Contemporary Issues in Mathematics Education
MSRI Publications
Volume **36**, 1999

Instructional Materials for K–8 Mathematics Classrooms: The California Adoption, 1997

BILL JACOB

Does 30 divide the product 36×45? If you believe it does then you should be concerned. The California State Board of Education does not appear to. In fact, they explained their reasoning in a public document and used it as justification to reject instructional materials for California students.

The year 1997 was an intense one for the California K–12 mathematics education community, with three major events. Each involved controversy, and each involved university research mathematicians. Drawing by far the most media attention — see, for example, [Co] or [La] — was the development and adoption of California's first Mathematics Standards (and Language Arts Standards). During this same period a second group met to prepare a first draft of a new "Mathematics Framework for K–12", a process which is conducted every seven years and is not yet complete. (A Curriculum Commission version will go to the State Board during 1999.) Finally, between February and September, a follow-up adoption of K–8 mathematics materials was conducted (the primary adoption occurred in 1994). The controversy surrounding this selection is the subject of the present article. The author was a member of both the 1994 and 1997 adoption panels.

California's selection of K–8 instructional materials is especially significant for a number of reasons. Unlike text selections for grades 9–12, where there is a long tradition of teacher autonomy, no state-wide timetable, and which in practice are usually made by individual schools, the K–8 selection determines the materials that most K–8 teachers use and greatly influences what is taught in schools. Further, it provides an important resource for understanding what the State Board values most in educational practice. Finally, the views expressed by the Board embody many of the beliefs at the heart of a growing national debate. US Education Secretary Riley [Ri] has expressed his concern that a failure to resolve the current "math wars" will harm the nation's students, and those seeking middle ground to resolve the conflict should find this case study informative.

Some Key California Events between 1985 and 1997

California has an extensive process for selecting instructional materials. The process includes a three-month review by the Instructional Resources Evaluation Panels (IREP) and three months further review by the Curriculum Commission (CC) which makes recommendations to the State Board of Education (SBE). All discussions and decisions are made at public meetings and must use criteria approved 30 months in advance by the SBE. The final decision rests with the SBE. A sketch of this process can be found in the appendix to this article. We set the stage for examining the 1997 adoption by reviewing a few key events.

In 1985 the SBE adopted a new Mathematics Framework [MF85] and new Instructional Materials Criteria, imprinting a different thrust to mathematics education in California. However, as noted in [BC] and [Su], the notions of the curriculum embodied in the new Framework were unfamiliar to many teachers, and apparently to the publishing industry as well. In 1986, the mathematics IREP and the CC judged that none of the submitted mathematics materials met the new criteria. (The CC subsequently initiated a year-long process working with publishers to modify 10% of the lessons so the materials could be sold in California. In order to help teachers implement the new Framework, the California Department of Education published a *Model Curriculum Guide, Kindergarten through Grade Eight* [MCG] which described "Teaching for Understanding" and included sample classroom tasks.)

In 1989, the National Council of Teachers of Mathematics issued its Curriculum and Evaluation Standards, and in 1992 the California SBE followed with a new Math Framework [MF92] and new Criteria, aligned with the NCTM standards. This framework (still in effect at this time) has been central to the recent controversy. In 1994, the mathematics IREP and the CC recommended the adoption of 9 out of 24 submitted sets of instructional materials, which the SBE approved and to which it added three non-recommended programs. This meant that, beginning with the 1995–96 academic year, for the first time in over a decade California's K–8 districts could select new mathematics materials chosen from a list of twelve that passed the full adoption process.

Tension, however, began to mount over the changing curriculum. In November 1996 the SBE selected a Framework Committee, rejecting ten of fifteen CC nominees and adding fourteen others recommended by member Janet Nicholas, who was opposed to the 1992 Framework. (Three of the rejected ten were returned the following month after the Superintendent of Public Instruction protested the SBE's action.) During 1997, the Framework Committee met between January and August, sending a draft document to the CC on a 13–9 vote, with all 8 CC nominated members in opposition. The Standards Commission approved Language Arts and Mathematics standards for K–12 in September 1997, following a year of deliberation and considering public comment. The SBE approved the Language Arts standards in November, but approved a substantially modified version of the Math Standards in December. SBE members Janet Nicholas and Robert Trigg coordinated the revision. (According to [Mi], four Stanford University mathematics professors did the bulk of the work.) The resulting document is the subject of continuing public debate; see, for example, [NCTM] or [Wu].

