation es-
11 tablished under section 2 of the National Science
12 Foundation Act of 1950 (42 U.S.C. 1861).

13 (2) FEDERAL LABORATORY.—The term “Fed-
14 eral laboratory” has the meaning given such term in
15 section 4 of the Stevenson-Wydler Technology Inno-
16 vation Act of 1980 (15 U.S.C. 3703).

17 (3) FOUNDATION.—The term “Foundation”
18 means the National Science Foundation established
19 under section 2 of the National Science Foundation
20 Act of 1950 (42 U.S.C. 1861).

21 (4) INSTITUTION OF HIGHER EDUCATION.—The
22 term “institution of higher education” has the
23 meaning given such term in section 101(a) of the
24 Higher Education Act of 1965 (20 U.S.C. 1001(a)).

1 (5) STEM.—The term “STEM” has the mean-
2 ing given the term in section 2 of the America COM-
3 PETES Reauthorization Act of 2010 (42 U.S.C.
4 6621 note).

5 (6) STEM EDUCATION.—The term “STEM
6 education” has the meaning given the term in sec-
7 tion 2 of the STEM Education Act of 2015 (42
8 U.S.C. 6621 note).

○