SCIENCE EDUCATION POLICY

Well-educated scientists and engineers drive the technology development that allows the United States to maintain its competitive edge in the global marketplace and improve the well-being of citizens worldwide. Chemistry, as well as science in general, is central to how people address pressing problems at local, national, and global levels. To prepare current and future students with the skills necessary to address rapidly evolving needed technology will require improvement to all levels of STEM (science, technology, engineering, and mathematics) education. It is vital that each student reaches an appropriate level of science understanding and is prepared for the 21st century STEM, health, and policy workforces. To achieve these goals, policymakers should pursue the following objectives for all modes of instruction:

- Promote lifelong, rigorous education of science concepts and practices in formal and informal settings to improve citizens’ understanding of science and the role it plays in our nation’s economic and social well-being.
- Provide adequate state and federal support for science education facilities, as well as pre- and in-service teacher preparation and education, to strengthen the quality of teaching that will, in turn, enhance student learning.
- Nurture students of all backgrounds—particularly those from underrepresented groups—in the pursuit of further studies, and ultimately, careers in the science and engineering fields.
- Ensure that all K-12 students reach an acceptable level of science understanding, in accordance with the Next Generation Science Standards (NGSS), and that students preparing for STEM careers have the opportunity for deeper exploration of science content.

A systematic approach—supported by research-based methods that yield measurable results and focused on the weakest areas of the science education system—is critical to meet these objectives. Also, national standards must reflect the current body of teaching and learning research, as well as emphasize the process and practice of science.

To improve the STEM education system, including alignment with workforce programs, we support

- Using national standards such as NGSS and the science literacy components of the Common Core State Standards (CCSS), where these have been adopted, and continuing to ensure that other states strive to have rigorous, broadly applicable standards for their students.
- Pursuing initiatives at all educational levels to encourage partnerships between...
schools and appropriate STEM industries and/or businesses to give students a hands-on learning environment in cutting-edge, high-impact science.

- Adopting research-based practices in higher education, including the expectation that faculty are trained in effective use of these practices.

**STRENGTHEN AND IMPROVE K-12 SCIENCE EDUCATION**

**We support preparing and nurturing well-educated teachers by**

- Recruiting, retaining, rewarding, and valuing teachers who are well prepared in their science and education backgrounds, and offering them lifelong professional-development opportunities to improve their content knowledge and pedagogical skills.
- Creating effective, alternative pathways for science and technology professionals to become second-career, K-12 teachers.
- Providing opportunities for science and technology professionals to positively engage with K-12 teachers and students.
- Ensuring that more teachers are retained in their positions by increasing their effectiveness and recognition.

**We support fostering a modern learning environment by**

- Including current teachers as full participants in designing programs for professional and curricula development.
- Increasing capacity for teacher associations to support nationwide collaboration and communication.
- Teaching science as core subject matter at every educational level and as an essential element of a well-rounded education aligned with the NGSS and CCSS.
- Providing adequate resources and facilities to support classroom and laboratory instruction toward these standards.
- Conducting rigorous assessments to demonstrate that stated learning goals are fulfilled for all modes of instruction.
- Ensuring that students have access to deeper study of science subjects if they will likely be pursuing STEM- or health-related study or work.
- Investing robustly in educational research in STEM subjects that guide the development of model programs, tools, and methods for improving the teaching and learning of science, and the means for assessing this.

**STRENGTHEN AND IMPROVE HIGHER EDUCATION IN SCIENCE**

**We support strengthening instruction in STEM in higher education by**

- Ensuring that all instructors have training in ideas of teaching and learning appropriate for STEM education during their preparation and during their employment.
- Providing for the development and use of evidence-based practices and curricula materials in STEM education.
- Ensuring that facilities, including information resources, are available for instruction in cutting-edge science content and practices.
- Adopting an expanded vision of scholarship that rewards and promotes discipline-based education research within STEM disciplinary departments.
We support enhancing the higher education curricula and facilities by
- Increasing the coordination of programs between two-and four-year institutions, to provide students who enter education in a variety of institutions with options for pursuing all degree paths.
- Carrying out targeted efforts to improve the capability of higher education institutions to recruit students, especially those from underrepresented groups, into the STEM fields.
- Expanding undergraduate research experiences by including support for summer and academic-year research projects and collaborations with industry, other academic institutions, government labs, and international partners.
- Developing and supporting curricula for all students, including STEM majors, which emphasize interdisciplinary aspects of chemistry, and the role of science in solving particular national and global challenges.

We support strengthening teacher education programs by
- Improving coordination, particularly in the area of teacher preparation, between teacher-education programs and STEM departments at higher education institutions.
- Strengthening and standardizing existing STEM teacher education programs, especially in the area of increased and up-to-date science content knowledge.