The Adoption Recommendations

Between February and April 1997, the mathematics IREP examined seven submitted programs using, as required by state law, the same criteria used in 1994. (The SBE had made some changes in the criteria to reflect recent legislation, but none could be utilized in the 1997 adoption because law requires that criteria be set 30 months prior to an adoption.) The mathematics criteria were divided into six interrelated sections — Mathematical Content, Program Organization and Structure, The Work Students Do, Student Diversity, Assessment, and Support for the Teacher — and an SBE-approved Evaluation Form is used to score programs in each criterion on a scale of 1 to 5. The criteria are not a check list of topics, but instead indicate standards the materials should meet.

For each criterion there are three paragraphs, written in parallel language, describing the level that needs to be attained to achieve a score of 5, 3.5, and 1, respectively. Here is an example from the "Work Students Do" section (with corresponding scores in parentheses):

(5) "Students are consistently expected to think and reason in their mathematical work..."

(3.5) "More often than not, students are expected to think and reason in their mathematical work..."

(1) "Only occasionally are students expected to think and reason in their mathematical work... more often students are expected to follow prescribed directions to achieve a predetermined answer."

In June 1997, the CC presented its report to the SBE, recommending five of the seven programs for adoption and not recommending two. The five recommended programs were [INDS] for grades 1, 2, 5, [CM] for grades 6 and 7, [MC] for grade 5, [MT] for grades K–3, and [PH] for grades 6–8; not recommended were [MC] (grades 6, 7) and [ED] (grades 1, 2, 4, 5). The CC report detailed their view of how each program was or was not aligned with the criteria and was based upon the information in the written summary prepared by the IREP.

The State Board Action, September 9, 1997

On September 2, the SBE liaisons to the CC, Kathryn Dronenburg and Bill Malkasian, in a memorandum [DM] to the SBE, recommended that all submitted programs be approved. (One "condition of adoption" was stipulated: that the pages 92–93 from the 2nd-grade unit "Does it Walk, Crawl, or Swim?" in [INDS] be removed because a discussion of students' private fears "could be personally invasive." In this lesson students list "scary things" as part of an activity to learn to collect and sort information. The memo cites "Code section 51513 which prohibits surveys of pupils' personal beliefs in specified areas without prior, written permission from parents or guardians." In 1994 the SBE was confronted with numerous objections to questions in the language arts portion of the California Learning Assessment System test, which some parents considered personally invasive. In 1997, the board was not interested in risking a repeat of this experience.)

At its September 9 meeting, the SBE approved five programs, but rejected two CC recommended programs, [INDS] and [CM]. (Though [INDS] is a K–5 program and [CM] is a 6–8 program, they are completely distinct and were separate submissions for adoption.) Both rejected programs are published by Dale Seymour and were developed by NSF-funded curriculum projects. This decision was unexpected since most people believed the Dronenburg–Malkasian recommendation would be accepted by the full board. The basis for the rejections was outlined in two memos authored by SBE member Janet Nicholas [N1; N2] that were distributed to the SBE. The decision was reached after a short discussion at the meeting, without any public input or review of the two memos. Neither the publisher nor the CC had any opportunity to respond.

State law [Ed. Code 60200 (d)] mandates that the SBE must "provide specific, written explanation of the reasons why the submitted materials were not adopted", and the two memos [N1; N2] provide that basis. The principal reasons for the rejections were

(1) inconsistencies with code section 60200.5,
(2) mathematical errors, and
(3) problems with instructional strategies employed, including the question of whether they were "research-based".

A representative sample of these objections follow.

(1) *Inconsistencies with code section* 60200.5. First we give the precise wording of this code.

> 60200.5. Instructional materials adopted under this chapter shall, where appropriate, be designed to impress upon the minds of the pupils the principles of morality, truth, justice, patriotism, and a true comprehension of the rights, duties, and dignity of American citizenship, and to instruct them in manners and morals and the principles of a free government. The

> State Board of Education shall endeavor to see that this objective is accomplished in the evaluation of instructional materials of educational content in appropriate subject areas.

To understand the SBE application of the code we quote from [N2, p. 5, paragraph 3]:

> ... The unit on fractions has the teacher tell a story about a burglar (disguised as the school janitor) and his friend who break into the school cafeteria every night to steal pizza.[1] This problem is inconsistent with the objectives defined in Sec. 60200.5.[2]

Another citation of Code 60200.5 [N2, p. 5] describes a suggested rubric score on a partner quiz sample appearing in [CM], Teacher's Edition, "How Likely is It?", Grade 6, pp. 85–88. It reads:

> Advocating grading of assessments based upon data/information not on the test is highly questionable and inconsistent with the objectives defined in 60200.5.

