From: Honeysett, Adam <Adam.Honeysett@ed.gov>
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Subject: Letter from Deputy Secretary Marten re: Using Federal Funds to Support STEM Education Strategies

Note: This letter is also available online at https://www2.ed.gov/policy/gen/guid/secletter/221206.html.

December 6, 2022

Dear Colleague:

We are writing today to provide updates to a letter released on January 18, 2017, regarding how Federal funds can support science, technology, engineering, and mathematics (STEM)[1] education. The COVID-19 pandemic has presented an immense set of challenges for educating our students. Despite the tireless efforts of educators and education leaders across the country, early indications suggest many students, especially those who already faced existing structural inequalities, fell behind in their academic achievement, including in STEM subjects.

A National Academies of Science, Engineering, and Medicine (NASEM) study on educational equity found that learning opportunities and enrollment patterns in STEM affect long-term learning trajectories and post-secondary education major choices, especially for students from low-income background. Moreover, STEM education can also provide relevant, problem-, place-, and project-based learning experiences that support students in learning new content and concepts and re-engage them in their learning. Research on student motivation has consistently found content relevance to be an effective way to drive student engagement. Moreover, by integrating multiple disciplines when learning a new topic, students may learn more content in less time through deeper engagement.

The purpose of this letter is to help State educational agencies (SEAs), local educational agencies (LEAs), and their partners better understand how to use Federal funds to support innovative, equity-focused pre-kindergarten through grade 12 (Pre-K-12) STEM education strategies. This letter provides examples of how funds from the American Rescue Plan (ARP) Act of 2021; Titles I, II, III, and IV of the Elementary and Secondary Education Act of 1965 (ESEA); the Individuals with Disabilities Education Act (IDEA); and the Carl D. Perkins Career and Technical Education Act of 2006, as amended by the Strengthening Career and Technical Education for the 21st Century Act (Perkins V), can support efforts to improve Pre-K-12 instruction and student outcomes in STEM fields.[2]

Funds from the Elementary and Secondary School Emergency Relief (ESSER) Fund under the ARP Act, the Coronavirus Response and Relief Supplemental Appropriations (CRRSA) Act, 2021, and the Coronavirus Aid, Relief, and Economic Security (CARES) Act, and funds from the Governor's Emergency Education Relief (GEER) Fund under the CRRSA and CARES Acts, may be used by States and districts responding to and recovering from COVID-19 for any activity authorized under the ESEA, IDEA, and Perkins V, in addition to the activities enumerated in those authorities. The U.S. Department of Education (Department) has released several resources about these programs, including guidance on the uses of funds under ESSER and GEER.

Now more than ever, it is critical we invest in STEM education to help our students get back on track and prepare for an ever-changing world. The COVID-19 pandemic has demonstrated the importance of scientific discovery and advancement. It has also accelerated the digital and data-driven transformation of our economy and shined a spotlight on the digital divide and the importance of closing that divide. Strengthening STEM skills is critical for both short-term innovation as we overcome the impacts of COVID-19, and for preparing students to address future challenges in a complex, interconnected world.

Research further suggests that when community and family role models emphasize the importance of STEM and STEM careers, students are more likely to enroll in STEM courses, improve academic performance, and pursue STEM-related careers. Well-designed STEM programs can help prepare students for a variety of exciting in-demand careers, including space exploration, renewable energy and climate adaptation, and emerging technologies, such as artificial intelligence (AI), data science, quantum computing, and blockchain.

A critical component of learning recovery is ensuring access to high-quality equitable STEM education. Federal agencies, SEAs, LEAs, and private sector partners must coordinate their efforts and use evidence-based methods to best meet students' needs. These methods should include strategies for effectively engaging girls and young women in math and science, assisting students in elementary mathematics and middle to high school mathematics, providing relevant and career-linked learning to help prevent students from dropping out, and STEM-linked pedagogies including experiential learning and computational thinking.

The following examples and resources fall into five categories:

1. Implement STEM learning acceleration programs that support students who have been disproportionately impacted by COVID-19.[3]
2. Redesign STEM courses and learning experiences to promote diversity, equity, and inclusion in STEM.
3. Increase students' equitable access to STEM courses and experiences, including out-of-school time (OST) programs,[4] dual enrollment, STEM-themed schools, and career pathways.
4. Recruit, prepare, and support a diverse STEM educator workforce, increase educators' knowledge and expertise in STEM, and equip educators to meet the diverse needs of all students.
5. Improve student access to materials and equipment needed to support inquiry-based pedagogy and active learning.[5]

Enhancing the impact of STEM education programs and maximizing the impact of available Federal resources necessitates leveraging various sources of support. For example, while being sure that Federal funds are used consistent with all applicable requirements, including the requirement that they supplement, and not supplant, other funds, an SEA or LEA may consider using funds under the following ESEA programs:

- Title I, Part A or Title IV, Part A funds may be used in innovative, supplementary ways to purchase or reconfigure STEM materials, devices, or STEM-focused digital learning resources[6] or spaces.

