

# California Science Teachers Association Recommendations for Science Education

## STANDARDS, CURRICULUM, AND INSTRUCTION

### Updating the Content Standards

The California Science Content Standards have been in place since 1998; there is no schedule for updating them. The science instructional materials that were adopted by the State Board of Education in 2006 were based on those 1998 standards and are intended to suffice until the next science adoption in 2012—14 years after the standards were developed. If the science standards are not reviewed and updated before the next science framework is adopted in 2010, California's students will be using instructional materials until 2018 that are based on standards (and therefore content) that are 20 years old. Absent significant initiative and research on the part of individual teachers, California's students will not receive the most up-to-date research and information in their science instructional materials, a circumstance that is particularly critical in the area of science, where scientific discovery and progress are made daily. Bills which would have required review and revision, as necessary, of the standards have been passed by the legislature in 2005 and 2006 but both were vetoed by the governor.

#### **Position Statement**

The academic content standards must be reviewed periodically, consistent with the instructional materials cycle, with revision being conducted one to two years prior to the adoption of curriculum frameworks. In the case of science, the standards must be reviewed and revised, as necessary, by 2010 at the latest.

### Providing Instructional Time for Science

Education Code 51210 requires science instruction in and throughout grades one through six, yet the reading/language arts framework requires a minimum of 150 minutes of reading daily in early elementary grades; the mathematics framework requires 50 to 60 minutes of math daily in the early elementary grades. Given the emphasis placed on reading and math, both inherent in the testing regimen and in the mandates of the law, and the limited time for teaching science, many schools and districts have been forced to abandon science instruction in the early elementary grades.

### Role of the State Board of Education and Curriculum Commission in Instructional Materials

The instructional materials adoption process has become overly politicized and partisan. A distrust between the Curriculum Commission and the public has developed due to the lack of transparency in the process and the propensity of the commission to overrule recommendations of the teachers and content experts who evaluate the programs. The Curriculum Commission, and thus the State Board of Education, has utilized criteria to evaluate instructional materials beyond an analysis of coverage of the state standards. Increasingly, instructional methodology has become part of the commission's focus. Districts are provided with a limited selection of materials for delivering science, among other subject areas. Districts do not have the flexibility to purchase the materials that would best serve the needs of their students. The state waiver process is cumbersome and difficult to navigate, and waivers for instructional materials are rarely granted.

#### **Position Statement:**

As long as they are in compliance with the state standards, school districts must be provided the flexibility to use state instructional materials fund dollars to adopt instructional materials that meet their unique needs, and not be limited by choices provided by the State Board of Education.

The current adoption process must be made more transparent and less redundant, and the recommendations of teachers and content experts must be respected and adhered to.

#### **Position Statement**

The State Board of Education must examine the curriculum frameworks for all core subject areas to ensure that instructional minutes that are recommended for each subject accommodate complete coverage of all core curriculum within the regular school day/week.

At a minimum, the science framework which will be adopted in 2010 must include required instructional minutes for science in grades K-6. The Education Code should be amended to mandate instructional minutes for all core subject areas, including science.

# ASSESSMENT

## High School End-of-Course Exams

California's assessment system provides for end-of-course California Standards Tests (CSTs) for students enrolled in biology/life sciences, chemistry, earth sciences, and physics (or integrated courses delivering content in those four areas) in grades 9, 10, and 11. While end-of-course science exams are administered in grades 9, 10, and 11, the state requires only two years of science for graduation. Because not all students are enrolled in a standards-based course in each of the three years science is tested, many students will not have taken a science CST. Further, 12<sup>th</sup> grade students who are enrolled in science do not get assessed, nor do the students taking science courses outside of the four content areas that the state assesses in the CST. However, the Academic Performance Index requires that all students in grades 9-11 be assigned a science score, irrespective of their enrollment in a standards-based course, and assigns a score of 200 to any student not taking a CST. This has the effect of penalizing districts, unfairly skewing their science scores lower than they are in reality and not adequately considering science subjects beyond the four content areas.

### *Position Statement*

The requirement that a score of 200 be assigned to any student not enrolled in a standards-based science course and not taking a science CST should be eliminated.

Graduation requirements should include three years of science which could be phased in over a six-year period.

High school science assessments must be broadened to include more sciences (e.g., physiology and anatomy).

## Fifth Grade Assessment

The assessment system includes a science test administered at fifth grade, which meets both the state CST and federal No Child Left Behind (NCLB) requirements and captures only the fourth and fifth grade standards. As science at the elementary level isn't tested until grade 5 and only covers the grade 4 and 5 standards, it has the effect of giving science a low priority in grades K-3, to the point that many districts don't teach science at all in those grades.

### *Position Statement*

The fifth grade test in science must include standards from grades K-5.