(2) *Mathematical Errors.* According to [N1, p. 4] we have

> *Materials have factual errors that distract from learning and serve to confuse teachers and students alike.*

A specific example in the subsequent paragraph reads:

> Another illustration of the potential for confusion is provided by the discussion of "Rewriting Multiplication Expressions." The text indicates that 36×45 can be rewritten as an expression with three factors such as $9 \times 5 \times 36$ or $9 \times 30 \times 6$. The number 30 is *not*, however, a factor of either 36 or 45.

At the bottom of this same page we find the following example.

> On more than one occasion, the books seem to have a difficult time distinguishing between a *ratio* and a *fraction*. These are often difficult distinctions for young students and the factual error in the text makes it even more confusing. By way of example, in the unit "Writing Fractions as Decimals" the scores of ball players' free throws are presented as: Angela: 17 out of 25, Emily: 15 out of 20, e.g. — ratios not fractions.[3]

Two other similar examples detailing the ratio-fraction distinction are also listed (ibid., p. 66b, and "Comparing and Scaling", Grade 7, p. 39). Four typographical

---

[1] [CM], Teacher's Edition, "Bits and pieces II", Grade 6, pp. 46, 50.

[2] In this problem the "notorious Pizza Pirate", on successive nights, repeatedly "gobbles down half" of the pizza that the students in the story keep in the cafeteria freezer. Working on this problem, students must iteratively compute $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \cdots$.

[3] [CM], Teacher's Edition, "Bits and Pieces I", Grade 6, p. 54.

errors are noted in the Investigations' teacher materials for [INDS] (none in any student materials), each of which are readily recognized as such and is easily repaired. (Typographical errors occur in new programs, the best and worst alike. In 1994, some Silver Burdett software was so buggy that IREP members couldn't evaluate it, yet the SBE approved the program (which was not recommended by either the IREP or the CC) assuming the problems would be fixed. In 1997 the SBE approved *Mathematics in Context*, which the IREP was required to reject because it was incomplete and the pre-publication editions had numerous blank pages. In fact, in [DM] a footnote reads "Recently, we received an opinion from Deputy General Counsel Roger D. Wolferz expressing the view that the teachers' materials in the EB program should be disqualified…". Apparently the SBE was willing to assume that these pages would be filled in correctly. The board's inconsistency here is quite shocking.)

(3) *Problems with Instructional Strategies.* In its opening discussion [N1, p. 1] (and reiterated in [N2, p.1]) it is stated that "The Commission's report does not identify or mention the method it used to determine that the submissions recommended for approval actually *incorporate principles of instruction reflective of current and confirmed research* (60200 c-3)." [Emphasis added here and in the next two quotations.]

Specific examples cited include [N2, p. 3] the following discussion of Grade 1:

> The program's fundamental "theory" is that the students will learn the definitions of mathematical terms exclusively from hearing them in conversation. The Teacher's Edition states that students are not asked to learn new definitions of mathematical terms and it states that "*This approach is compatible with current theories of second language acquisition, which emphasize the use of new vocabulary in meaningful context while students are actively involved with objects, pictures and physical movement.*"[4] Current and confirmed research does not support the program's claim that the explicit teaching of definitions and terms is counterproductive to students mastering fundamental skills in mathematics. The law specifically requires instructional materials to be based on current and confirmed research rather than theories.

As a second example, [N2, p. 4] looks at Grade 6 and states:

> The program *"does not teach specific algorithms with rational numbers. Instead it helps the teacher create a supportive environment for students to grapple with interesting problems in which ideas of fractions, decimals and percents are embedded…"* I know of no current and confirmed research that supports the supposition that continuous exclusion of algorithms is beneficial to a student's mathematical knowledge and learning.

[4]Teacher's Edition, "Survey Questions and Secrets", Grade 1, pp. 1–20.

Discussion of the Board's Objections

We next consider the SBE objections to the Dale Seymour programs and compare them to the actual criteria for adoption. (California law requires that the IREP, the CC, and the SBE *all* use the same SBE-approved criteria, which must be published 30 months prior to an adoption.) Readers concerned more with the general issues raised by this controversy than with the details of the California math wars may wish to skip this section.

(1) *Inconsistencies with code section* 60200.5. It is hard to understand how "principles of morality, truth, justice, patriotism..." relate to "scary things" or "pizza pirates." As I wrote in my public memo [J] to the CC, "If a six-sentence story about a 'pizza burglar', which is used to appropriately set up a good problem, is somehow unpatriotic, how is the Watergate story to be handled in history adoptions?"