- Title II, Part A funds may be used to provide professional development to educators on how to teach new STEM concepts and approaches, including those in computer science, data science, AI, or other emerging STEM disciplines.
- Title III, Part A funds may be used to provide access to supplemental STEM resources and STEM teacher professional development specifically designed or adapted for English learners. Title IV, Part A funds may be used to provide students with access to well-rounded educational opportunities, including by increasing student access to and improving student engagement and achievement in high-quality STEM courses.
- Title IV, Part B funds may provide students at 21st Century Community Learning Centers with the opportunity to engage in authentic STEM content that aligns to their school day and focuses on hands-on, experiential, STEM-rich experiences.

Similarly, Perkins V funds may be used to develop comprehensive STEM career pathways and programs of study, including career guidance and counseling, instructor compensation, professional development, career and technical student organization advisor costs, equipment, and technical skill assessments. IDEA Part B section 611 funds set aside for other State-level activities may be used to provide professional development for STEM educators to support the needs of children with disabilities, to improve the use of technology in the classroom by children with disabilities to enhance their STEM learning, or to support the use of technology in STEM programs to maximize accessibility to the general education curriculum for children with disabilities. ARP ESSER funds include specific set-asides for evidence-based summer, comprehensive afterschool, and other programs that address the academic impact of lost instructional time – each of these can include a focus on STEM programming.

All uses of Federal resources must comply with applicable laws and requirements for each funding source, including the nondiscrimination requirements in Federal civil rights laws. Please visit the Department's STEM webpage (www.ed.gov/stem) for additional information and resources.

We hope the examples and other information provided in this letter will be helpful in your efforts to provide access to high-quality STEM programs and resources as well as improve learning and achievement for all students.

Sincerely,

Cindy Marten
Deputy Secretary of Education

Attachment

Examples of Leveraging ARP ESSER, ESEA, IDEA, and Perkins V Funds for STEM Education

The pace of technological and scientific change continues to accelerate, and students beginning elementary school will graduate into an innovation economy with new technologies, scientific advances, and job opportunities that did not exist a decade ago. To best prepare for this future, allstudents will benefit from a solid foundation in the STEM fields. The Department encourages educators at every level to pursue evidence-based and innovative and promising strategies and active teaching methods in STEM, while working to ensure equitable educational opportunities across STEM disciplines. To help catalyze such innovation, this letter provides examples that illustrate how grantees may use funds made available under ARP ESSER, ESEA, IDEA, and Perkins V.

The use of grant funds must comply with the programmatic and fiscal requirements in the Federal law and regulations governing such programs. The examples below highlight ways in which a grantee may use Federal funds for STEM education for the 2022-2023 school year and beyond to:

I. Implement STEM learning acceleration programs that support students who have been disproportionately impacted by COVID-19
II. Redesign STEM courses and learning experiences to promote diversity, equity, and inclusion in STEM
III. Increase students' equitable access to STEM courses and experiences, including out-of-school time (OST) programs, dual enrollment, STEM-themed schools, and career pathways
IV. Recruit, prepare, and support a diverse STEM educator workforce, increase educators' knowledge and expertise in STEM, and equip educators to meet the diverse needs of all students
V. Improve student access to materials and resources needed to support inquiry-based pedagogy and active learning

The examples below are not intended to be comprehensive. They provide just a few examples of allowable uses of Federal funds that might support the development, implementation, and expansion of STEM approaches to help improve student achievement.[7] Additional STEM resources are available at https://www.ed.gov/STEM. To identify further opportunities, please review the statutes, regulations, and guidance for each Federal program or contact your Department program officer.

