

July 31, 2023

Dr. Nafeesa Owens
Assistant Director for STEM Education
White House Office of Science and Technology Policy

RE: Feedback on the Next Federal STEM Strategic Plan

Dear Dr. Owens:

On behalf of the STEM Education Coalition and the undersigned organizations listed below, we are pleased to submit these suggestions for consideration as you develop the 2023-2028 Federal STEM Strategic Plan.

The STEM Education Coalition is an alliance of education, business, and professional organizations nationwide that works to inform federal, state, and local decision makers about the critical role that science, technology, engineering, and mathematics (STEM) education plays in enabling students to thrive, innovate, and invent and therefore support American competitiveness and domestic economic development. We believe that our nation must improve the way our students learn STEM and that the business, education, and STEM communities must work together to achieve this goal.

The 2018 five-year strategic plan, *Charting a Course for Success: America's Strategy for STEM Education*, which was developed with substantial input from many of the STEM stakeholders signing this letter, proposed a wide range of policies to improve STEM education and bolster the competitiveness of the American workforce. We look forward to working with the Biden Administration and the Office of Science and Technology Policy (OSTP) in developing with a new strategic plan that will guide STEM education over the next five years.

Our comments center on the key challenges in K-12 STEM education (equity, teaching and learning, partnerships, systemic reform, and the role of federal agencies) that should be addressed, and in several instances we provide concrete recommendations that we believe will inform the work of the OSTP STEM team.

We have six key recommendations, which we will elaborate on in the remainder of this letter:

- Achieving Equity in STEM Education Must Be a National Priority
- Science Education Must Be Elevated as a National Priority within a Transdisciplinary Well-Rounded STEM Education
- Increase the Number of STEM Teachers in Our Nation's Classrooms
- Support Partnerships with Community Based STEM Organizations, Out of School Providers And Informal Learning Providers
- Take a Systemic Approach to Future STEM Education Interventions
- Clarify and Define the Role of Federal Agencies and OSTP in Supporting STEM Education

Achieving Equity in STEM Education Must Be a National Priority

The Five Year STEM Strategic Plan presents a historic opportunity to ensure that ALL students have access to high-quality STEM education that includes computer science.

A National Academies of Science report *Call to Action for Science Education* recognizes that “many students, particularly students who live in poverty, Black, Latino/a, and Indigenous students, and students living in rural areas, have lacked access to high-quality science and STEM education across K-16 and have been shut out of many opportunities in STEM.”

Inequities in STEM education must be acknowledged and rectified. In-service teachers must be educated and equipped to motivate and enhance the participation of students from historically marginalized communities in STEM through the lens of equity and social justice. Students need to see themselves, their culture, and their everyday lives reflected in STEM instruction through culturally responsive teaching materials and strategies.

Attracting and retaining more STEM teachers from historically marginalized communities is also critical. Working to identify approaches to preservice and induction that incentivize, recruit, train, and retain diverse teachers and administrators who will become science and STEM leaders must be given priority. Collaborations with community-based partners who reflect the students’ local contexts and lived experiences, will also help foster a sense of belonging as will including young people’s voices and perspectives in discussions about STEM education reform and innovations as they are best positioned to articulate their needs and challenges.

The federal government can assist states to develop a better understanding about which students, teachers, schools and communities have access and opportunity to high-quality STEM learning by providing increased research, data, and technical assistance on key areas that will strengthen STEM education nationwide.

Science Education Must Be Elevated as a National Priority within a Transdisciplinary Well-Rounded STEM Education

As the 2021 National Academies of Science report *Call to Action for Science Education* documented, many districts continue to emphasize mathematics and English language arts to the point that they have severely limited K-5 science, even though current research has found that rich learning in science is critical for literacy learning. Almost all elementary classes spend time on mathematics instruction every school day; in contrast, only 1 in 3 classes in grades 4–6 and 1 in 5 classes in grades K–3 receive science instruction every school day.

Science should also have equal priority with mathematics and English language arts in federal and state accountability requirements. Accountability drives the amount and quality of instruction provided in the classroom and in out of school time (OST) settings and will result in

better student outcomes. Science education must also be given the same priority for federal research and spending priorities that is given to mathematics and English language arts.

The Five Year STEM Strategic Plan should encourage schools and districts to develop and use assessments and accountability systems for science education, and use evidence to document progress and inform ongoing improvement. The federal strategic plan should encourage states and districts to steer away from outdated and ineffective assessments and explore and develop new and innovative methods for evaluating science performance including sampling, student growth models, and portfolio examinations. Further, federal and state leaders should focus on evaluating schools and districts, rather than individual student and teacher performance, when creating accountability and assessment requirements.

Finally, the federal strategic plan should also call for an increase in the frequency of the NAEP science assessment to match math and reading. Aligning the frequency of science assessment with the math and reading assessments will improve our ability to understand how student science performance has changed over time and will also increase the importance of science education.

Furthermore, content areas need to NOT be taught as disparate content—we have a wealth of evidence of the importance of transdisciplinary learning for engaging young people in STEM and a plethora of high-quality, evidence-based instructional materials and curriculum that use real-world problems and challenges to teach STEM content and scientific literacy. The most recent NAEP data in reading and mathematics underscore that need for instruction in these domains, but these should not be to the exclusion of other domains that are critical to ensuring that our nation continues to innovate and thrive as well as striving to educate a more well-rounded citizenry.

Increase the Number of STEM Teachers in Our Nation's Classrooms

Teachers are the engines that drive the quality STEM education that districts seek, yet states across the country are reporting record teacher shortages in both science and mathematics. As a result, experienced, certified/credentialed teachers are often less prevalent at schools with historically marginalized populations. The federal strategic plan should address how incentives and significant resources can be used to keep these teachers in our classrooms.

The federal strategic plan should highlight the importance of ongoing K-12 STEM professional learning and should provide information on how states can prioritize resources and materials so that teachers are able to successfully utilize student-driven, hands-on activities and investigations. In addition, given the rapid pace of change in STEM fields as well as in society, demands on teachers are constantly changing and educators must keep current in order to prepare students, but most professional learning, mentorship, and leadership opportunities for these educators is practically nonexistent. Content-specific professional development is essential so that teachers both understand STEM and know how to teach it in engaging,

student-centered ways that reflect current evidence about how people learn. K-8 teachers need specific support to develop thoughtful teaching practices around the integration of science, ELA, & math. The federal strategic plan should highlight the importance of ongoing K-12 STEM professional learning and should provide information on how states can prioritize resources and materials so that teachers are able to successfully utilize student-driven, hands-on activities and investigations.

Support Partnerships with Community Based STEM Organizations, Out of School Providers and Informal Learning Providers.

Young people spend more than 80% of their waking hours outside of school, hence it is critical that we take an immersion approach to increasing engagement and belonging in STEM. State and local science and STEM-focused community organizations (also known as STEM ecosystems, STEM networks, or STEM alliances), OST providers including afterschool and summer program providers, and other informal learning organizations are critical to a well-rounded, high-quality STEM learning environment.

Alliances that involve these key stakeholders are currently working together to create evidence-based visions and plans for improving STEM education and addressing disparities in opportunity. These plans include focusing on the technology and physical facility needs to ensure a well-rounded, high-quality STEM education; ensuring that professional development for educators supports effective STEM education; and ensuring that transportation, support staff, and other tools and supports to ensure an equitable learning environment are available.

The Five Year Federal STEM Strategic Plan should encourage, incentivize and cultivate more collaborative partnerships with schools and community-based STEM organizations, OST providers, and informal educators. There are a number of examples of such providers offering science that counts for science credit in schools. Study of these could provide critical models for states and districts struggling to provide high-quality STEM instruction. Looking at how to leverage these partnerships to strengthen STEM education. This will enable a more responsive, tailored, and sustainable focus on prioritizing STEM education improvements nationwide.

Take a Systemic Approach to Future STEM Education Interventions

In education reform efforts, there are often targeted interventions implemented at the state, district or school level that lack coherence to other aspects of the system.