So what is going on? It appears that Sec. 60200.5 is used to cover the board's objections to the use of "non-mathematical subject matter." During 1994 the SBE did have to confront complaints about "inappropriate subject matter" in its statewide testing program (the California Learning Assessment System, CLAS), and subsequently Governor Wilson vetoed funding for the tests. On September 9 the SBE did mention CLAS during its adoption discussion, and this seems to have been an important factor. California has an established procedure for handling perceived inappropriate subject matter. A Legal Compliance Committee of community members and parents studies all submitted material and reports to the California Department of Educations (CDE) and the SBE. The IREP and CC are informed that if they note something unusual it should be passed to CDE staff. During the 1997 IREP deliberations our panel did note one area of concern in the Encyclopedia Britannica program, where in the Grade 6 "Made to Measure" unit, students measure each other's body parts. We note that the Dale Seymour programs had each passed legal compliance, and that the SBE did not address the legal compliance concerns when it approved the Encyclopedia Britannica program.

Why can't the SBE discuss the real issues? For example, in any particular instance, how the use of context is useful (or not useful) to mathematical learning is a crucial consideration. In fact, this issue plays a central role in the adoption criteria — the "Evaluation Form, Mathematical Content" (paragraph 2), "Program Organization and Structure" (end of paragraph 2), and "The Work Students Do" (end of paragraph 3) each deal with appropriate use of context. Unfortunately, the SBE seems to have ignored these criteria.

In the quiz sample discussion, the SBE assertion [N2] that "Advocating grading of assessments based upon data/information not on the test..." greatly misrepresents what the program says. In the teacher's manual it is explained that, when assessing student thinking, one needs to understand how students express their ideas. During this one-paragraph discussion of the assessment sample one finds the statement, "I made this interpretation based upon the way my students talk about events in class" ([CM], "How Likely is it?", p. 85.), which presumably triggered the SBE objection. Nowhere is it suggested that the teacher assess these students' work using data/information not on the test. In fact, the program's approach is compatible with the criteria. (See [MF92, p. 183], which states "The materials include suggestions to the teacher concerning how to... Observe, listen to, and question students while they work and how to keep track of insights about the students they may have.") For the SBE to cite code 60200.5 in this context, and not refer to either the Assessment or Support for the Teacher criteria in their discussion, makes no sense. Another source of discomfort with this assessment discussion [N2, p. 5] is the high score given a response to the first question "From the description of the game, do you and you partner think... ?". The students' first thought is wrong, but after starting the project they quickly correct their thinking. The issue becomes, if you ask students to describe their initial ideas, are they penalized for an error that they subsequently fix? Apparently the SBE believes they must be.

(2) *Mathematical Errors.*

In considering the question of whether 30 can divide the product 36×45, the exact beliefs of the SBE are not clear. It appears that the author of [N2] fails to understand the mathematics. Possibly some different discussion of the problem was expected, but a careful reading of the teacher's manual reveals no lack of mathematical clarity. My interpretation is that the SBE wants arithmetic skills structured according to some rigid, predetermined order, and the formulation of this question didn't align with their view of this ordering of skills. If so, this view greatly limits expectations for student understanding and is not compatible with the criteria. See "Evaluation Form, The Work Students Do", paragraphs 1, 3, and "Program Organization and Structure", paragraph 2.

The problems cited by the SBE dealing with ratios and fractions are correctly formulated and are consistent with common practice. The question posed for students in the free throw example cited above is "which player should the coach select to shoot the free throw?" This problem is assigned after students discuss, in class, the notion of "success rate". Observe that the statement of the problem does not call the information being presented a "fraction" — it merely lists the events that occurred. Nowhere is any claim made that these ratios are fractions and interpreting this information correctly in context is the point of the problem.

In fact, the treatment of the concept of proportion in [CM] teaches students correct usage of units in applications, and later connects this skill with numerical, graphical, and symbolic representations of linear functions by the end of Grade 7. The author found the mathematical treatment in full alignment with the criteria, and also found the SBE claims to be unsubstantiated. (Writing about the confusion some educators have about ratios and fractions, U.C. Berkeley Mathematics Professor H. Wu in [Wu] says "Some educators, it is said, have begun to advocate that fractions are not ratios. If so, then we must redouble our efforts not to allow such ideas to creep into any mathematics standards.") *It is a major concern that the SBE member who, in 1997, arguably has wielded more power over California's mathematics education future than anyone else would author a public document leading us to seriously question her understanding of middle school mathematics.*

(3) *Problems with Instructional Strategies.* To be sure, the issue of instructional strategies is a hot topic these days. But we must first realize that, regardless of the SBE's current beliefs about the "best instructional strategies", the 1997 adoption was, by law, required to follow the criteria set in the 1992 Framework. This Framework claims that its instructional strategies are research-based; see, for example, [MF92, pp. 32–33]. So, although the Commission's report may not explicitly identify its method for complying with 60200 c-3, the answer is built into the adoption process and is implicit in the state board approved Framework and Instructional Materials Criteria.

