

[~116H4979]



(Original Signature of Member)

117TH CONGRESS  
1ST SESSION

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

To coordinate Federal research and development efforts focused on STEM education and workforce development in rural areas, including the development and application of new technologies to support and improve rural STEM education, and for other purposes.

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IN THE HOUSE OF REPRESENTATIVES

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

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**A BILL**

To coordinate Federal research and development efforts focused on STEM education and workforce development in rural areas, including the development and application of new technologies to support and improve rural STEM 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 “Rural STEM Edu-  
5 cation Research Act”.

1 **SEC. 2. FINDINGS.**

2 Congress finds the following:

3 (1) The supply of STEM workers is not keeping  
4 pace with the rapidly evolving needs of the public  
5 and private sector, resulting in a deficit often re-  
6 ferred to as a STEM skills shortage.

7 (2) According to the Bureau of Labor Statis-  
8 tics, the United States will need one million addi-  
9 tional STEM professionals than it is on track to  
10 produce in the coming decade.

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

14 (4) The 60,000,000 individuals in the United  
15 States who live in rural settings are significantly  
16 under-represented in STEM.

17 (5) According to the National Center for Edu-  
18 cation Statistics, nine million students in the United  
19 States—nearly 20 percent of the total K–12 popu-  
20 lation—attend rural schools, and for reasons rang-  
21 ing from teacher quality to shortages of resources,  
22 these students often have fewer opportunities for  
23 high-quality STEM learning than their peers in the  
24 Nation’s urban and suburban schools.

25 (6) Rural areas represent one of the most  
26 promising, yet underutilized, opportunities for

1       STEM education to impact workforce development  
2       and regional innovation, including agriculture.

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

7           (8) Employment in computer and information  
8       technology occupations is projected to grow 11 per-  
9       cent from 2019 to 2029. To help meet this demand,  
10      it is important rural students have the opportunity  
11      to acquire computing skills through exposure to com-  
12      puter science learning in grades Pre-K through 12  
13      and in informal learning settings.

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

1 **SEC. 3. NIST ENGAGEMENT WITH RURAL COMMUNITIES.**

2 (a) MEP OUTREACH.—Section 25 of the National  
3 Institute of Standards and Technology Act (15 U.S.C.  
4 278k) is amended—

5 (1) in subsection (c)—

6 (A) in paragraph (6), by striking “commu-  
7 nity colleges and area career and technical edu-  
8 cation schools” and inserting the following:  
9 “secondary schools (as defined in section 8101  
10 of the Elementary and Secondary Education  
11 Act of 1965 (20 U.S.C. 7801)), community col-  
12 leges, and area career and technical education  
13 schools, including those in underserved and  
14 rural communities,”; and

15 (B) in paragraph (7)—

16 (i) by striking “and local colleges”  
17 and inserting the following: “local high  
18 schools and local colleges, including those  
19 in underserved and rural communities,”;  
20 and

21 (ii) by inserting “or other applied  
22 learning opportunities” after “apprentice-  
23 ships”; and

24 (2) in subsection (d)(3) by striking “, commu-  
25 nity colleges, and area career and technical edu-  
26 cation schools,” and inserting the following: “and

1 local high schools, community colleges, and area ca-  
2 reer and technical education schools, including those  
3 in underserved and rural communities.”.

4 (b) RURAL CONNECTIVITY PRIZE COMPETITION.—

5 (1) PRIZE COMPETITION.—Pursuant to section  
6 24 of the Stevenson-Wydler Technology Innovation  
7 Act of 1980 (15 U.S.C. 3719), the Secretary of  
8 Commerce, acting through the Under Secretary of  
9 Commerce for Standards and Technology (referred  
10 to in this subsection as the “Secretary”), shall, sub-  
11 ject to appropriations, carry out a program to award  
12 prizes competitively to stimulate research and devel-  
13 opment of creative technologies in order to deploy  
14 affordable and reliable broadband connectivity to un-  
15 derserved rural communities.

16 (2) PLAN FOR DEPLOYMENT IN RURAL COMMU-  
17 NITIES.—Each proposal submitted pursuant to para-  
18 graph (1) shall include a plan for deployment of the  
19 technology that is the subject of such proposal in an  
20 underserved rural community.

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

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

6           (5) CONSULTATION.—In carrying out the pro-  
7           gram under subsection (a), the Secretary may con-  
8           sult with the heads of relevant departments and  
9           agencies of the Federal Government.

10 **SEC. 4. NITR-D BROADBAND WORKING GROUP.**

11           Title I of the High-Performance Computing Act of  
12           1991 (15 U.S.C. 5511 et seq.) is amended by adding at  
13           the end the following:

14 **“SEC. 103. BROADBAND RESEARCH AND DEVELOPMENT**  
15 **WORKING GROUP.**

16           “(a) IN GENERAL.—The Director shall establish a  
17           broadband research and development working group to ad-  
18           dress national research challenges and opportunities for  
19           improving broadband access and adoption across the  
20           United States.

