



Connecticut Science Supervisors Association, Inc.
www.cssaonline.net

CSSA Position Statement: High School Science Reform

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It is vital that our children learn science. An understanding of science provides them with increased opportunities for careers, with skills in problem solving and decision-making, with increased understanding of the world around them, and with personal satisfaction. An improvement in science education in Connecticut will, in the long run, help ensure our economic vitality, technological growth, and national security.

Children, teenagers, and adults learn science most effectively by doing science, not by reading about science or watching science. One cannot become a good tennis player by learning about the game or even by watching others play. Rather, you become a good tennis player by repeated participation in the game. The same is true with learning science: students need to be full participants in the scientific methods of inquiry to truly learn the real nature of science. For science education to be effective, students must actively participate in experimentation and investigations on a frequent basis. It is then, and only then, that students master science concepts and begin to appreciate the power, beauty, and awe of science.

High school science education is not an island. The formal foundations of high school science education must begin in Kindergarten, and build as students progress through the grade levels. Furthermore, science can be integrated and learned through other avenues, including language arts, mathematics, social studies, and health.

Statewide reform in high school science education is, indeed, a daunting undertaking. The CSSA has kept in mind the existing structure and has attempted to make reasonable, practical recommendations to help propel our students toward high-quality, 21st century science education. The CSSA's recommendations that follow strive to balance realism and idealism.

CSSA Recommendations

1. Every child should experience science every school day of every year during their formal K-12 educational journey. Students don't all learn the same way on the same day, but common standards (what students should know) and benchmarks (what students are expected to demonstrate) should be the target of learning.
Note: The statement "every school day" should not be construed as a statement about block schedules that meet on alternate days.
2. To graduate from a Connecticut high school, the science requirement should be changed to:
 - a. **Credit Requirement:** Three laboratory science credits, for the class of 2013; Establish a goal of moving to four laboratory science credits for the class of 2015.
 - b. **Performance Requirement:** For the class of 2013, students must meet established State Performance Goal on any two end-of-course, statewide science assessments (assessments available in Biology, Chemistry, Physics, and Earth/Space Science). For the class of 2015 and beyond, students must meet State Performance Goal on any three end-of-course, statewide science assessments. (Note: This replaces the CAPT-Science)
3. Statewide science assessments must be aligned with the science curriculum and focus on the evaluation of content knowledge, application of concepts, interpretation of data, use of inquiry skills, and relevant social implications. These assessments should be designed to inform the students, parents, teachers, administrators, and the community regarding student achievement and play a role in the development of curriculum and instruction.
4. Revision of the *Connecticut Science Framework* should emphasize depth of learning over breadth, and should include well-defined learning standards in each of the core curriculum areas of Biology, Chemistry, Physics, and Earth/Space Science. The *Connecticut Science Framework* should flow seamlessly from Kindergarten through twelfth grade, as the end product is dependent upon the learning throughout all grade levels. The State of Connecticut should develop model course standards and benchmarks based upon the National Science Standards, Project 2061, and/or the National Assessment of Educational Progress. These will be helpful to districts as they revise their curricula. A model curriculum should not be interpreted as a mandated curriculum.

5. All science curricula must include relevant links to reading, writing, mathematics, technology, environmental issues, the arts, and societal/contemporary issues. Other subject areas should also develop curricular integration with science. This will provide students with opportunities to make interdisciplinary connections and to develop ownership of their science learning. Learning science is not an independent academic exercise. Science pervades our lives and should be integrated with or related to all subject areas.
6. High-quality professional development related to the new expectations in science needs to be implemented for all teachers of science, including those at the elementary level. This professional development should be based on best practices in science education and an understanding of the changing nature of science teaching and learning.
7. Districts should have the option to structure their science programs with a variety of science courses and sequences at the high school level. Program variations must be taken into account when developing state assessments and other requirements. While many districts offer a traditional science sequence of Biology and then Chemistry, an increasing number of districts now offer a variation of this sequence. For example, a sequence of courses (Physics, then Chemistry, then Biology) may provide more effective learning experiences. Capstone experiences in environmental, earth, and life sciences are effective in assimilating the concepts of prior learning. To ensure that our students are globally competitive, we need to enable and support district initiatives which explore promising and innovative science programs.
8. In addition to traditional presentations of science content, high school science courses (and K-8 science experiences) should be scheduled in such a way as to provide ample time for inquiry-based laboratory investigations. The inquiry process takes time. It often does not fit into a 45-minute period of time, regardless of grade level. Extended learning time should be available on a weekly basis at all learning levels. In particular, students in lower level classes often need more learning time than their counterparts in higher level courses.

The time is right for change, and the CSSA is eager to play a role in that change. Science education remains vital to our economy and welfare as well as to many ethical and global issues. Science education will have a significant impact on our future. The CSSA looks forward to partnering in any way possible with the Connecticut State Department of Education in moving science education forward.