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A New Vision for Elementary School Teaching and Learning

High-quality science education is not the national priority it needs to be. There are also deep disparities that have shut too many students out of science learning and careers.

The National Academies of Sciences, Engineering, and Medicine convened a committee of experts to present a detailed vision of better, more equitable science learning from kindergarten to postsecondary education, and to outline recommendations for how policymakers can achieve this vision.

STRENGTHENING ELEMENTARY SCHOOL SCIENCE LEARNING

The elementary grades are a critical time for science learning. Early experiences in science can build on children's natural curiosity and help them appreciate the wonder and joy of learning about the world through science. Limiting early science learning opportunities in school may leave them unprepared for science courses in middle and high school—an opportunity gap that can affect students' educational journey and career path into adulthood.

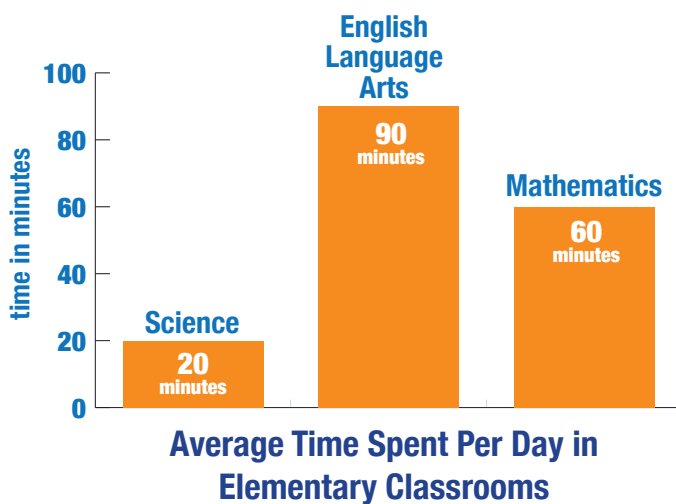
Unfortunately, the average American elementary classroom devotes less than 20 minutes per day to science, but nearly 90 minutes to English/Language Arts and nearly one hour to mathematics. In addition, students in high-poverty elementary schools are less likely than students in more affluent schools to do “hands-on” work every week.

This is likely in part due to the unintended consequence of state school accountability systems built as a result of No Child Left Behind (NCLB) and its successor, the Every Student Succeeds Act. The law does not require science to be built into state accountability systems. There is also wide variation across states in how much time for science is required in elementary school. In states that include science in accountability for fourth grade, fourth grade teachers report spending more time on science.

Even the youngest children are capable of engaging in science investigations. Students in elementary education need opportunities to do the things that scientists do: pose questions, carry out investigations, analyze data, draw evidence-based conclusions, and communicate results in various ways. Making science a fundamental part of K-5 instruction leverages

Every student should
experience the
joy and wonder
of science

Only **22 percent** of American high school graduates are proficient in science. It's not surprising why. Students spend:



SOURCE: National Center for Education Statistics, U.S. Department of Education. (2017). *The Nation's Report Card: 2015 Science at Grades 4, 8 and 12. NCES 2016162.*

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their natural curiosity about the world. In addition, science provides a rich context for building competencies in mathematics and English/Language Arts and for developing language.

How to make it happen:

- In elementary school—starting in kindergarten—ensuring students spend sufficient time learning science each week is essential.
- Schools and communities will need to provide the time, materials, and resources necessary to support high-quality science learning experiences for all elementary school students.

STRENGTHENING ELEMENTARY SCHOOL TEACHING

Teachers are essential to improving elementary science. In a recent national survey, the majority of elementary teachers (69%) reported they are not very well-prepared to teach science. Elementary teachers frequently have to modify their investigations because they lack the prerequisite materials and supplies.

The challenge of teachers' lack of preparation to teach science is more acute in schools that serve higher percentages of students of color and students living in poverty.

Professional learning opportunities for teachers are an essential part of ensuring high-quality science instruction and educators should feel well-prepared to teach science topics. Elementary school teachers need ample, ongoing opportunities to participate in professional learning focused specifically on science pedagogy and to engage in professional communities to share best teaching practices, troubleshoot challenges and receive and provide feedback.

How to make it happen:

- Offer professional learning opportunities for elementary school educators that are consistent, closely connected to the curriculum being taught and allow time for reflection.
- Devote the same measure of professional development resources, including time, to science as the other disciplines for elementary school educators.
- Provide time, materials, and resources for science instruction.

The Call to Action committee has provided clear, actionable recommendations for federal and state lawmakers, education leaders, advocates and local communities. To learn more, visit nationalacademies.org/cta-science-education.

69%
of elementary
school teachers
say they are not
very well-prepared
to teach
science

SOURCE: Horizon Research, Inc. (2019).
Highlights from the 2018 NSSME+.