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

24                   “(1) promising research areas;

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

3           “(3) opportunities for better alignment and co-  
4           ordination across Federal agencies and external  
5           stakeholders; and

6           “(4) input on the development of new Federal  
7           policies and programs to enhance data collection and  
8           research.

9           “(c) COORDINATION.—The working group shall co-  
10          ordinate, as appropriate, with the Rural Broadband Inte-  
11          gration Working Group established under section 6214 of  
12          the Agriculture Improvement Act of 2018 (Public Law  
13          115–334) and the National Institute of Food and Agri-  
14          culture of the Department of Agriculture.

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

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

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

22          (a) STUDY.—Not later than 12 months after the date  
23          of enactment of this Act, the Director shall enter into an  
24          agreement with the National Academy of Sciences under

1 which the National Academy agrees to conduct an evalua-  
2 tion and assessment that—

3 (1) evaluates the quality and quantity of cur-  
4 rent Federal programming and research directed at  
5 examining STEM education for students in grades  
6 Pre-K through 12 and workforce development in  
7 rural areas;

8 (2) assesses the impact of the scarcity of  
9 broadband connectivity in rural communities has on  
10 STEM and technical literacy for students in grades  
11 Pre-K through 12 in rural areas;

12 (3) assesses the core research and data needed  
13 to understand the challenges rural areas are facing  
14 in providing quality STEM education and workforce  
15 development; and

16 (4) makes recommendations for action at the  
17 Federal, State, and local levels for improving STEM  
18 education for students in grades Pre-K through 12  
19 and workforce development in rural areas.

20 (b) REPORT TO DIRECTOR.—The agreement entered  
21 into under subsection (a) shall require the National Acad-  
22 emy of Sciences, not later than 24 months after the date  
23 of enactment of this Act, to submit to the Director a re-  
24 port on the study conducted under such subsection, includ-



1 ing the National Academy's findings and recommenda-  
2 tions.

3 (c) AUTHORIZATION OF APPROPRIATIONS.—There  
4 are authorized to be appropriated to the Director to carry  
5 out this section \$1,000,000 for fiscal year 2022.

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

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

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

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

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

21 (4) an assessment of challenges that state and  
22 Federal STEM education programs face in reaching  
23 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. NATIONAL SCIENCE FOUNDATION RURAL STEM RE-**  
13 **SEARCH ACTIVITIES.**

14 (a) PREPARING RURAL STEM EDUCATORS.—

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 research and de-  
19 velopment to advance innovative approaches to sup-  
20 port and sustain high-quality STEM teaching in  
21 rural schools.

22 (2) USE OF FUNDS.—

23 (A) IN GENERAL.—Grants awarded under  
24 this section shall be used for the research and  
25 development activities referred to in paragraph  
26 (1), which may include—

1 (i) engaging rural educators of stu-  
2 dents in grades Pre-K through 12 in pro-  
3 fessional learning opportunities to enhance  
4 STEM knowledge, including computer  
5 science, and develop best practices;

6 (ii) supporting research on effective  
7 STEM teaching practices in rural settings,  
8 including the use of rubrics and mastery-  
9 based grading practices to assess student  
10 performance when employing the  
11 transdisciplinary teaching approach for  
12 STEM disciplines;

13 (iii) designing and developing pre-  
14 service and in-service training resources to  
15 assist such rural educators in adopting  
16 transdisciplinary teaching practices across  
17 STEM courses;

18 (iv) coordinating with local partners  
19 to adapt STEM teaching practices to lever-  
20 age local natural and community assets in  
21 order to support in-place learning in rural  
22 areas;

23 (v) providing hands-on training and  
24 research opportunities for rural educators  
25 described in clause (i) at Federal Labora-

1                   tories, institutions of higher education, or  
2                   in industry;

3                   (vi) developing training and best prac-  
4                   tices for educators who teach multiple  
5                   grade levels within a STEM discipline;

6                   (vii) designing and implementing pro-  
7                   fessional development courses and experi-  
8                   ences, including mentoring, for rural edu-  
9                   cators described in clause (i) that combine  
10                  face-to-face and online experiences; and

11                  (viii) any other activity the Director  
12                  determines will accomplish the goals of this  
13                  subsection.

14                  (B) RURAL STEM COLLABORATIVE.—The  
15                  Director may establish a pilot program of re-  
16                  gional cohorts in rural areas that will provide  
17                  peer support, mentoring, and hands-on research  
18                  experiences for rural STEM educators of stu-  
19                  dents in grades Pre-K through 12, in order to  
20                  build an ecosystem of cooperation among edu-  
21                  cators, researchers, academia, and local indus-  
22                  try.

