Item 6.B.

*Science Framework*

Adopted by the State Board of Education on November 3, 2016
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# **Chapter 13**

**Criteria for Evaluating Instructional Resources for Kindergarten through Grade Eight**

The adoption of new science instructional resources will be guided by the criteria described below. To be adopted, resources must meet Category 1, Alignment with CA NGSS Three-Dimensional Learning, in full. Resources will be evaluated holistically for strengths in the other categories of Program Organization, Assessment, Access and Equity, and Instructional Planning and Support. This means that while a program may not meet every criterion listed in those categories, they must on balance meet the intent stated in the introductory paragraph of each category to be eligible for state adoption. Programs that do not meet Category 1 in full and do not show strengths in each one of the other four categories will not be adopted. These criteria are designed to be a guide to publishers in developing their instructional resources and to local educational agencies when selecting instructional resources for their students. To assist in the evaluation of instructional resources, publishers will use SBE-approved standards map and evaluation criteria map templates, developed and supplied by the California Department of Education (CDE), to provide evidence that the program provides students a path to meet the appropriate grade-level performance expectations of the CA NGSS by the end of the year.

It is the intent of the SBE that these criteria be seen as neutral on the format of instructional resources. Print-based, kit-based, digital, interactive online, and other types of programs may all be submitted for adoption as long as they are aligned to the evaluation criteria. Any gross inaccuracies or deliberate falsification revealed during the review process may result in disqualification; any found during the adoption cycle may subject the program to removal from the list of state-adopted instructional resources. Gross inaccuracies and deliberate falsifications are defined as those requiring changes in instructional content. All authors listed in the instructional program are held responsible for the content. Beyond the title and publishing company’s name, the only name to appear on a cover and title page shall be the actual author or authors.

**Criteria for Instructional Resources Aligned to the CA NGSS and CA Science Framework**

The criteria for the evaluation of science instructional resources for kindergarten through grade eight are organized into five categories:

1. **Alignment with CA NGSS Three-Dimensional Learning:** Instructional resources include content as specified in the CA NGSS. Programs must include a well-defined sequence of instructional opportunities that provides a path for all students to become proficient in all grade-level performance expectations to be eligible for adoption.
2. **Program Organization:** Instructional resources support instruction and learning of the CA NGSS and include such features as the organization, coherence, and design of the program; chapter, unit, and lesson overviews; and glossaries.
3. **Assessment:** Instructional resources include multiple models of both formative and summative assessment tasks for measuring what students know and are able to do and provide guidance for teachers on how to use scoring rubrics and interpret assessment results to guide instruction.
4. **Access and Equity:** Instructional resources should include suggestions for teachers on how to differentiate instruction to meet the needs of all students. In particular, instructional resources should provide guidance to support students with special needs, including standard English learners, English learners, long-term English learners, students living in poverty, foster youth, girls and young women, advanced learners, students with disabilities, gifted learners, students below grade level in reading comprehension or mathematics skills and knowledge, and students below grade level in science skills and knowledge.
5. **Instructional Planning and Support:** Information and resources suggest coherent guidelines for teachers to follow when planning three-dimensional instruction and are designed to help teachers provide effective standards-based instruction.

Resources that fail to meet the criteria in Category 1: Science Content/Alignment with the Standards, will not be considered suitable for adoption. All criteria statements in Category 1 must be met for a program to be adopted. The criteria for Category 1 must be met in the core resources or via the primary means of instruction, rather than in ancillary components. In addition, programs must have strengths in each of categories 2 through 5 to be suitable for adoption. Extraneous resources should be minimal and clearly purposeful.

***Category 1: Alignment with the CA NGSS Three-Dimensional Learning***

All programs must include the following features:

1. Instructional Resources, as defined in *EC* Section 60010(h), must align to the CA NGSS, adopted by the SBE in September 2013 for kindergarten through grade five and resources from grades six through eight must be aligned either to the Integrated Learning Progression Courses for Middle Grades Six through Eight adopted in November 2013 found in chapter 5 of the *CA Science Framework* or, alternatively, the Discipline Specific Courses for Grades Six through Eight found in chapter 6 of the *CA Science Framework*. Alignment shall be determined by assessing a full year’s program, not unit by unit. When developing Discipline Specific courses, the publisher should consider which disciplinary core ideas, if any, from the other science domains would need to be introduced in specific grade-level courses in order to facilitate students’ full understanding of each performance expectation by the end of the year. For this reason, some units of the Discipline Specific Course model contain supplemental Disciplinary Core Ideas (DCIs) from other domains.
2. Instructional resources engage students in using text, discourse, and experiential learning to develop mastery of the three integrated dimensions of the CA NGSS: the Science and Engineering Practices (SEPs), Crosscutting Concepts (CCCs), and DCIs.
3. Instructional resources reflect the full content of the *CA Science Framework* allowing teachers to engage students in using each of the SEPs in multiple contexts and to use and apply the CCCs to connect ideas across science topics.
4. Instructional resources progressively build students’ abilities to meet all grade-level Performance Expectations (PEs) through a three-dimensional instructional sequence.
5. Teacher resources support instructional opportunities and assessments that engage students in three-dimensional learning.
6. Instructional resources shall use proper grammar and spelling (*EC* Section 60045).
7. Use of primary sources, such as scientific research, case studies, and photographs, are integrated into the three-dimensional learning, as grade-level appropriate.
8. Instructional resources introduce real-world phenomena and systems that students can investigate, model, and explain using the targeted DCIs and CCCs.
9. Instructional resources focus on the application of science to be learned (e.g., medicine, engineering, environmental science) using authentic and meaningful real-world applications and scenarios that are specific to California when appropriate.
10. The science curriculum is enriched with opportunities for students to access informational texts, literature, simulations and other media related to science and engineering and it presents diverse examples of notable scientists and engineers.
11. Resources include examples of people and groups who used their context, learning, and intelligence to make important contributions to society through science and technology from different demographic groups: Native Americans; African Americans; Mexican Americans and other Latino groups; Asian Americans; Pacific Islanders; European Americans; lesbian, gay, bisexual, and transgender Americans; persons with disabilities; women; and members of other ethnic and cultural groups. Resources emphasize the importance of science education to all members of our society in a way that is culturally and socially authentic [*EC* Sections 51051, 60040(b), and 60044(a)].
12. Student assignments make linkages and are consistent with the grade-level appropriate expectations in the California Common Core State Standards for English Language Arts and Literacy in History/Social Studies, Science, and Technical Subjects (CA CCSS for ELA/Literacy), the California English Language Development Standards: Kindergarten through Grade 12 (CA ELD Standards), and California Common Core State Standards: Mathematics (CA CCSSM) and are consistent with the guidance in the *CA Science Framework*.
13. The materials provide support for students to develop grade-level appropriate academic language and discipline-specific vocabulary through their use in context in classroom discourse around science phenomena (science talk), and through well-written and grade-level appropriate text resources.
14. Teacher resources provide guidance to support all students, including language learners and non-standard English speakers, to develop their science-related language and reading abilities, and to coordinate the multiple elements (text, diagrams, graphs and charts, etc.) that occur in science textual materials.
15. Instructional resources, where appropriate, examine humanity’s place in ecological systems and the necessity for the protection of the environment (*EC* Section 60041). Resources include instructional content based upon the Environmental Principles and Concepts developed by the California Environmental Protection Agency and adopted by the SBE *(Public Resources Code* Section 71301) in context and aligned to the CA NGSS*,* as exemplified in Appendix 2.
16. Instructional resources include explanations about human organ and tissue donation, as age and grade-level appropriate, aligned to the relevant standards and related science research (*EC* Section 33542).
17. Instructional resources, as age and grade-level appropriate, discuss trends and research in science, including medical research, neuroscience and neurological diseases (such as Amyotrophic Lateral Sclerosis, or Lou Gehrig’s disease) and inform students about career pathways in science.
18. Instructional resources support students to address the applications of science in the development of technologies and in fields such as agriculture, medicine, engineering, and environmental protection. Resources support students to reflect on the interconnections between science, engineering and technology, and to discuss ethical and regulatory issues that can arise when new science and technology allow new capabilities.
19. Instructional resources engage students in the SEPs. Teacher resources will include discussion of expendable and permanent equipment and materials necessary to conduct activities, guidance on obtaining those materials inexpensively, recycling or disposing of materials, and explicit instructions for organizing and safely conducting instruction, labs and activities. (Aligned to the *Science Safety Handbook for California Public Schools*, California Department of Education [CDE] 2014).
20. Instructional resources include opportunities for reflection on the nature and history of science and on their science learning as indicated in the *CA Science Framework*.

***Category 2: Program Organization***

Sequential organization and a coherent instructional design of the science program provide structure for what students should learn each year and allow teachers to facilitate exposure to the content efficiently and effectively, incorporating the three dimensions of the CA NGSS. Instructional resources must have strengths in these areas to be considered for adoption:

1. Sequential organization of the material provides structure concerning what students should learn each year and allows teachers to convey the science content incorporating the three-dimensional learning expressed in the CA NGSS.
2. Instructional resources support teacher questioning strategies as a tool to assess students' knowledge and skills, promote student-to-student discourse, and guide student learning.
3. Instructional resources explicitly state which knowledge and skills learned in prior grades or units are applied and extended to accommodate new knowledge and skills.
4. Teacher resources provide support to engage students in three-dimensional learning and suggest research-based strategies to elicit student thinking and support student discourse.
5. The instructional resources are grade-level specific and provide instructional content for 180 days of instruction for at least one daily class period, including an estimate of the necessary instructional time.
6. The content is well organized and presented in a manner consistent with providing all students an opportunity to achieve the essential knowledge and skills described in the CA NGSS and the *CA Science Framework*.
7. Resources include explanations to teachers regarding how the SEPs, DCIs, and CCCs work together to support students in making sense of phenomena and/or to design solutions to problems and build toward the PEs of the CA NGSS. Teacher resources support understanding of how PEs are developed within units and across units throughout a year.
8. Topics selected for in-depth study are developed through their role in explaining selected phenomena, chosen to support students in building the knowledge and abilities needed to achieve proficiency in a bundle of PEs.
9. Resources encourage the meaningful use of technologies such as video clips or computer simulations to investigate phenomena that cannot be directly experienced in the classroom; effective measuring tools (computer linked thermometer or range-finder, digital scales, etc.); and spreadsheets and other software to record, display, and analyze data, etc. In these contexts, the materials support teachers as they introduce students to computational thinking and provide guidance to teachers on how science instruction may be improved by the effective use of library media centers and information literacy skills.
10. Resources suggest appropriate engineering design tasks in varied contexts as a path to understanding and applying the science ideas being learned. Where appropriate, resources suggest computational tools and software to support the design process and allow students to model or simulate their designed products.
11. Teacher resources include references to where related supplemental open educational resources may be found.
12. Ancillary and support resources are an integral part of the instructional program and are clearly aligned with the CA NGSS.
13. Course descriptions are aligned to a specific progression of courses across each grade band so that students completing the course sequence can meet all grade band CA NGSS PEs. The progression builds ideas in a planned sequence, so that each unit builds progressively on prior learning. The logic of the progression is described and explained in teacher resources.
14. Suggested students tasks, including end-of-chapter or culminating problems and exercises, are three-dimensional in nature and build in complexity throughout the year and across years.

***Category 3: Assessment***

The program provides teachers with assistance in using both formative and summative assessment tasks for planning and modifying instruction, and for measuring the effectiveness of instruction through progress monitoring. Instructional resources must have strengths in these areas to be considered suitable for adoption:

1. Assessments in the instructional resources reflect the three-dimensional nature of the CA NGSS and the *CA Science Framework.* Assessment tools measure what students know and are able to do, as defined by the PEs in the CA NGSS. Assessments stress performance tasks rather than rote memorization.
2. Entry-level assessments for each unit are provided to help teachers elicit students’ prior knowledge and preconceptions and gauge their facility for using the SEPs and CCCs. Information is provided to teachers to help them use the results of those assessments to guide instruction and to determine modifications for specific students or groups of students.
3. Teacher materials provide support to engage students in tasks that afford both learning and formative assessment opportunities at the same time and provide guidance to teachers on how to embed formative assessment activities in the broader learning activity.
4. Brief formative assessment tools and practices at key stages in the unit of instruction are designed to elicit current understandings and preconceptions and to provide evidence of students’ progress toward mastering the three-dimensional learning called for in the CA NGSS and the *CA Science Framework*. In addition to providing formative assessment tools, instructional materials must also provide teachers with strategies of how to address preconceptions during instruction. These strategies are to be differentiated for different age levels.
5. Assessments should yield information teachers can use in planning and modifying instruction to help all students meet or exceed the standards.
6. Teacher resources supply a differentiated path for diverse students to build toward the PEs of the CA NGSS. In particular, formative assessment tasks are designed to support teachers in collecting and analyzing data about student conceptual understanding.
7. Summative assessments designed to provide valid, reliable and fair measures of students' progress and attainment of three-dimensional learning after a period of instruction (for example at the end of a chapter, unit, or course) should involve multi-component tasks including, but not limited to: hands-on or simulation-based performance tasks, open-ended constructed response problems, and scoring of portfolios of student work collected over the course of instruction. Selected-response items, if used, should require analysis and reasoning to answer them, rather than simply memorized responses.
8. Students’ progress toward meeting the three-dimensions of the CA NGSSis assessedthrough both writing and performance tasks. Student written responses are consistent with the grade-level writing and mathematics requirements in the *CA CCSS for ELA/Literacy and the CA CCSSM*.
9. Resources include student work expectations and analytical rubrics for scoring performance tasks and, where possible, examples of student work at each scoring level. Resources include an explanation of the use of rubrics by teachers and students to evaluate the progress of students’ models, projects, writing, and progression toward understanding.
10. Assessment tools include multiple measures of student performance as addressed in the assessment chapter in the *CA Science Framework*, including, but not limited to, engineering design and lab practical tasks; performance-based tasks; open-ended, short answer and essay responses; lab reports; research projects; computational simulations; and oral presentations.
11. Assessment tools include guidance on measuring students’ ability to apply information literacy skills when obtaining and evaluating information about science topics.

***Category 4: Access and Equity***

The goal of science programs in California is to ensure universal and equitable access to high-quality curriculum and instruction for all students (all standards, all students) so they can meet or exceed the PEs as described in theCA NGSS. To reach the goals of access and equity, instructional resources must provide teachers with the necessary content and pedagogical tools to teach all students the CA NGSS. In particular, the instructional resources provide support for differentiated instruction for students with special needs, including standard English learners, English learners, long-term English learners, students living in poverty, foster youth, girls and young women, advanced learners, gifted learners, students with disabilities and students below grade level in science skills, three-dimensional learning, literacy skills or mathematics skills. Resources should incorporate recognized principles, concepts, and research-based strategies to meet the needs of students and provide equal access to learning, which could include Universal Design for Learning, Response to Intervention and Instruction, and Multi-tiered System of Supports, as outlined in chapter 10 on access and equity, in the *CA Science Framework*. Instructional resources must have strengths in these areas to be considered for adoption:

1. The instructional resources should reflect the goals of access and equity outlined in chapter 10 of the *CA Science Framework.*
2. At every grade level, suggested lessons and teacher resources will include research-based strategies to address the needs of English learners consistent with the CA ELD Standards.
3. Instructional resources incorporate instructional strategies to address the needs of students with disabilities in lessons, assessments, and teacher resources, as appropriate, at every grade level.
4. Teacher resources supply a differentiated path for all students. In particular, instructional resources should provide guidance to support students with special needs, including standard English learners, English learners, long term English learners, students living in poverty, foster youth, girls and young women, advanced learners, students with disabilities and students below grade level in science skills, three-dimensional learning, literacy skills, or mathematics skills.

**Category 5: Instructional Planning and Support**

The resources present explicit guidance to help teachers plan instruction. The resources should be designed to help teachers provide instruction that ensures opportunities for all students to learn the essential skills and knowledge specified in the CA NGSS*.* The resources must have strengths in these areas of instructional planning and teacher support to be considered suitable for adoption:

1. Program resources include a curriculum guide for the academic instructional year for teachers to follow when planning for 180 days of instruction.
2. The teacher resources provide an estimated instructional time for each activity, lesson, chapter, and unit which allows for student engagement in the SEPs and engineering design projects.
3. The teacher resources provide guidance in daily lessons and units of instruction with appropriate opportunities for checking for understanding and adjusting lessons, if necessary, to ensure three-dimensional learning.
4. Program resources address the articulation of three-dimensional learning by identifying the knowledge and skills learned in prior grades and prior grade-level units, and address how to connect and build on these learnings to help students develop increasingly sophisticated ideas.
5. Teacher resources provide background knowledge about the SEPS, DCIs, and CCCs and discuss the desired level of SEPs in which students will engage, including how the three dimensions are integrated into units and lessons.
6. All suggested student tasks, including classroom activities, end-of chapter tasks, suggested out-of-school activities, and assessment tasks are supported with guidance for the teacher on how to implement and, where appropriate, grade the task. Assessment keys and rubrics are provided.
7. Teacher and student resources have correlating page numbers in print resources or corresponding references in electronic resources.
8. Teacher resources include a planning guide describing the relationships between the components of the program and how to use all the components to meet all of the CA NGSS.
9. Instructional objectives for three-dimensional learning are explicitly stated and clearly identifiable in the teacher resources. Teacher resources include guidance on explaining these objectives to parents.
10. While learning goals may be explicitly stated in the teacher materials, student resources will provide experiences that clearly build to the development of those learning goals without explicitly stating those goals prior to the instruction. In most cases, prior to instruction, introduce a phenomenon or guiding question or the end result of the lesson series.
11. Lessons include instructional strategies aligned to the CA NGSS, the *CA Science Framework* and based on current and confirmed research (e.g., teacher facilitated student-led conversations, as well as hands-on activities and laboratories). Resources are clearly connected to and support the goals of the CA CCSSM and CCSS for ELA/Literacy.
12. Instructional resources should include a list of consumable and non-consumable equipment and materials required for each lesson and address safety issues included in the *Science Safety Handbook for California Public Schools* (CDE 2014).
13. Terms from the CA NGSS and *CA Science Framework* are used appropriately and accurately in the instructions.
14. Electronic learning resources, including technology-based assessments, support instruction that is connected explicitly to the CA NGSS, have a well-designed user interface, provide technical support, and include suggestions for appropriate and differentiated use.
15. The teacher resources provide background information about important events, diverse people, places, ideas, and scientific principles appearing in, but not limited to the CA NGSSand *CA Science Framework*.
16. Teacher resources discuss and identify preconceptions typical at a grade span (such as inaccurate explanations based on everyday experiences or vernacular conflicts between the everyday use of a term and the meaning of the term in a scientific context) and provide guidance to help students build more accurate understandings of the scientific concept or process.
17. Suggested homework, if included, extends and reinforces classroom instruction. Homework should also provide opportunities to support student learning through shared experiences with family. Opportunities may include projects, journaling, reflection, or interviews with parents around a concept or activity such as family history used in genetics, decomposition in gardening, or chemistry in cooking.
18. The program should include resources that teachers can use to inform families about the CA NGSS and student progress.
19. Resources provide teachers with instructions on how outside resources (e.g., guest speakers; museum visits; electronic field trips, informal science education providers including state parks, nature parks, science centers, local organizations, school gardens or schoolyard open spaces, local parks, etc.) can be incorporated into a three-dimensional learning, standards-based science program.
20. Using guidance from the Model School Library Standards for California Public Schools, resources provide information for teachers on the effective use of library and media resources that best complement the standards.
21. The teacher resources provide guidance and support for engaging students in collaborative conversations using grade level appropriate academic vocabulary for scientific discourse.

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