Examining all aspects of the STEM education system at each level and mapping out coherent approaches to school improvement is essential for student success. It is also important to reflect current trends, such as the growing attention and incorporation of student voice, into any new approaches and innovations. The federal STEM strategic plan should focus on a systemic approach to improving K-16 STEM education that includes STEM literacy as well as career development practices that coincide with STEM education initiatives, workforce development, teacher preparation, and more. Local, state, and federal funding and policies and resources must be coordinated in a consistent and coherent manner.

Clarify and Define the Role of Federal Agencies and OSTP in Supporting STEM Education

Federal agencies have the capacity to play a major role in improving STEM education. Their programs must integrate workforce, K-12, higher-education, career and technical, informal and out-of-school learning, opportunities for innovation and invention, and research elements in a process that effectively leverages resources across the federal government. Unfortunately, many federal programs created for STEM classrooms are out of touch with the realities of the K-12 classroom or OST programs, and a vast majority of educators and school and district education leaders are unaware of what these agencies offer.

The federal STEM strategic plan should include strategies that will:

- Determine the common and recurring challenges K-12 administrators face when implementing quality STEM education and learning experiences that promote diversity, equity, and inclusion in STEM and use this information when developing programs at the local and state level.
- Strategize and identify key research-informed and field-tested outcomes and products that inform teaching and learning and that will best address these challenges and can be scaled and disseminated quickly to schools. These products should be more accessible and aligned to the Framework for K–12 Science Education and related standards.
- Create a broad outreach/dissemination campaign targeted to school administrators that will generate awareness about what a quality K-12 STEM education involves.
- Develop a communication network that will increase awareness and access to federal STEM programs so that they have maximum reach to states and districts that need in need of resources
- Create a model for states/districts that will deepen understanding and use of effective, federal education programs and driven STEM content, practices and skills and can be scaled up for use in other states/districts.

- Incentivize collaborations with OST program providers so that young people have a variety of venues where they can engage with STEM to charge up their interest and develop a sense of agency and belonging.
- Create a dedicated permanent STEM coordinator position within OSTP whose role will be to drive a broad STEM education and STEM literacy, workforce, and jobs agenda across the federal government.
- Reestablish the Office of STEM Education at the Department of Education and ensure it is adequately staffed.
- Ensure that the Federal Committee on STEM Education (FC-STEM), charged with interagency coordination, is fully staffed and supported to be effective in its Congressionally mandated functions. More broadly disseminate the work and activities of FC-STEM and its interagency working groups.
- Appoint qualified STEM education professionals with experience in both in-school and out-of-school learning settings to a wider range of federal advisory bodies, such as the President's Council of Advisors on Science and Technology and the National Science Board, and in White House and other senior federal agency policymaking positions.
- Reinstate the White House Science/STEM Fair and hold public events that excite the public about STEM and demonstrate to the Nation that STEM is an Administration priority.

In conclusion, the Biden Administration has the unique opportunity to create a strategic plan to chart the direction of STEM education that will effectively reach more students and teachers, strengthen the infrastructure for supporting STEM instruction and engagement, broaden participation in STEM fields by historically marginalized populations, and reorganize federal efforts and redirect resources around more clearly defined priorities. We strongly encourage that key goals and visions proposed in the strategic plan and endorsed by the STEM community are also reflected in future federal agency budget proposals.

We look forward to your response to our ideas, and working with OSTP as the strategic plan is developed.

Sincerely,

STEM Education Coalition
Universal Technical Institute
National Science Teaching Association
Inventionland Education
Society of Hispanic Professional Engineers
National Instruments
Girlstart
Student Association for STEM Advocacy
National Consortium of Secondary STEM Schools
American Chemical Society

Ignite Worldwide
Society of Women Engineers
Afterschool Alliance
Aviation Technician Education Council
American Statistical Association
STEM Next Opportunity Fund
Girls, Inc.
American Society of Civil Engineers
Project Lead the Way
National Council of Teachers of Mathematics
Education Development Center
Hands on Science Partnership
American Mathematical Society
Battelle
STEMx
Association of Science and Technology Centers
TIES
STEM Learning Ecosystems Community of Practice
National Math and Science Initiative
American Nuclear Society
American Association of Colleges for Teacher Education