23                  (b) BROADENING PARTICIPATION OF RURAL STU-  
24                  DENTS IN STEM.—

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—

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

8           (B) development of innovative solutions to  
9 improve the participation and advancement of  
10 rural students in grades Pre-K through 12 in  
11 STEM studies.

12           (2) USE OF FUNDS.—

13           (A) IN GENERAL.—Grants awarded under  
14 this section shall be used for the research and  
15 development activities referred to in paragraph  
16 (1), which may include—

17           (i) developing partnerships with com-  
18 munity colleges to offer advanced STEM  
19 course work, including computer science, to  
20 rural high school students;

21           (ii) supporting research on effective  
22 STEM practices in rural settings;

23           (iii) implementing a school-wide  
24 STEM approach;

1 (iv) improving the National Science  
2 Foundation's Advanced Technology Edu-  
3 cation program's coordination and engage-  
4 ment with rural communities;

5 (v) collaborating with existing commu-  
6 nity partners and networks, such as the co-  
7 operative research and extension services  
8 of the Department of Agriculture and  
9 youth serving organizations like 4-H, after  
10 school STEM programs, and summer  
11 STEM programs, to leverage community  
12 resources and develop place-based pro-  
13 gramming;

14 (vi) connecting rural school districts  
15 and institutions of higher education, to im-  
16 prove precollegiate STEM education and  
17 engagement;

18 (vii) supporting partnerships that  
19 offer hands-on inquiry-based science activi-  
20 ties, including coding, and access to lab re-  
21 sources for students studying STEM in  
22 grades Pre-K through 12 in a rural area;

23 (viii) evaluating the role of broadband  
24 connectivity and its associated impact on

1 the STEM and technology literacy of rural  
2 students;

3 (ix) building capacity to support ex-  
4 tracurricular STEM programs in rural  
5 schools, including mentor-led engagement  
6 programs, STEM programs held during  
7 nonschool hours, STEM networks,  
8 makerspaces, coding activities, and com-  
9 petitions; and

10 (x) any other activity the Director de-  
11 termines will accomplish the goals of this  
12 subsection.

13 (c) APPLICATION.—An applicant seeking a grant  
14 under subsection (a) or (b) shall submit an application at  
15 such time, in such manner, and containing such informa-  
16 tion as the Director may require. The application may in-  
17 clude the following:

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

21 (2) A description of the process for recruitment  
22 and selection of students, educators, or schools from  
23 rural areas to participate in such activity or activi-  
24 ties.

1           (3) A description of how such activity or activi-  
2           ties may inform efforts to promote the engagement  
3           and achievement of rural students in grades Pre-K  
4           through 12 in STEM studies.

5           (4) In the case of a proposal consisting of a  
6           partnership or partnerships with one or more rural  
7           schools and one or more researchers, a plan for es-  
8           tablishing a sustained partnership that is jointly de-  
9           veloped and managed, draws from the capacities of  
10          each partner, and is mutually beneficial.

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

13           (1) encourage applicants which, for the purpose  
14           of the activity or activities funded through the grant,  
15           include or partner with a nonprofit organization or  
16           an institution of higher education (or a consortium  
17           thereof) that has extensive experience and expertise  
18           in increasing the participation of rural students in  
19           grades Pre-K through 12 in STEM;

20           (2) encourage applicants which, for the purpose  
21           of the activity or activities funded through the grant,  
22           include or partner with a consortium of rural schools  
23           or rural school districts; and

24           (3) encourage applications which, for the pur-  
25           pose of the activity or activities funded through the



1 grant, include commitments from school principals  
2 and administrators to making reforms and activities  
3 proposed by the applicant a priority.

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

10 (f) ACCOUNTABILITY AND DISSEMINATION.—

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

14 (A) use a common set of benchmarks and  
15 tools to assess the results of research conducted  
16 under such grants and identify best practices;  
17 and

18 (B) to the extent practicable, integrate the  
19 findings of research resulting from the activity  
20 or activities funded through such grants with  
21 the findings of other research on rural student's  
22 pursuit of degrees or careers in STEM.

23 (2) REPORT ON EVALUATIONS.—Not later than  
24 180 days after the completion of the evaluation  
25 under paragraph (1), the Director shall submit to

1 Congress and make widely available to the public a  
2 report that includes—

3 (A) the results of the evaluation; and

4 (B) any recommendations for administra-  
5 tive and legislative action that could optimize  
6 the effectiveness of the grants awarded under  
7 this section.