I. Implement STEM learning acceleration programs that support students who have been disproportionately impacted by COVID-19

SEAs, LEAs, and their partners can utilize ARP ESSER funds to support learning acceleration. At least 5 percent of an SEA's ARP ESSER allocation and at least 20 percent of an LEA's ARP ESSER allocation must be used to address the academic impact of lost instructional time using evidence-based interventions. As mentioned in ED's COVID

Handbook Volume 2 and Strategies to Address the Impact of Lost Instructional Time, some examples of learning acceleration that are particularly relevant for STEM learning include:

A. High-impact, evidence-based tutoring (see page 21 in ED's COVID Handbook Volume 2)
B. Project/problem-based learning
C. Work-based learning and career academies
D. Access to rigorous coursework such as dual enrollment or AP course-taking
E. Summer learning and enrichment
F. Comprehensive afterschool programs

The Education and Innovation Research (EIR) discretionary grant program is another opportunity for the field to pursue evidence-based STEM interventions. EIR provides funding to create, develop, implement, replicate, or take to scale entrepreneurial, evidence-based, field-initiated innovations to improve student achievement and attainment for high-need students; and rigorously evaluate such innovations.

Resources to Support Learning Acceleration

1. Regional Educational Laboratory (REL) Northeast and Islands Creating and Using Performance Assessments: An Online Course for Practitioners
2. REL Midwest Toolkit for Assessing Learning Changes After COVID-19 School Closures
3. REL Central Using Assessments to Identify and Address COVID-19 Learning Gaps Virtual Presentation and Handout
4. REL Central Personalizing Instruction to Address COVID-19 Learning Gaps Virtual Chat and Handout
5. ED Games Expo: Remote Tutoring to Accelerate Learning featuring AmeriCorps and Institute of Education Sciences (IES) Grantees
6. Summer Learning and Enrichment Collaborative: 5/27 Session on Evidence on High-Impact Tutoring
7. Learning Recovery: How to Develop and Implement Effective Tutoring Programs – Overview
8. Institute of Education Sciences (IES) Practice Guides
    a. Assisting Students Struggling with Mathematics
    b. Supporting Writing for Secondary Students and Elementary Students
    c. Foundational Skills to Support Reading for Understanding in K-3
    d. Teaching Strategies for Improving Algebra Knowledge in MS and HS
    e. Organizing Instruction and Study to Improve Student Learning
9. Structuring Out of School Time to Improve Academic Achievement
10. IES Evidence-Based Practices for Recovery and Renewal (afterschool and data science checklists)
11. Teaching K-12 Science and Engineering During a Crisis, National Academies for Science, Engineering and Medicine (NASEM), 2020
12. Enhancing Science and Engineering in Prekindergarten through Fifth Grade, NASEM, 2021

II. Redesign STEM courses, learning experiences, and assessments to promote diversity, equity, and inclusion in STEM

According to the Department's Civil Rights Data Collection for the 2017-18 school year, less than 50 percent of high schools in the United States offer calculus and about 60 percent offer physics. Even in schools where a full suite of STEM courses is offered, many students, especially those from underrepresented backgrounds, often do not take these courses, as exemplified in computer science enrollment challenges. Efforts to advance gender equity in STEM attempt to remedy the fact that women are underrepresented in STEM careers (34 percent) and in the skilled technical workforce (26 percent) compared to their representation in the employed U.S. population (48 percent).[8]

A. SEAs, LEAs, and their partners can use ARP ESSER funds, as well as funds from Title I schoolwide programs, Title II, Part A and Title IV, Part A (ESEA sections 4104(b)(3)(A) and 4107(a)(3)(C)) of the ESEA, to redesign STEM teaching and learning experiences to ensure that all student groups are able to participate equitably, particularly those that faced additional barriers to participation during the pandemic.
B. SEAs can use funds from Title I, Part B of the ESEA to align State assessments with State science standards and to embed engineering skills and practices into science assessments, which has the potential to increase relevancy for students. (ESEA section 1201).
C. LEAs can use Perkins V funding to develop comprehensive STEM career pathways and programs of study, including career guidance and counseling, instructor compensation, professional development, career and technical student organization advisor costs, equipment, and technical skill assessments. (Perkins V section 135).

Resources to Support Equity in STEM

1. IES Practice Guide, What Works Clearinghouse (WWC): Encouraging Girls in Math and Science, a summary of research with implementation tips
2. Developing a STEM Identity, an Office of Education Technology (OET) blog
3. OET Digital Education Equity Roundtables, public engagement effort to increase broadband adoption and reduce digital barriers
4. Dear Colleague Letter: Resource Comparability, Office for Civil Rights detailed guidance on the legal obligation to provide students with equal access to educational resources without regard to race, color, or national origin
5. Supporting English Language Learners in STEM Subjects, NASEM, 2018
6. STEM Teaching Tools: Equity in Science Education, brief funded by the National Science Foundation (NSF)
7. Cracking the Code: Girls' and Women's Education in Science, Technology, Engineering, and Mathematics (STEM), UNESCO Digital Library, a global snapshot of under-representation, the factors behind it, and examples of how to improve the interest, engagement, and achievement of girls in these fields

III. Increase students' equitable access to STEM courses and experiences, including OST programs, dual enrollment, STEM-themed schools, and career pathways

To help address the critical gap in access to STEM courses and experiences, schools, LEAs, and SEAs can use Federal funds to support increased access to STEM opportunities both during the school day and out-of-school time. An SEA or LEA might use these funds to provide students access to high-quality, year-round STEM enrichment experiences, including by partnering with nonprofit and community-based organizations.[9]

A. Increase access to rigorous STEM coursework for all students.

Depending on the student population served, program funds (see potential options below) can be used to support dual or concurrent enrollment programs, early college high school models, or other methods to increase access to rigorous STEM coursework and enhance career and college readiness. Schools and LEAs can use Federal funds to support STEM coursework for:

1. Students who are members of underrepresented groups in STEM. (ESEA section 4107(a)(3)(C)).
2. Students attending a school operating a Title I schoolwide program, consistent with the school's comprehensive needs assessment. (ESEA section 1114).
3. Students identified as failing, or most at risk of failing, to meet the challenging State academic standards who are attending a school operating a Title I targeted assistance program. (ESEA section 1115).
4. Supplemental English language acquisition activities in STEM courses for English learners and supplemental early college high school or dual or concurrent enrollment programs or courses designed to support English learners' success in postsecondary education. (ESEA section 3115).
5. IDEA-eligible children with disabilities who require STEM coursework in order to receive a free appropriate public education, or who need additional services and supports in STEM courses to access the general education curriculum. (IDEA sections 602, 611, 612, 613, and 614).

B. Increase access to OST and expanded learning programs in STEM.

1. SEAs and their subgrantees (e.g., LEAs and community-based organizations) can use funds from the Department's 21st Century Community Learning Centers (Title IV, Part B) program to provide high-quality STEM, computer science, and maker[10] activities to students in OST learning settings and as part of expanded learning programs that meet certain conditions. Eligible entities can use funds to carry out programs that foster innovation in learning by supporting non-traditional STEM education teaching methods that can emphasize hands-on, experiential learning. (ESEA sections 4201(a)(2) and 4205(a)(1)(A)(13)).
   Technical Assistance Resource: YouforYouth (Y4Y) STEM is a free, online professional learning and technical assistance website for 21st Century Community Learning Centers and other OST providers.
2. Schools operating eligible targeted assistance school programs can use Title I, Part A resources to support students identified as failing, or most at risk of failing, through expanded learning time, before- and after-school programs, and summer programs and opportunities. (ESEA section 1115).

3. Eligible entities may use Title IV, Part A funds to support the participation of low-income students in nonprofit competitions related to STEM subjects, such as robotics, science research, invention, mathematics, computer science, and technology competitions. (ESEA section 4107(a)(3)(C)).
   Technical Assistance Resource: T4PA Center, this technical assistance center provides State coordinators with assistance in implementing the Student Support and Academic Enrichment grant program (Title IV, Part A).

C. Increase access to career-based experiential learning.

1. Perkins V subrecipients can use funds to support collaborations with technology industries to offer internships, apprenticeships, and mentoring programs that improve the mathematics and science knowledge of students, as well as to purchase the technology needed to carry out these programs and the costs of career and technical student organization advisors. (Perkins V section 135). Funds reserved for State leadership activities can also be used to support, develop, improve, or expand the use of technology through collaborations with technology industries to offer internships and mentoring programs. (Perkins V section 124).
   Technical Assistance Resource: Perkins Collaborative Resource Network
2. Title I, Part A funds can be used to support programs that coordinate and integrate academic and career and technical education content through coordinated instructional strategies that can incorporate experiential learning opportunities and promote skills attainment important to in-demand occupations or industries and work-based learning opportunities that provide students in-depth interaction with industry professionals. (ESEA section 1112).

D. Increase access to STEM-focused schools[11] and pathways.

1. LEAs can utilize Title IV, Part A funds to support the creation and enhancement of STEM-focused specialty schools. (ESEA section 4107(a)(3)(C)).[12]
2. LEAs can utilize Title IV, Part A funds to integrate other academic subjects such as arts, history, and writing, into STEM subject programs to increase participation in STEM subjects, improve attainment of skills related to STEM, and promote well-rounded education. (ESEA section 4107(a)(3)(C)).
3. LEAs or consortia of LEAs can use STEM-focused instructional activities under the Magnet Schools Assistance Program to establish theme-based magnet schools that attract students of diverse backgrounds. (ESEA sections 4401 and 4407).
4. Public charter schools can support STEM initiatives using funds received under the Charter Schools Program. (ESEA section 4302).

E. Increase access to STEM-focused field-based or service-learning experiences.

1. Eligible entities can use funds to provide hands-on and active learning and exposure to STEM subjects, such as science fairs, citizen science projects, student entrepreneurship, and integrated maker activities and maker fairs, and to support the use of field-based or service learning to enhance students' understanding of the STEM subjects. (ESEA section 4107(a)(3)(C)).

2. Schools operating a Title I schoolwide program can use Title I funds to support activities such as field trips to increase access to real-world, hands-on STEM learning, activities, and applications, including experiences that expand student knowledge of the impact of STEM in the world, or the historical contributions to advance STEM made by individuals of diverse backgrounds. Such uses must be consistent with applicable SEA or LEA policies, Federal requirements for uses of funds, and the school's comprehensive needs assessment. (ESEA section 1114).

Resources to Support Equitable Access to STEM Learning and Experiences

1. Early Learning: STEM – Math Video
2. STEM Data Story — A Leak in the STEM Pipeline: Taking Algebra Early
3. Funding Digital Learning
4. IES National Center for Education Research (NCER) and National Center for Special Education Research (NCSER): A Compendium of Math & Science Research 2002-2013
5. IES NCER and NCSER: A Compendium of Education Technology Research 2002-2014
6. IES Stats in Brief
7. OET STEM Innovation Spotlights
8. WWC Practice Guides
9. NSF Racial Equity in STEM Grants
10. NSF report, Women, Minorities, and Persons with Disabilities in Science and Engineering (issued every two years)
11. Evidenced-Based Strategies for Attracting and Retaining Girls and Women in STEM, NSF INCLUDES National Network, 2021
12. Equity in PreK-12 STEM Education, NASEM, 2022 (NASA & NSF funded)
13. STEM Innovation for Inclusion in Early Education (STEMIE) Center (ED-funded)

IV. Recruit, prepare, and support a diverse STEM educator workforce, increase educators' knowledge and expertise in STEM, and equip educators to meet the diverse needs of all students

Educators have an incredible impact on student learning and engagement in STEM. Therefore, they need to be supported at all stages of their profession through pre-service preparation, on-boarding, continuing education and professional development, recognition, and other retention and promotion efforts. Persistent STEM teacher shortages shortchange our students, particularly those most impacted by the COVID-19 pandemic and in systemically underserved communities.

A. Recruit and prepare novice STEM educators, especially those from groups underrepresented in STEM.

1. The ED COVID-19 Handbook, Volume 2 and the Dear Colleague Letter on teacher and staff labor shortages are resources to assist in countering STEM teacher shortfalls.
2. Title II, Part A funds can be used to provide stipends to attract STEM educators to low-income schools. (ESEA section 2103(b)(3)(B)).
3. Title II, Part A funds can be used to recruit qualified individuals with STEM content knowledge from other fields to become teachers, including professionals from other occupations, former military personnel, and recent graduates with records of academic distinction. (ESEA section 2103(b)(3)(C)).

4. Title II, Part A funds can be used to establish "grow-your-own" programs in low-income schools to provide avenues for local students to stay or return to the school to become a STEM educator. (ESEA section 2103(b)(3)(B)).
5. Title III, Part A funds can supplement other professional learning activities for teachers to improve teaching skills in meeting the diverse needs of English learners, including how to implement effective programs and curricula on teaching English learners. (ESEA sections 3111(b)(2) and 3115(c)(2)).
6. LEAs, SEAs, the Bureau of Indian Education (BIE), or nonprofits or for-profits in partnership with LEAs, SEAs, or BIE can improve the processes for recruiting and retaining STEM teachers and school leaders in high-need schools through the Teacher and School Leader Incentive Program. (ESEA section 2212).
7. Eligible entities can apply for Teacher Quality Partnership (TQP) grant funds to improve the preparation of prospective STEM teachers, enhance professional development activities for new teachers, and recruit highly qualified individuals, including minorities and individuals from other occupations, into the teaching force.
8. SEAs can use IDEA, Part B section 611 funds they retain for authorized State-level activities, other than administration, to provide professional development to STEM educators of children with disabilities, to support the use of technology and universal design principles to maximize accessibility to general education curriculum, including STEM courses, for children with disabilities, and to support the needs of children with disabilities who require STEM coursework in order to receive a free appropriate public education. (IDEA sections 602, 611, 612, and 614).