The criticism in [N2] about learning of vocabulary in first grade greatly distorts what is actually said, to wit, "mathematical vocabulary is introduced naturally during the activities." [INDS], "Survey Questions and Secret Rules", pp. 1-20. In this program teachers do teach proper mathematical vocabulary quite explicitly, but do so in settings where the students will use the terms immediately. In addition, the unit contains a section supporting teachers who work with students with limited English proficiency; it gives references to support its approach (ibid, p. 108).

The statement about "continuous exclusion of algorithms" in Grade 6 [N2, p. 4] misrepresents the Connected Mathematics Program. This program explicitly teaches the importance of developing facility with algorithms for computation. The first words of the sentence quoted are "This unit does not...", and for the memo to state "The program does not teach specific algorithms..." is deceptive. The unit cited is the first of *two* units on fractions, and the arithmetic operations are studied in detail in the second. There one finds, "Talk to your class about what an algorithm is in mathematics" ([CM], "Bits and Pieces II", p. 53, "Launch"). The overview of this second unit explicitly states "We expect students knowing algorithms for computation that they understand and can use with facility" (ibid., p. 1b). The assertion of [N2] that "the program's presumption seems to be that mathematical 'meaning' is inconsistent with the acknowledgment of specific algorithms" completely lacks justification and is irresponsible.

There are more examples in the memos [N1; N2] than can be given here. But the above samples are representative. As shown in detail in [J], outside of four typographical errors, the objections raised by the SBE either misrepresent the criteria or program content, or (in several instances) are based upon fallacious mathematical reasoning. *The documents* (*all of public record*) *show that the SBE* *failed to be even-handed in its review of mathematics materials, and was willing to compromise its credibility in order to take sides in California's "math wars".*

Issues of General Concern Raised by the Adoptions Controversy

Although the Standards debate in California captured media attention, the SBE's actions on adoptions may be the best indicator of its understanding and beliefs about mathematics education. I hope mathematicians and educators will look closely at the views expressed by California's SBE in their adoption documents as they think about the welfare of K–8 students.

What else can we learn from the California's 1997 adoption? Here are some further thoughts.

The distinction between the intended curriculum and the received curriculum. The California Mathematics Instructional Resources Evaluation Form stresses mathematical content throughout, but asks evaluators to view materials through several lenses, such as "The Work Students Do" (a high priority) and "Support for the Teacher", as well as having a criterion actually labeled "Mathematical Content". This is an approach not so common in the university mathematics culture. The criteria provide distinct, yet highly interrelated, ways to view the mathematics children will think about in school. One message this sends is that even the most brilliant content exposition may or may not lead students to mathematical understanding. K–12 educators have known this for a time. Yet many mathematicians writing about K–12 devote heavy emphasis to textbook exposition of theory. Isn't this approach shortsighted? Consider the conclusion of one analysis [FP, p. 418]: "the results of this investigation challenge the popular notion that the content of math instruction in a given elementary classroom is essentially equal to the textbook being used." In [BC, p. 251], one finds "We certainly saw many different versions of 'following the textbook' in the California classrooms that we observed."

Shouldn't we be equally concerned with the work students do (e.g., is it rote, or is it thoughtful and utilizing understanding?), in addition to how texts lay out the theorems? Shouldn't we begin to think about what educators call *pedagogical content knowledge* (see [Sh] or [K] for extended discussion), which differs from general knowledge of pedagogy and content knowledge and instead refers to the ability to represent ideas in a way that makes them understandable to students? I think we mathematicians need to find a better balance, both in our discourse about university courses as well as in our interactions with the K–12 community. Only by viewing ourselves as members of a team (not arrogantly as the arbiters of true mathematical content) can we play a valuable role.

Using non-mathematical contexts to teach mathematical ideas. The September 9 actions of the California SBE have shown that the lines between the issues of factual accuracy, principles of pedagogy, and appropriate non-mathematical subject matter have at best become blurred, and at worst disastrously confused. As long as mathematics curricula use non-mathematical contexts (whether in word problems or extended investigations), this difficulty will not disappear. