

## INFORMATION MEMORANDUM

**DATE:** January 29, 2004

**TO:** MEMBERS, STATE BOARD OF EDUCATION

**FROM:** Sue Stickel, Deputy Superintendent  
Curriculum and Instruction Branch

**SUBJECT:** Curriculum Commission: Approval of Criteria for Evaluating K-8 Science Instructional Materials for 2006 Primary Adoption

The Curriculum Commission is submitting Draft Criteria for Evaluating K-8 Science Instructional Materials to the State Board in preparation for the 2006 Primary Adoption. Action on this item will fulfill the State Board's statutory obligation under *Education Code* Section 60200 to adopt criteria at least 30 months prior to the date that instructional materials are approved.

### Background

#### State Board of Education Actions

- In October 1998 the State Board adopted the *Science Content Standards for California Public Schools, Kindergarten through Grade Twelve*
- In March 1999 the State Board adopted the Criteria for Evaluating Science Instructional Materials for the 2000 Primary Adoption. The Criteria and adoption were based on the California *Science Content Standards*.
- In February 2002 the State Board adopted the *Science Framework for California Public Schools, Kindergarten through Grade Twelve*

#### Curriculum Commission Actions

- In January 2003 the Science Subject Matter Committee (SMC) of the Curriculum Commission adopted as one of its annual goals the review of the Criteria in preparation for the 2006 K-8 Science Primary Adoption
- In September 2003 the Curriculum Commission began discussions on the Criteria with Curriculum Frameworks and Instructional Resources (CFIR) Division staff input on the need to provide publishers with very specific and detailed directions and information. CFIR staff was directed to work with the Chair and Vice-Chair of the Science SMC to incorporate suggested changes and edits to a revised version of the Criteria for review by the SMC and Commission in November 2003. Public comment was received at this meeting with regard to the need for publishers to provide instructional materials that contained the highest accuracy of content information.

- In October 2003 CFIR staff worked with the Chair and Vice-Chair of the Science SMC to incorporate suggested edits and address the concerns presented during the public comment.
- In November 2003 the Curriculum Commission continued the review of the revised Draft Criteria (including changes and edits previously approved). The Commission received public comments and written correspondence addressing the Draft Criteria, further edits were incorporated in the Criteria, and the Criteria were then posted online on the CFIR Web site.
- In January 2004 the Curriculum Commission continued the review and editing of the Draft Criteria, receiving oral public comments and written and electronic correspondence. Based upon the concerns of science educators, the Commission made additional changes to the Criteria to ensure that adopted instructional materials would support both direct instruction and hands-on learning in keeping with the *Science Framework* (as required by law). The revisions to the Criteria will allow flexibility and support for teachers in meeting the needs of all students. The revised Draft Criteria were approved by the Curriculum Commission in January 2004 and has been posted online on the CFIR Web site.

[Attachment 1](#): Draft Criteria for Evaluating K-8 Science Instructional Materials  
(14 pages)

1                                   **DRAFT Criteria for Evaluating**  
2                                   **K-8 Science Instructional Materials**

3   **Introduction**

4   Instructional materials are adopted by the state for the purpose of helping  
5   teachers present the content set forth in the *Science Content Standards for*  
6   *California Public Schools* (referred to in this document as simply the "California  
7   Science Standards"). To accomplish this purpose, this document establishes the  
8   criteria for evaluating instructional materials, as defined in *Education Code*  
9   Section 60010. These criteria will govern the evaluation of instructional materials  
10  for kindergarten through grade eight that are submitted for adoption beginning  
11  with the 2006 Adoption of Science Instructional Materials, and they will be helpful  
12  to publishers in developing their submissions.

13  
14  The California Science Standards are challenging. In the initial years of  
15  implementing the 2003 *Science Framework for California Public Schools*  
16  (referred to in this document as simply the "California Science Framework"), a  
17  major goal of most local education agencies across the state will be to facilitate  
18  the transition from what many students have traditionally been taught in science  
19  to the rigorous content presented in the California Science Standards.  
20  Instructional materials play a central role in facilitating this transition.