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

10 (1) IN GENERAL.—As part of the first report  
11 required by section 36(e) of the Science and Engi-  
12 neering Equal Opportunities Act (42 U.S.C.  
13 1885c(e)) transmitted to Congress after the date of  
14 enactment of this Act, the Committee on Equal Op-  
15 portunities in Science and Engineering shall in-  
16 clude—

17 (A) a description of past and present poli-  
18 cies and activities of the Foundation to encour-  
19 age full participation of students in rural com-  
20 munities in science, mathematics, engineering,  
21 and computer science fields; and

22 (B) an assessment of trends in participa-  
23 tion of rural students in grades Pre-K through  
24 12 in Foundation activities, and an assessment  
25 of the policies and activities of the Foundation,

1 along with proposals for new strategies or the  
2 broadening of existing successful strategies to-  
3 wards facilitating the goals of this Act.

4 (2) TECHNICAL CORRECTION.—

5 (A) IN GENERAL.—Section 313 of the  
6 American Innovation and Competitiveness Act  
7 (Public Law 114–329) is amended by striking  
8 “Section 204(e) of the National Science Foun-  
9 dation Authorization Act of 1988” and insert-  
10 ing “Section 36(e) of the Science and Engineer-  
11 ing Equal Opportunities Act”.

12 (B) APPLICABILITY.—The amendment  
13 made by paragraph (1) shall take effect as if  
14 included in the enactment of section 313 of the  
15 American Innovation and Competitiveness Act  
16 (Public Law 114–329).

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

22 (i) AUTHORIZATION OF APPROPRIATIONS.—There  
23 are authorized to be appropriated to the Director—

1           (1) \$8,000,000 to carry out the activities under  
2           subsection (a) for each of fiscal years 2022 through  
3           2026; and

4           (2) \$12,000,000 to carry out the activities  
5           under subsection (b) for each of fiscal years 2022  
6           through 2026.

7   **SEC. 9. RESEARCHING OPPORTUNITIES FOR ONLINE EDU-**  
8                                   **CATION.**

9           (a) **IN GENERAL.**—The Director shall, subject to ap-  
10          propriations, award competitive grants to institutions of  
11          higher education or nonprofit organizations (or a consor-  
12          tium thereof, which may include a private sector partner)  
13          to conduct research on online STEM education courses for  
14          rural communities.

15          (b) **RESEARCH AREAS.**—The research areas eligible  
16          for funding under this subsection shall include—

17                 (1) evaluating the learning and achievement of  
18                 rural students in grades Pre-K through 12 in STEM  
19                 subjects;

20                 (2) understanding how computer-based and on-  
21                 line professional development courses and mentor ex-  
22                 periences can be integrated to meet the needs of  
23                 educators of rural students in grades Pre-K through  
24                 12;

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

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

7           (5) any other activity the Director determines  
8           will accomplish the goals of this subsection.

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

15          (d) ACCOUNTABILITY AND DISSEMINATION.—

16                 (1) EVALUATION REQUIRED.—The Director  
17                 shall evaluate the portfolio of grants awarded under  
18                 this section. Such evaluation shall—

19                         (A) use a common set of benchmarks and  
20                         tools to assess the results of research conducted  
21                         under such grants and identify best practices;  
22                         and

23                         (B) to the extent practicable, integrate  
24                         findings from activities carried out pursuant to  
25                         research conducted under this section, with re-

1           spect to the pursuit of careers and degrees in  
2           STEM, with those activities carried our pursu-  
3           ant to other research on serving rural students  
4           and communities.

5           (2) REPORT ON EVALUATIONS.—Not later than  
6           180 days after the completion of the evaluation  
7           under paragraph (1), the Director shall submit to  
8           Congress and make widely available to the public a  
9           report that includes—

10                   (A) the results of the evaluation; and

11                   (B) any recommendations for administra-  
12           tive and legislative action that could optimize  
13           the effectiveness of the grants awarded under  
14           this section.

15           (e) COORDINATION.—In carrying out this section, the  
16           Director shall, for purposes of enhancing program effec-  
17           tiveness and avoiding duplication of activities, consult, co-  
18           operate, and coordinate with the programs and policies of  
19           other relevant Federal agencies.

20   **SEC. 10. DEFINITIONS.**

21           In this Act:

22                   (1) DIRECTOR.—The term “Director” means  
23           the Director of the National Science Foundation es-  
24           tablished under section 2 of the National Science  
25           Foundation Act of 1950 (42 U.S.C. 1861).

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

5           (3) FOUNDATION.—The term “Foundation”  
6           means the National Science Foundation established  
7           under section 2 of the National Science Foundation  
8           Act of 1950 (42 U.S.C. 1861).

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

13          (5) STEM.—The term “STEM” has the mean-  
14          ing given the term in section 2 of the America COM-  
15          PETES Reauthorization Act of 2010 (42 U.S.C.  
16          6621 note).

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