

# Call to Action for Science Education

## BUILDING OPPORTUNITY FOR THE FUTURE

### Summary

Science is an essential tool for solving the greatest problems of our time and understanding the world around us. Scientific thinking and understanding are essential for *all people* navigating the world, not just for scientists and other science, technology, engineering, and mathematics (STEM) professionals. They enable people to address complex challenges in local communities and at a global scale, more readily access economic opportunity and, rein in life-threatening problems such as those wrought by a global pandemic. In this way, knowledge of science and the practice of scientific thinking are essential components of a fully functioning democracy. Science is also crucial for the future STEM workforce and the pursuit of living wage jobs. Yet, science education is not the national priority it needs to be, and states and local communities are not yet delivering high-quality, rigorous learning experiences in equal measure to all students from elementary school through higher education.

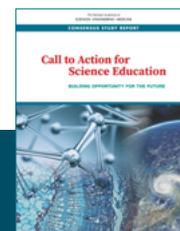
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*Science education is not the national priority it needs to be.*

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This report, authored by a committee convened by the National Academies of Sciences, Engineering, and Medicine, lays out a vision for equitable access to quality science learning experiences across K-16 education that will enable all people to develop the scientific literacy they need for personal and professional success. To achieve this vision, investing in improved science learning for all must be a national priority embraced by federal and state policy makers and local communities.

The work of the committee was conducted during the COVID-19 pandemic at a time when our nation is confronting systemic racial and economic inequities that we must end. This context influenced the content of the committee's deliberations, the vision for a **better, more equitable science education** we mapped, and the recommendations we put forth. This report presents our vision, with the aspiration that stakeholders in communities across the country will work together to ensure that, nationwide, students of all races, ethnicities, and financial circumstances have the opportunity to shape the future.



Our vision for K-16 science education is that every student experiences the joy and wonder of science, learns how science can be used to solve local and global problems, sees the pathways they can take into science-related careers, and feels welcomed and valued in science classrooms. This vision is grounded in decades of research on effective teaching and learning. We recognize 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 education across K-16 and have been shut out of many opportunities in STEM. Addressing the deep and enduring disparities in K-16 science education is paramount.



In this report, we articulate our vision for high-quality science education, describe the gaps in opportunity that currently exist for many students, and outline key priorities that need to be addressed in order to advance

### **better, more equitable science education**

across K-16. These priorities include (1) providing time, materials, and resources for science instruction; (2) developing and supporting a strong, diverse science teaching workforce; (3) designing supportive pathways for students in science; (4) employing well-designed assessments and accountability systems for science; and (5) using evidence to document progress and inform ongoing improvement efforts.

The committee embraces the idea that policy can spur innovation and move an ambitious agenda forward. We recognize that federal, state, and local actors have different roles to play in our education system, and that many of the actions that are needed to realize the promise of science education must be taken at local and regional levels. However, federal and state policy makers and national stakeholders in STEM education can play key roles in supporting the work of local and regional communities as they work to expand opportunities in science education. With this in mind, the committee recommends:



## ACTION AREA 1: ELEVATE THE STATUS OF SCIENCE EDUCATION

**RECOMMENDATION 1:** The White House, with leadership from the Office of Science and Technology Policy (OSTP), should act to raise the profile of science education and elevate the importance of access to high-quality science learning opportunities for all students across K-16. Specifically, OSTP should encourage national stakeholders, including federal agencies, along with those in the education, business, nonprofit, scientific, and philanthropic sectors, to focus resources and leverage their assets to increase the quality of and accessibility to K-16 science education.

**RECOMMENDATION 2:** Congress should include science as an indicator of academic achievement when it next reauthorizes the Elementary and Secondary Education Act. Accountability for science should focus on students gaining conceptual understanding of science and should not be based on single tests. It should involve a system of assessments and indicators that together provide results that complement each other and provide information about the progress of schools, districts, and states.

**RECOMMENDATION 3:** State Departments of Education should act now to include science in their accountability systems for K-12 education. A state accountability system for science needs to include assessments that support classroom instruction, assessments that monitor science learning more broadly (at the school, district, and state levels), and indicators that track the availability of high-quality science learning opportunities.

**RECOMMENDATION 4:** National stakeholders in science, technology, engineering, and mathematics (STEM) education should undertake coordinated advocacy to improve science education K-16 with particular attention to addressing disparities in opportunity. These stakeholders (including professional organizations, advocacy groups, scientists, and business and industry) will need to balance advocacy for STEM broadly with attention to the importance of high-quality learning experiences in science as well as in each of the other STEM disciplines.

## ACTION AREA 2: ESTABLISH LOCAL AND REGIONAL ALLIANCES FOR STEM OPPORTUNITY

**RECOMMENDATION 5:** Leaders of local and regional K-12 systems and postsecondary institutions should work together to form Alliances for STEM Opportunity that involve key stakeholders in science, technology, engineering, and mathematics (STEM)



education, such as informal education organizations, nonprofit, afterschool and summer programs, business and industry, and the philanthropic sector. Each alliance should develop an evidence-based vision and plan for improving STEM education that includes specific attention to high-quality science learning opportunities and addresses disparities in opportunity. Plans should include, at minimum, strategies for:

- (1) providing access to high-quality science learning experiences across K-16 and addressing existing disparities in access;
- (2) providing high-quality instructional materials and other resources to support these experiences;
- (3) building a high-quality, diverse workforce for teaching science to include provisions for professional development and ongoing support;
- (4) creating pathways for learners in science across grades 6 through 16 with supports for learners who want to pursue STEM careers.

**RECOMMENDATION 6:** The federal government, philanthropic organizations, and business and industry should provide funding to support the work of local and regional Alliances for STEM Opportunity as they work to improve science education. Funding should be targeted first to communities where a significant number of students live in poverty. Funds should support coordination and management of the alliances, programmatic efforts, and research and evaluation.

### **ACTION AREA 3: DOCUMENT PROGRESS TOWARD BETTER, MORE EQUITABLE SCIENCE EDUCATION**

**RECOMMENDATION 7:** States should develop and implement data-driven, state-level plans for providing equitable K-16 science, technology, engineering, and mathematics (STEM) education with specific attention to science. These plans should include “STEM Opportunity Maps” that document and track where opportunities are available, where there are disparities in opportunity, and how much progress is being made toward eliminating disparities and achieving the goals of the state STEM education plan. The STEM Opportunity Maps should incorporate documentation from local and regional Alliances for STEM Opportunity.

**RECOMMENDATION 8:** The federal government should develop an annual “STEM Opportunity in the States” report card that documents the status of K-16 science, technology, engineering, and mathematics (STEM) education across each of the states and territories and tracks equity of opportunity for students in science and in the other STEM disciplines.