## Eighth Grade Assessment

The assessment system includes a science NCLB test administered at the eighth grade, which covers only the eighth grade standards (emphasizing physical science). As the eighth grade test is the only test administered at the middle school level, it has the effect of de-emphasizing the content of the other middle school science standards, specifically earth and life sciences.

### *Position Statement*

The eighth grade NCLB test in science must include science standards from grades 6-8.

## Tenth Grade Assessment

An assessment to comply with NCLB requirements is administered in the tenth grade and assesses all students on the sixth, seventh, and eighth grade life science and high school biology standards. Because the standards at the high school level are not specified by grade level, not all students take the same course in the same grade. Requiring all students to be tested at the tenth grade on biology and life sciences either requires districts to revamp their entire science program to accommodate this federal test, thereby negating the philosophy, encompassed in the standards, of providing maximum flexibility to districts on how to structure their science programs, or results in erroneously low scores.

### *Position Statement*

The high school assessment in science required by NCLB must be designed and administered in a way that does not abrogate local district determinations for scope and sequencing of science programs. This could include an administration at the eleventh grade, or an administration at both tenth and eleventh grades with participation rates calculated as a cumulative of those two years.

## Performance-Based Assessment

State assessments are uniformly multiple choice exams that do not assess students' critical thinking skills, nor do they require students to demonstrate a mastery of science content or process skills embodied in the Investigation and Experimentation standards. The lack of performance-based assessments challenges the ability to implement a problem-solving curriculum and results in a superficial and inaccurate representation of student knowledge of the subject.

### *Position Statement*

The science CSTs should include a writing and performance-based assessment modeled after the Golden State Exams.

# ACCOUNTABILITY

## Academic Performance Index Science Weights

The Academic Performance Index (API) has minimal science emphasis. Depending on the grade span of a school serving any of grades K-8, science ranges between 3.1 percent and 5.6 percent of a school's API. At the high school level, depending on grade levels served and the number of students enrolled in science courses, science is roughly 15 percent of the API. Schools and districts are not currently held accountable in a meaningful way for students' mastery of science. As a result, districts focus on those subjects that they are held accountable for—namely, English/language arts and math.

### **Position Statement**

The API should reflect equal value of all subject areas assessed by the CST.

## Adequate Yearly Progress

The Adequate Yearly Progress calculation does not include science.

### **Position Statement**

Adequate Yearly Progress, if it is to be continued as a metric for evaluating schools, should require proficiency levels in science as well.

## State Monitoring of Low Performing Schools

For state-monitored schools and districts, the state requires strict adherence to the "Nine Essential Program Components," which focus exclusively on English/language arts and math. Specifically, the Nine Essential Program Components are:

- ▶ SBE adopted ELA and math materials
- ▶ Adherence to instructional minutes for ELA and math
- ▶ AB 75 training, focused on ELA and math
- ▶ AB 466 training, focused on ELA and math
- ▶ Use of data to monitor achievement
- ▶ Instructional support for teachers
- ▶ Monthly teacher collaboration
- ▶ Pacing schedule
- ▶ Fiscal support

The state's lowest performing schools and districts have been forced to abandon any meaningful science (and other subjects) instruction in order to focus on the priorities in the "Nine Essential Program Components." These schools are the most likely to have new teachers who are the least well-equipped to integrate science instruction into the English/language arts or math curriculum.

### **Position Statement**

The "Nine Essential Program Components" should be expanded to include support for science.

# TEACHER RECRUITMENT, PREPARATION, AND PROFESSIONAL DEVELOPMENT

## Expand UC Efforts to Increase the Pipeline of Science Teachers

Efforts on the part of the University of California to implement the "CalTeach" program as a way to increase the supply of qualified science teachers in California fail to address the existing teacher shortage and do not elaborate on ways to collaborate with the California State University system, which is the state's main institution for teacher preparation.

### **Position Statement**

The University of California, California State University, and community colleges must work collaboratively to address existing and projected teacher shortages in science, through (a) enhanced professional development support in science for existing K-12 teachers, and (b) coordinated efforts in preservice teacher preparation in science.

## State Professional Development

Currently, there is no state professional development funding for science, as there is for math and reading. Science teachers require quality standards-based professional development that focuses on both content and effective pedagogy. Bills that would have provided funding for science teacher professional development have been introduced the last two years but have not been passed by the legislature.

### **Position Statement**

The state needs to fund professional development for science teachers, as it does for reading and math teachers. Professional development offered through state-approved providers must be focused on the standards, not driven by the instructional materials.

The **California Science Teachers Association** represents science educators statewide, in every science discipline, at every grade level, Kindergarten through University. This document was originally produced jointly by the California School Boards Association and the California Science Teachers Association, and has been updated by CSTA.

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