21  
22  The State Board of Education (State Board) will adopt science programs that  
23  provide effective learning materials for all students - those students who have

24 mastered most of the content taught in the earlier grades and those who have  
25 not and that specifically address the needs of teachers who instruct a diverse  
26 student population. These criteria, in keeping with the California Science  
27 Framework, do not specify a single pedagogical approach, although the  
28 framework incorporates certain commonsense pedagogical features. The State  
29 Board encourages publishers to select research-based pedagogical approaches  
30 that comprehensively cover the rigorous California Science Standards, reflect the  
31 California Science Framework, make judicious use of instructional time, present  
32 science in interesting and engaging ways, and otherwise give teachers the  
33 resources they need to teach science effectively.

#### 34 **Evaluation Criteria**

35 The criteria for evaluation of K-8 instructional materials are organized into five  
36 categories:

- 37 1. Science Content/Alignment with Standards. The content as specified in the  
38 California Science Standards, and presented in accord with the guidance  
39 provided in the California Science Framework.
- 40 2. Program Organization. The sequence and organization of the science  
41 program that provide structure to what students should learn each year.
- 42 3. Assessment. The strategies presented in the instructional materials for  
43 measuring what students know and are able to do.
- 44 4. Universal access. The resources and strategies that address the needs of  
45 special student populations, including students with disabilities, students  
46 whose achievement is either significantly below or above that typical of their

47 class or grade level, and students with special needs related to English  
48 language proficiency.

49 5. Instructional planning and support. The instructional planning and support  
50 information and materials, typically including a separate edition specially  
51 designed for use by the teacher, that enable the teacher to implement the  
52 science program effectively.

53

54 In kindergarten through grade five, the California Science Standards are  
55 organized by grade level in three content strands: Physical Sciences, Life  
56 Sciences, and Earth Sciences. Investigation and Experimentation standards are  
57 also provided at each grade level which must be taught in the context of these  
58 content strands. The standards for grades six through eight provide for a specific  
59 content focus in each year, with Earth Sciences being the focus in grade six, Life  
60 Sciences in grade seven, and Physical Sciences in grade eight.

61

62 In grades nine through twelve, the California Science Standards are organized by  
63 discipline. A set of Investigation and Experimentation standards common to all of  
64 the disciplines is also presented. Most high schools provide the grade nine  
65 through grade twelve science curriculum in discipline-specific courses, while  
66 some either additionally or exclusively provide integrated science courses that  
67 combine the various disciplines. To provide local education agencies and  
68 teachers with flexibility in presenting the material, the standards do not identify a  
69 particular discipline with a particular grade. Moreover, the standards do not

70 specify a particular organization of the content of each discipline, although the  
71 California Science Framework suggests the logical sequencing of content in  
72 some places. Instructional materials may group related standards and address  
73 them simultaneously for purposes of coherence and utility.

74

75 Submissions that fail to meet Category 1, the Science Content/Alignment with  
76 Standards criteria, will not be considered satisfactory for adoption. Categories 2-  
77 5 will be considered as a whole with each submission passing or failing these  
78 criteria as a group. However, every submission will be expected to have  
79 strengths in each of Categories 2-5 to be worthy of adoption.

80

### 81 **Category 1: Science Content/Alignment with Standards**

82 Science instructional materials must support teaching and learning of the  
83 California Science Standards, in accordance with the guidance provided in the  
84 California Science Framework. To be considered suitable for adoption, an  
85 instructional materials submission must provide:

- 86 1. Content that is scientifically accurate.
- 87 2. Comprehensive teaching of all California Science Standards at the intended  
88 grade level(s), as discussed and prioritized in the California Science  
89 Framework, Chapters 3 and 4. The only standards that may be referenced  
90 are the California Science Standards. There should be no reference to  
91 national standards or benchmarks or to any standards other than the  
92 California Science Standards.

- 93 3. Multiple exposures to the California Science Standards (introductory,  
94 reinforcing, and summative) leading to student mastery of each standard  
95 through sustained effort.
- 96 4. A checklist of California Science Standards in the teacher edition, with page  
97 number citations or other references that demonstrate multiple points of  
98 student exposure, and a reasonable and judicious allotment of instructional  
99 time for learning the content of each standard. Extraneous lessons or topics  
100 that are not directly focused on the standards are minimal, certainly  
101 composing no more than 10 percent of the science instructional time.
- 102 5. A table of evidence in the teacher edition, demonstrating that the California  
103 Science Standards can be comprehensively taught from the submitted  
104 materials with hands-on activities composing no more than 20 to 25 percent  
105 of science instructional time (as specified in the California Science  
106 Framework). Additional hands-on activities may be included, but must not be  
107 essential for complete coverage of the California Science Standards for the  
108 intended grade level(s), must be clearly marked as optional, and must meet  
109 all other evaluation criteria.
- 110 6. Investigations and experiments that are integral to, and supportive of the  
111 grade-appropriate Physical, Life, and Earth Science Standards, so that  
112 investigative and experimental skills are learned in the context of those  
113 content standards. The instructional materials must include clear procedures  
114 and explanations, in the teacher and student materials, of the science content  
115 embedded in hands-on activities.

- 116 7. Evidence in the teacher edition that each hands-on activity (whether part of  
117 the intended program or included as an additional activity) directly covers one  
118 or more California Science Standards, (in the grade-appropriate Physical,  
119 Life, or Earth Science strands), demonstrates scientific concepts, principles,  
120 and theories outlined in the California Science Framework, and produces  
121 scientifically meaningful data in practice. All hands-on activities (whether part  
122 of the intended program or included as an additional activity) must be safe  
123 and age appropriate.
- 124 8. Explicit instruction in science vocabulary that emphasizes the meanings of  
125 roots, prefixes, and suffixes, and the usage and meaning of common words in  
126 a scientific context.
- 127 9. Extensive grade-level appropriate reading and writing of expository text, and  
128 practice in the use of mathematics, aligned with, respectively the Reading  
129 Language-Arts Framework for California Public Schools and the Mathematics  
130 Framework for California Public Schools.
- 131 10. Examples, where directly supportive of the California Science Standards, of  
132 the historical development of science and its impact on technology and  
133 society. The contributions of minority persons, particularly those individuals  
134 who are recognized as prominent in their respective fields, should be included  
135 and discussed when it is historically accurate to do so.
- 136 11. Examples, where directly supportive of the California Science Standards, of  
137 principles of environmental science, such as conservation of natural  
138 resources and/or pollution prevention. These examples should give direct

139 attention to the responsibilities of all people to create and maintain a healthy  
140 environment, and to use resources wisely.

141

## 142 **Category 2: Program Organization**

143 The sequence and organization of the science program provides structure to  
144 what students should learn each year and allow teachers to convey the science  
145 content efficiently and effectively. The program content is organized and  
146 presented in a manner consistent with the guidance provided in the California  
147 Science Framework. To be considered suitable for adoption, an instructional  
148 materials submission must provide:

- 149 1. A logical and coherent structure that facilitates efficient and effective teaching  
150 and learning within a lesson, unit, and year.
- 151 2. Specific instructional objectives that are identified and sequenced so that  
152 prerequisite knowledge is introduced before more advanced content.
- 153 3. Clearly stated student outcomes and goals that are measurable and  
154 standards-based.
- 155 4. Materials and assessments that include a cumulative and/or spiraled review  
156 of skills.
- 157 5. A program organization that provides the option of pre-teaching of the science  
158 content embedded in any hands-on activities.
- 159 6. A program organization that supports various lengths of instructional time,  
160 and helps make efficient use of small blocks of time that may be available  
161 during the instructional day in kindergarten through grade three.

- 162 7. An overview of the content in each lesson or instructional unit that outlines the  
163 scientific concepts and skills to be developed. Topical headings need to  
164 reflect the framework and standards, and clearly indicate the content that  
165 follows.
- 166 8. Support materials that are an integral part of the instructional program. These  
167 may include video and audio materials, software, and student workbooks.
- 168 9. Tables of contents, indexes, glossaries, content summaries, and assessment  
169 guides that are designed to help teachers, parents/guardians, and students.
- 170 10. For grades four through eight, explicit statements of the relevant grade-level  
171 standards in both the teacher and student editions.

### 172 **Category 3: Assessment**

173 Instructional materials should contain strategies and tools for continually  
174 measuring student achievement, following the guidance provided in Chapter 6 of  
175 the California Science Framework. To be considered suitable for adoption, an  
176 instructional materials submission must provide:

- 177 1. Strategies and/or instruments teachers can use to determine students' entry-  
178 level skills and knowledge, and methods of using the information in guiding  
179 instruction.
- 180 2. Multiple measures of individual student progress at regular intervals and at  
181 strategic points of instruction, such as lesson, chapter, and unit tests, or  
182 laboratory reports.

- 183 3. Suggestions on how to use assessment data to guide decisions about  
184 instructional practices, and to help teachers determine the effectiveness of  
185 their instruction.
- 186 4. Guiding questions for monitoring student comprehension.
- 187 5. Answer keys for all workbooks and other related student resources.

188 **Category 4: Universal Access**

189 Resources and strategies must be provided to enable effective teaching of  
190 students with special needs, allowing them full access to the rigorous academic  
191 content specified in the Science Content Standards in accordance with the  
192 guidance set forth in Chapter 7 of the California Science Framework. The  
193 resources and strategies must support compliance with applicable state and  
194 federal requirements, for providing instruction to diverse populations and  
195 students with special needs and should be consistent with any applicable policies  
196 of the State Board toward that end. To be considered suitable for adoption, an  
197 instructional materials submission must provide:

- 198 1. Suggestions based on current and confirmed research for strategies to adapt  
199 the curriculum and the instruction to meet students' identified special needs.
- 200 2. Strategies for students who are below grade level, including more explicit  
201 explanations of the science content to assist in accelerating student  
202 knowledge to grade level.
- 203 3. Teacher and student editions that include suggestions or reading materials for  
204 advanced learners who need an enriched or accelerated program or  
205 assignments.

- 206 4. Suggestions to help teachers pre-teach and reinforce science vocabulary and  
207 concepts with English learners.
- 208 5. Resources that provide specific help to meet the needs of students whose  
209 reading, writing, listening, and speaking skills are below grade level (in  
210 relationship to the English-Language Arts Content Standards for California  
211 Public Schools and the Reading-Language Arts Framework for California  
212 Public Schools) and help ensure that these students know, understand, and  
213 use appropriate academic language in science.
- 214 6. Evidence of adherence to the Design Principles for Perceptual Alternatives,  
215 Design Principles for Cognitive Alternatives, and Design Principles for Means  
216 of Expression, as detailed below.

217 The following design principles are guidelines for publishers to use in creating  
218 materials that will allow access for all students:

219 **Design Principles for Perceptual Alternatives**

- 220 • Consistent with federal copyright law, provide all student text in digital format  
221 so that it can easily be transcribed, reproduced, modified, and distributed in  
222 braille, large print (only if the publisher does not offer such an edition),  
223 recordings, American Sign Language videos, or other specialized accessible  
224 media for use by pupils with visual disabilities or other disabilities that prevent  
225 use of standard materials.
- 226 • Provide written captions and/or written descriptions in digital format for audio  
227 portions of visual instructional materials, such as videotapes (for those  
228 students who are deaf or hard-of-hearing).

- 229 • Provide educationally relevant descriptions for the images, graphic devices,  
230 or pictorial information essential to the teaching of key concepts. (When key  
231 information is presented solely in graphic or pictorial form, it limits access for  
232 students who are blind or who have low vision. Digital images with verbal  
233 description provide access for those individuals and also provide flexibility for  
234 instructional emphasis, clarity, and direction.)

235 **Design Principles for Cognitive Alternatives**

- 236 • Use "considerate text" design principles including:
- 237 - Adequate titles for each selection
  - 238 - Introductory subheadings for chapter sections
  - 239 - Introductory paragraphs
  - 240 - Concluding or summary paragraphs
  - 241 - Complete paragraphs including clear topic sentence, relevant support, and  
242 transitional words and expressions (e.g. furthermore, similarly)
  - 243 - Effective use of typographical aids - boldface print, italics
  - 244 - Adequate, relevant visual aids connected to the print, such as illustrations,  
245 photos, graphs, charts, maps
  - 246 - Manageable versus overwhelming visual and print stimuli
  - 247 - Identification and highlighting of important terms
  - 248 - List of reading objectives or focus questions at the beginning of each  
249 selection
  - 250 - List of follow-up comprehension and application questions

251 • Provide optional information or activities to enhance students' background  
252 knowledge. (Some students face barriers because they lack the necessary  
253 background knowledge. Pre-testing prior to an activity will alert teachers to  
254 the need for advanced preparation. Instructional materials can include  
255 optional supports for background knowledge, to be used by students who  
256 need them.)

- 257 • Provide cognitive supports for content and activities including:
- 258 - Assessments to determine background knowledge
  - 259 - Summaries of those key concepts from the standards that the content  
260 addresses
  - 261 - Scaffolds for learning and generalization
  - 262 - Opportunities to build fluency through practice

263 **Design Principles for Means of Expression**

264 • Explain in the teacher edition that there are various ways for students with  
265 special needs to use the materials and demonstrate their competence, and  
266 suggest modifications that teachers could use to allow students to access the  
267 materials and demonstrate their competence. For example, for students who  
268 have dyslexia (or difficulties physically forming letters, writing legibly, or  
269 spelling words), appropriate modifications of means of expression might  
270 include (but are not limited to) student use of computers to complete pencil  
271 and paper tasks, use of on-screen scanning keyboards, enlarged keyboards,  
272 word prediction, and spellcheckers.

- 273 • Provide support materials that will give students opportunities to develop oral  
274 and written expression.

275 **Category 5: Instructional Planning and Support**

276 Instructional materials must contain a clear "road map" for teachers to follow  
277 when planning instruction. To be considered suitable for adoption, an  
278 instructional materials submission must provide:

- 279 1. A teacher edition that describes what to teach, how to teach, and when to  
280 teach, including ample and useful annotations and suggestions on how to  
281 present the content in the student edition and in the ancillary materials.
- 282 2. A checklist of program lessons in the teacher edition, with cross-references to  
283 the standards covered, and details regarding the instructional time necessary  
284 for overall instruction and hands-on activities.
- 285 3. Lesson plans including suggestions for organizing resources in the classroom  
286 and ideas for pacing lessons.
- 287 4. Blackline masters that are accessible in print and in digitized formats and are  
288 easily reproduced. Dark areas are to be minimized to conserve toner.
- 289 5. Prioritization of critical components of lessons. Learning objectives and  
290 instruction are explicit, and the relationship of lessons to standards or skills  
291 within standards is explicit.
- 292 6. Clear grade-appropriate explanations of science concepts, principles, and  
293 theories that are presented in a form that teachers can easily adapt for  
294 classroom use.

- 295 7. Lists of necessary equipment and materials for any hands-on activities,  
296 guidance on obtaining these materials inexpensively, and explicit instructions  
297 for organizing and safely conducting the instruction.
- 298 8. Strategies to address and correct common student errors and misconceptions
- 299 9. Suggestions for how to adapt each hands-on activity provided to direct  
300 instruction methods of teaching.
- 301 10. Charts of time and cost of staff development services available for preparing  
302 teachers to fully implement the science program.
- 303 11. Technical support and suggestions for appropriate use of audiovisual,  
304 multimedia, and information technology resources associated with a unit.
- 305 12. Strategies for informing parents and guardians about the science program  
306 and suggestions for how they can help to support student achievement.
- 307 13. Teacher editions containing full, adult-level explanations and examples of the  
308 more advanced science concepts, principles, and theories that appear in the  
309 lessons, so that teachers can refresh or enhance their own knowledge of the  
310 topics being covered as may be necessary.