BUILDING OPPORTUNITY FOR THE FUTURE



This guide highlights key messages from the Call to Action report to help advocates spread the word. The following Elevator Pitch, Talking Points and "Tough" Q&A offer sample language advocates are welcome and encouraged to use throughout their efforts to advance better, more equitable science learning for all.

### **ELEVATOR PITCH**

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

The National Academies of Sciences, Engineering, and Medicine gathered a committee to present a new vision for science learning from kindergarten through higher education. This Call to Action report outlines recommendations for how policymakers should ensure all students get the quality science education they need to succeed in tomorrow's jobs and solve our greatest challenges. The experience of engaging with science should be dynamic and exciting for students.

Now, it's time for local, state and national leaders to act on the recommendations outlined in the report.

### **TALKING POINTS**

#### About Call to Action for Science Education: Building Opportunity for the Future (2021)

- The National Academies of Sciences, Engineering, and Medicine convened a committee of experts to present a detailed vision of better, more equitable science education across elementary, secondary and post-secondary, and to offer recommendations for how stakeholders can achieve this vision.
- The report concludes science education is not the urgent national priority it needs to be. In this way, the Call to Action report is a wake-up call as well as a roadmap for policymakers and local communities.
- The report's vision for K-16 science 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.
- Paramount to this vision is a renewed and nuanced attention to equity—equity of resources, time, quality instruction and access—so that students of all races, ethnicities, and financial circumstances have the opportunity to shape the future.
- The report outlines key priorities that need to be addressed in order to advance better, more equitable science education across K-16. These priorities include:
  - providing time, materials, and resources for science instruction,
  - developing and supporting a strong, diverse science teaching workforce,
  - · designing supportive pathways for students in science,
  - employing well-designed assessments and accountability systems for science, and
  - using evidence to document progress and inform ongoing improvement efforts.
- The report offers eight clear, actionable recommendations for how federal and state lawmakers, advocates and local communities can:
  - Elevate the status of science education;

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- Establish regional and local Alliances for STEM Opportunity; and
- Document progress toward better, more equitable science education.

The study — undertaken by the <u>Committee on Call to Action for Science Education</u> — was sponsored by the Carnegie Corporation of New York and National Academy of Sciences' W.K. Kellogg Fund.

#### Why Quality Science Education is Important:

# Scientific thinking and understanding are essential for everyone, not just for scientists and other STEM professionals.

- We navigate and experience our world through science. From a young age to adulthood, science is what allows us to address complex challenges in our communities locally and globally, and to rein in and understand life-threatening problems. Never has this been clearer than during a global pandemic.
- Knowledge of science and the practice of scientific thinking are essential components of a fully functioning democracy. Civic leaders and citizens—all of us—must make informed decisions about issues and investments affecting our community by asking what science teachers constantly ask their students: "What does the evidence suggest?"

#### Science is crucial for the future STEM workforce and the pursuit of living wage jobs.

- In-demand careers in healthcare, pharmaceuticals, computer science and other fields require mastery in scientific disciplines that must begin when students are early in their academic journey.
- Skills learned through science engagement are required for just about every job today, both within and beyond STEM fields.
- STEM jobs in a wide range of industries are much more likely to secure living wages for those employed in them. The U.S. Bureau of Labor Statistics reports that in 2019, the wage of a STEM professional averaged \$50,000 more annually than a non-STEM worker.
- Trades such as welders, electricians, farmers and other important roles in our community now demand more technical training and in some cases advanced degrees.

# Better and more equitable access to science learning connotes quality as well as quantity. Disparities in K-16 science education—and therefore gaps in STEM opportunity and careers—are deep and enduring, and require significant change.

- Many students, particularly students who live in poverty, Black, Latino/a, and Indigenous students, students learning English and multilingual learners, 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.
- We see the consequences of this disparity carry through to the rest of students' lives. People of color make up 27% of the U.S. population, but only 11% of STEM professionals.
- Equity refers to all students having equitable time spent with science learning both inside and outside of the classroom; equitable access to learning resources and materials; and equitable exposure to instructors trained in relevant science subject areas as well as culturally and linguistically responsive pedagogy.
- Equity is also about helping all students develop the skills they need for a successful future and the opportunity to pursue and succeed in jobs.

#### Quality science learning should be meaningful and relevant to students' lives.

- Raise the profile of science education and elevate the importance of access to high quality science learning opportunities for all students across K-16.
- The nation's schools teach reading, writing, and mathematics because these are seen as foundational skills for daily life and participation in society. Science literacy is fundamental as well.