B. Support and scale innovative STEM pedagogy in teacher preparation and development to improve teaching and learning, that includes community outreach, community-based learning, and other strategies to improve equity and inclusion.

1. Title II, Part A funds can be used to hire STEM coaches to help grantees tailor professional learning to the needs of individual educators. For example, coaches might help educators bolster their STEM content knowledge or expand STEM pedagogy to include problem-, place- or project-based active learning. (ESEA section 2103(b)(3)(M)).
2. Title II, Part A funds can be used to provide professional learning opportunities to educators. Examples include sustained, relevant professional development opportunities offered by science institutions (such as science museums, makers spaces, Federal labs, or nonprofits). (ESEA section 2103(b)(3)(M)).
3. Title II, Part A funds can be used to support educators as they implement new STEM courses, such as computer science, data science, artificial intelligence, or cybersecurity, in partnership with either an institution of higher education or Indian Tribal organization, or through a contract or grant with a for-profit or nonprofit entity. (ESEA section 2103(b)(3)(M)).
4. Title II, Part A funds can be used to support and provide professional development for teachers, principals, or other school leaders in effectively engaging parents, families, and community partners in new or existing STEM programming, and to coordinate services between school and community needs. (ESEA section 2103(b)(3)(M)).

5. Title II, Part A funds can be used to support educators to effectively teach children with disabilities in STEM subjects. (ESEA section 2103(b)(3)(F) and (M)).
6. Title II, Part A and Title III, Part A funds can be used to provide supplemental support to educators to effectively teach English learners and immigrant youth in STEM subjects. (ESEA sections 2103(b)(3)(F) and 3115).
7. Title II, Part A funds can be used to support elementary STEM teachers, including preschool educators, to incorporate STEM learning experiences into their classrooms and to utilize effective STEM pedagogy in their teaching. (ESEA section 2103(b)(3)(G) and (M)).
8. Title II, Part A and Title IV, Part A funds can be used to provide professional development to educators on incorporating technology into effective STEM instruction through personalized learning or blended learning, or digital learning, as defined in ESEA section 4102, to increase student achievement in STEM subjects. (ESEA sections 2103(b)(3)(M) and 4109(a)(5)).
9. Title IV, Part A funds can be used to facilitate collaboration among school, after-school, and informal program personnel to improve the integration of programming and instruction in STEM subjects. (ESEA section 4107(a)(3)(C)).
10. Eligible entities can apply for Supporting Effective Educator Development (SEED) grant funds to increase the number of highly effective educators by supporting the implementation of evidence-based practices that prepare, develop, or enhance the skills of educators.
11. Perkins V funds reserved by the State for leadership activities and funds available to LEAs can be used to offer internship programs that provide relevant STEM career experiences for secondary and postsecondary teachers, faculty, administrators, and career guidance and academic counselors who are involved in integrated career and technical education programs. (Perkins V sections 124 and 135).

Resources to Support a Diverse STEM Educator Workforce

1. Inclusion Across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (INCLUDES) Network (NSF-funded)
2. STEM Teacher Leader Network (NSF-funded)
3. Enhancing Science and Engineering in Prekindergarten through Fifth Grade, NASEM, 2021
4. Teaching K-12 Science and Engineering During a Crisis, NASEM, 2020
5. Science and Engineering for Grades 6-12: Investigation and Design at the Center, NASEM, 2019
6. Identifying and Supporting Productive STEM Programs in Out-of-School Settings, NASEM, 2015
7. Successful K-12 STEM Education: Identifying Effective Approaches in Science, Technology, Engineering, and Mathematics, NASEM, 2011
8. Successful STEM Education: A Workshop Summary, NASEM, 2011

V. Improve student access to materials and equipment needed to support inquiry-based pedagogy and active learning

Supporting students in STEM learning can require additional resources and technologies; the Department invites SEAs, LEAs, and other grantees to consider the following in addition to the Federal civil rights requirements related to resource comparability:[13]

A. Purchase digital devices for students to support STEM learning by improving access to instructional materials, collaborating with peers, and connecting with educators.

1. Mobile Devices: Federal funds can be used to provide students with mobile learning devices to support STEM learning.
    a. Schools operating a Title I schoolwide program can use Title I, Part A funds to acquire devices, including tablets and laptops, as part of a comprehensive plan to upgrade the educational program of a school, consistent with the school's comprehensive needs assessment. (ESEA section 1114).
    b. LEAs that receive an allocation under Title IV, Part A may purchase devices, equipment, software applications, software access, and cloud storage to address readiness shortfalls, to develop innovative or rigorous academic courses and curricula, or for carrying out blended learning models, consistent with the LEA's needs assessment and approved subgrant application, subject to certain limitations. (ESEA section 4109).
2. Assistive Technologies: Federal funds can provide children with disabilities with assistive technology devices and services in accordance with their individualized education programs (IEPs) to support their STEM learning.
    a. SEAs can use IDEA, Part B, section 611 funds they retain for authorized State-level activities, other than administration, to improve the use of technology in the classroom by children with disabilities to enhance their learning.[14]
    b. LEAs can use their IDEA, Part B funds to provide assistive technology devices and services to enable children with disabilities to participate in STEM courses, if a student's IEP specifies that the student requires an assistive technology device or service. (IDEA sections 602, 611, 612, 613, and 614).

B. Enhance STEM school-based laboratories, makers spaces, and other specialized learning spaces.

1. Title I, Part A funds can be used by schools operating Title I schoolwide programs to update existing STEM-related labs and lab materials or other specialized learning spaces to support inquiry-based STEM or maker activities as part of a comprehensive plan to upgrade the educational program of a school, consistent with the school's comprehensive needs assessment. (ESEA section 1114).
2. Title IV, Part A funds can be used to purchase devices, equipment, and STEM-related software, including simulation applications, to address readiness shortfalls. (ESEA section 4109).
3. Perkins V subrecipients can use funds for equipment, technology, hardware and software, and instructional materials for STEM career and technical education programs that are aligned with business and industry needs (Perkins V section 135).

C. Support English learners with supplementary resources to enhance instruction.

1. LEAs can use Title III, Part A funds to improve instruction for English learners by acquiring supplementary digital learning resources and software that will support English learners' acquisition of English and STEM content, including materials in languages other than English. (ESEA section 3115).

D. Connect educators with STEM professionals using technology.

1. Consistent with their subgrant applications, LEAs can use their Title IV, Part A funds to purchase software and devices that are an essential component of their plans to create and provide digital professional learning communities with practicing scientists, computer and data scientists, or engineers if consistent with their needs assessment, approved subgrant application, and other limitations.[15] These activities may be especially helpful in rural schools and communities.[16] (ESEA section 4109).

Resources to Support STEM Learning

1. ED's STEM Webinars
2. ED's STEM Newsletter
3. STEM4ALL, a Federal repository of STEM workforce training opportunities.
4. Q-12 Education, a Federal partnership to provide educational tools to support quantum learning and career pathways.
5. Quantum.gov, a Federal gateway to quantum research and development.
6. AI.gov, a product of the White House Office of Science and Technology Policy's National Artificial Intelligence Initiative Office, develops and supports the implementation of a national artificial intelligence strategy.
7. Data.Gov, this site includes tools and resources from across the Federal government for conducting research, developing web and mobile applications, and designing data visualizations.

Federal Agency STEM Education Resources

1. Centers for Disease Control & Prevention (CDC)
2. Environmental Protection Agency (EPA)
3. Department of Agriculture (USDA)
4. U.S. Department of Defense - STEM (DOD STEM)
5. Environmental Protection Agency (EPA)
6. Department of Agriculture (USDA)
7. Department of Labor (DOL)
8. Bureau of Labor Statistics (DOL)
9. Department of Energy (DOE)
10. NASA
11. National Science Foundation (NSF)
12. National Institutes of Health (NIH)
13. U.S. Department of Health and Human Services (HHS)
14. National Initiative for Cybersecurity Education (NICE) at National Institutes of Standards and Technology (NIST), U.S. Department of Commerce (DOC)
15. National Oceanic and Atmospheric Administration (NOAA)

16. Smithsonian Science Education Center
17. U.S. Geological Survey (USGS), U.S. Department of the Interior (DOI)
18. U.S. Patent and Trademark Office (USPTO), U.S. Department of Commerce (DOC)
19. U.S. Census Bureau

Thank you for your commitment to expanding STEM educational opportunities for our nation's educators and students. For ongoing support and resources, we encourage you to subscribe to the Department's monthly STEM Newsletter at www.ed.gov/subscriptions and to visit the tools and resources on www.ed.gov/STEM. There you will be able to view the archived STEM briefings and other STEM resources and opportunities. For questions, please reach out to your program officers or contact us at STEM@ed.gov.

