The American Commitment to a High-Quality Science Education for Every Student

Every student – from every part of our society – deserves a high-quality science education. A scientifically literate society is essential to both a healthy democracy and to our future economic prosperity. Unfortunately, our nation is falling behind in science education at a time when its critical importance is rapidly rising. Our policymakers can and must act to elevate the priority of science education in our nation's federal and state level education laws.

Our Declining Performance in Science Education Demands Action

It is clear that many of our schools are not providing sufficient science education to K-12 students, especially to our most vulnerable students and to our youngest learners. In far too many classrooms science is being ignored as more instruction time, professional learning, and resources go to the tested subjects of math and reading/language arts.

It is critical that access to effective science teachers and high-quality science instructional resources be provided to every student throughout their K-12 experience – both in the classroom and in out of school time settings. But according to 2019 NAEP Science results (Nation's Report Card 2019), across the grades few students are proficient in science. By the time they reach 12th grade, only 59% scored *above basic* in science.

According to latest *National Survey of Science and Mathematics Education* (Banilower et al., 2018), a survey of about 10,000 mathematics and science teachers that has been conducted periodically since 1977, a solid foundation in science education is lacking for the students who need it most:

Key Message #1: Too Many Students Lack an Opportunity to Learn Science

> "**Lack of time and materials for science instruction, especially in the elementary grades, is particularly problematic.** 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**. In addition, elementary mathematics lessons tend to be substantially longer than science lessons, although the amount of time devoted to science and mathematics is substantially less than reading/language arts. Computer programming instruction is offered in only about 1 in 4 elementary schools."
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> **"**Programs to support students in computer science are relatively uncommon, with only 26 percent of high schools requiring any amount of computer science for graduation and fewer than one-third of all schools offering programs or practices to enhance interest in computer science beyond encouraging students to participate in camps."

Key Message #2: Teachers Need More Robust and Sustained Professional Development to Support Science Instruction

> "Elementary teachers are typically assigned to teach multiple subjects-- including science and mathematics, and other areas as well--to a single group of students. However, these teachers do not feel equally well prepared to teach the various subjects and school leaders do not have the tools to help create conditions to support science instruction. Although 73 percent of elementary teachers of self-contained classes feel very well prepared to teach mathematics—slightly lower than the 77 percent for reading/language arts— **only 31 percent feel very well prepared to teach science, and only 6 percent feel very well prepared to teach computer science or programming**. "

> "Given the inclusion of engineering in the Next Generation Science Standards and many states' standards, as well as teachers' self-report of lack of preparation to teach engineering, it is somewhat surprising that fewer than a third of K–12 science teachers have attended professional development that focused heavily on deepening their understanding of how engineering is done. Further, **only about a quarter of science teachers across the grade-range categories have attended professional development with a heavy emphasis on incorporating students' cultural backgrounds into science instruction despite the push for culturally responsive teaching**."

Key Message #3: Quality Science Instruction is Not Equitably Distributed

> "In science, classes composed of mostly low prior achievers and classes with the highest proportion of students from race/ethnicity groups historically underrepresented in STEM fields are significantly less likely than classes of high prior achievers and few students from these race/ethnicity groups to be taught by teachers who have participated in more than 35 hours of professional development in the last three years."

> "There are also differences in opportunities related to the percentage of students in schools eligible for free/reduced-price lunch, with similar patterns within science, mathematics, and computer science. For example, opportunities such as after-school help, family nights, and visits to industry are more prevalent in schools with a high percentage of eligible students, whereas subject-specific clubs and opportunities to participate in academic competitions are more likely to be available in schools with a low percentage of eligible students."

Principles to Inform Federal, State and Local Policies on Science Education

Given these challenges, our central recommendation is that science should be elevated as a priority in our nation's education policies and their related budget priorities. Such policies should embody these four key principles:

1. Science should 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 will result in better student outcomes.

2. Federal and state leaders should focus on evaluating schools and districts, rather than individual student and teacher performance, when creating accountability and assessment requirements.

3. Federal and state accountability and assessment requirements should allow 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 – and provide funding supports for such innovations. Efforts to innovate should also include collaboration between stakeholders to bolster systems alignment, particularly with industry in-mind as policymakers seek to strengthen the K-12 to workforce pipeline.

4. Federal and state funding and programs should prioritize science teacher recruitment, retention, and professional development on an equal basis with mathematics and English language arts, as well as provide for high-quality science and math instructional materials and adequate resources – in both classroom and out of school time settings.

Frequently Asked Questions

Why does science education matter?

Science education matters because our future depends on it. Science is a crucial part of the economy and our daily lives, and having a strong foundation in its basic principles will provide crucial tools that our society needs to strive. It is also important to have an understanding of scientific concepts in order to make informed decisions and develop problem-solving skills. Without science education, we would not have the technology and the knowledge to continue advancing in a modern world.

How would you describe a great science education?

A great science education begins with engaging students in meaningful experiences that help them build a foundational understanding of core scientific concepts. It should combine opportunities for hands-on exploration and inquiry-based learning with direct instruction. Students should be exposed to a variety of resources and perspectives, and have a chance to explore science-related topics in depth. Furthermore, teachers should foster an atmosphere of exploration and creativity as they help students discover their passions within the broad field of science.

What are some examples of specific policies and practices that can improve outcomes in science education for students?

- Incorporating diverse scientific perspectives in science course content and classroom activities.
- Incorporating authentic experiences in science education, such as educational trips, field work, and observation of natural phenomena.
- Implementing well-designed assessments that include both written and hands-on activities to evaluate students' understanding of science content.
- Encouraging students to collaborate in small groups as they learn science topics and explore related inquiry.
- Engaging students in problem-solving activities and projects to strengthen their critical thinking skills and analytical reasoning.
- Establishing a student-centered learning environment that encourages students to take an active role in their education.
- Offering enrichment activities for students to engage in science-related experiments and simulations.
- Providing professional development for teachers to help them stay up-to-date on the latest teaching strategies and science content.
- Integrating technology, such as computer simulations and digital science tools, into the curriculum.
- Encouraging and rewarding student creativity and inquiry in the classroom

Organizations Supporting this Statement (as of April 12, 2023)

STEM Education Coalition
National Science Teaching Association
Beyond100K
American Chemical Society
Education Development Center
Campaign for Environmental Literacy
Society of Women Engineers
Hands on Science Partnership
National Consortium of Secondary STEM Schools
Vernier Science Education
United Scientific
Conrad Foundation
Aldon Corporation
Partnerships in Education and Resilience (PEAR) Institute
Universal Technical Institute
Girlstart
American Association of University Women (AAUW)
National Coalition of Aviation and Space Education
Aeronautical Repair Station Association
Exploratorium
Learning Blade
University of North Carolina Charlotte
Southern Methodist University
South Carolina's Coalition for Mathematics & Science
Minnesota Academy of Science
The Academy of Science - St. Louis
New York Hall of Science
Interactive Science Programs
Robotics Education & Competition Foundation
Black Family Technology Awareness Association
Carolina Biological Supply Company
Tennessee Junior Academy of Science
Maine Mathematics and Science Alliance (MMSA)
Arc Capital Development
STEM Learning Design, LLC
ACT Now Illinois
Anderson Institute of Technology
American Statistical Association
Data Science 4 Everyone
Chicagolandeweek

Roboost
Project Exploration
Gulliver Preparatory School
DuPage Children's Museum
University of North Carolina Charlotte
Essential Elements of the Community, Inc.
The South Carolina Military Museum
Watertown City School District
New York Sun Works
Hawaii University International Conference on STEM/STEAM and Education
Aquaponics USA
Finn Partners

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