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- Only 22 percent of American high school graduates are proficient in science.
- The average elementary classroom devotes less than 20 minutes per day to science.
- Too many students are learning science through passive lectures and textbook reading, without an appreciation for how science is relevant to their lives. A recent study revealed students spent 87 percent of their class time listening to their instructor talk. The Call to Action report supports a vision aligned with A Framework for K-12 Science Education, in which science instruction comes alive, and all students experience the joy and wonder of science. This Framework is the foundation for the Next Generation Science Standards.
- Much like mathematics, engineering and other STEM disciplines rely on a foundational understanding of science that builds in rigor and complexity from K-16.
- It is difficult to have a democracy that depends on evidence-based decision-making with a citizenry that does not have foundation in science and its core principles.

# A high-quality, diverse workforce for teaching science across K-16 is essential to bolster high-quality science learning.

- Teachers are the engines of better, more equitable science education. At every stage of the K-16 continuum, students need science teachers who both understand science and know how to teach it in engaging, student-centered ways that reflect current evidence about how people learn.
- Communities need to devote the same measure of professional development resources, including time, to science as the other disciplines.
- 69 percent of elementary teachers say they are not well-prepared to teach science.
- There is also a particular need in postsecondary education for all who teach science (faculty, instructors, lecturers, grad students, and post docs) to have opportunities to learn about effective science pedagogy.
- Attracting and retaining more science teachers and faculty of color is a top priority for all levels of education.

# There is a lot of work to be done to strengthen the connection between K-12 and higher education.

- The wide disparities in access to high-quality learning experiences, well-prepared science teachers, and well-resourced institutions of higher education, are exacerbated by the siloed nature of K-12 and higher education.
- Few K-16 students have the kinds of high-quality science learning experiences consistently across their educational journeys that are needed to inspire and prepare them for STEM careers.
- High school students learn that science provides a pathway to living wage jobs. When these students matriculate, there must be a smooth transition to their higher education learning experiences, where faculty must mentor students effectively and ensure they enter the job market with career-ready skills.
- The Call to Action report's recommendations can build on and accelerate the ongoing efforts of faculty, instructors, education researchers and directors of Centers for Teaching and Learning to transform undergraduate STEM education.

### **CALL TO ACTION RECOMMENDATIONS FOR KEY STAKEHOLDER GROUPS**

The White House, with leadership from the Office of Science and Technology Policy (OSTP):

• Encourage national stakeholders, including federal agencies, along with those in the education, business, non-profit, scientific, and philanthropic sectors, to focus resources

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and leverage their assets to increase the quality of and accessibility to K-16 science education.

#### Congress:

 Include science as an indicator of academic achievement when it next reauthorizes the Elementary and Secondary Education Act, as accountability for science should focus on students gaining conceptual understanding of science and should not be based on single tests. Rather, 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.

#### National stakeholders in STEM education:

- Undertake coordinated advocacy to improve science education K-16 with particular attention to addressing disparities in opportunity.
- 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.

#### State Departments of Education and State Leaders:

- 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.
- Develop and implement data driven state-level plans for providing equitable K-16 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.

#### Leaders of local and regional K-12 systems and post-secondary institutions:

- Work together to form Alliances for STEM Opportunity that involve key stakeholders in STEM education, such as informal education organizations, nonprofits, afterschool and summer programs, business and industry, and the philanthropic sector.
- With these Alliances, 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.

#### Philanthropic organizations, business and industry:

- Provide funding to support the work of local and regional Alliances for STEM Opportunity as they work to improve science education. Funds should:
  - First target communities where a significant number of students live in poverty.
  - Support coordination and management of the alliances, programmatic efforts, and research and evaluation.

### TOUGH Q&A

#### What's different here that we haven't heard before regarding science education?

The Call to Action report:

- Looks at the full continuum K-16 elementary, secondary, post-secondary
- Has a strong emphasis on equity and opportunity

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- Empowers local communities to create change
- Emphasizes how science education is necessary for participation in democracy and daily life (goes beyond workforce development)

#### How are climate science and evolution addressed in this report?

The Call to Action report does not advocate for any particular curriculum. The report emphasizes the need for all students to access each of the fundamental disciplinary areas in science (physical sciences, life sciences, earth and space sciences, and engineering, technology and applications of science.) The report also underscores the importance of equipping students with scientific literacy and critical thinking skills to make informed decisions in their daily lives.

# Recommendations for the White House and OSTP will be too politically fraught for my community. Can I still advocate for the messages in this report?

Absolutely. The Committee specifically recognizes the important roles of local and state-level policymakers, education leaders and other community advocates in enacting these important changes in science education. There are recommendations and toolkit assets for all of these audiences, and we encourage allies to lean into the conversations and actors with whom they have the greatest influence.

#### Why doesn't the report include more about out-of-school time (OST) STEM?

The *Call to Action* report does indeed highlight the importance of expanding access to OST STEM, but we fully welcome additional insights and recommendations from our peers in OST spaces (programmatic, philanthropic and otherwise)! Our hope is that partners and allies add to the conversation and enhance efforts to advance better, more equitable science learning for all both inside and beyond the classroom.

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 <u>nationalacademies.org/cta-science-education</u>.