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[1] STEM education is an expanding field that can include computer science, data science, artificial intelligence, and other pedagogies that impart computational literacy, problem-solving, and transdisciplinary skills and knowledge.
[2] Although the examples provided in this letter are limited to the ARP, ESEA, IDEA, and Perkins V, funds from other formula and competitive grant programs administered by the Department may also be used to support STEM learning.
[3] The Biden-Harris Administration acknowledges the unique impact of COVID-19 on, and trauma experienced by, underserved students, including students from low-income backgrounds; students of color; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) students; English learners; children with disabilities; migratory students; rural students; American Indian, Alaska Native, Native Hawaiian, and Asian American Pacific Islander students; students in foster care; students in correctional facilities; and students experiencing homelessness. The Administration recognizes that communities of color have borne a disproportionate burden of illness and serious outcomes from COVID-19 and require additional considerations.
[4] A wide range of programs can be considered OST programs, including comprehensive afterschool, summer-learning and enrichment programs, vacation academies, work-based learning programs, youth development programs, experiential or service-learning programs and other informal learning programs.
[5] Active learning is a process whereby students engage in activities such as reading, writing, discussion, prototyping, or problem-solving that promote analysis, synthesis, and evaluation of course content.
[6] Schools operating a Title I schoolwide program under the ESEA may use Title I, Part A funds to acquire devices, including tablets and laptops, as part of a comprehensive plan to upgrade a school's educational program, consistent with the school's comprehensive needs assessment.
[7] The non-Federal resources referenced in this document are included for the benefit of the reader. They may contain examples of, adaptations of, and links to resources created and maintained by another public or private organization. This information is provided as a convenience. The Department does not control or guarantee the accuracy, relevance, timeliness, or completeness of this outside information. The inclusion of these resources is not intended to represent or be an endorsement by any Federal agency or department, or the U.S. Government, of any views expressed, or materials provided, or links to information contained therein.
[8] National Science Foundation, Science and Engineering Indicators, 2022.
[9] See U.S. Department of Education, Office for Civil Rights, Dear Colleague Letter: Voluntary Youth Service Organizations (2015), offering guidance on how to determine whether an organization qualifies as a voluntary youth service organization under Title IX of the Education Amendments Act of 1972, which prohibits sex discrimination, and how OCR evaluates a school district's compliance with Title IX when it chooses to work with such an organization.
[10] Making involves higher-order reasoning and problem-solving skills as well as individual and collaborative project-based learning; the "maker mindset" actively fosters dispositions and skills that have inherent value, such as curiosity, collaborative problem-solving, and self-efficacy. By helping students experience hands-on STEM learning and real-world problem solving, making can spark deep interest and develop the necessary passion for students to excel in the 21st century.
[11] Successful K-12 STEM Education, NASEM, 2011
[12] Section 4102(8) of the ESEA defines a STEM-focused specialty school to mean "a school, or dedicated program within a school, that engages students in rigorous, relevant, and integrated learning experiences focused on science, technology, engineering, and mathematics, including computer science, which include authentic schoolwide research."
[13] OCR's DCL and other resource comparability materials are available at https://www2.ed.gov/about/offices/list/ocr/resourcecomparability.html.
[14] These improvements should include technology with universal design principles and assistive technology devices (in accordance with a student's IEP) to make the general education curriculum accessible for children with disabilities. Note that public schools must provide accessible technology to children with disabilities, as required by Section 504 of the Rehabilitation Act of 1973 and Title II of the Americans with Disabilities Act of 1990. Under these laws, public schools are also required to make STEM courses available to children with disabilities, if those courses are available to other students, and to provide

disability-related services and modifications as needed. These requirements apply regardless of whether IDEA funds are used to provide the accessible technology.

[15] See prior footnote.

[16] Note that rural LEAs that receive funds under the Rural Education Achievement Program (Title V, Part B) may use these funds for the activities that are allowable under Title I, Part A; Title II, Part A; Title III, Part A; and Title IV, Part A funds, among other uses. See ESEA section 5212(a) for allowable uses under the Small, Rural School Achievement Program and ESEA section 5222(a) for allowable uses under the Rural and Low-Income School Program.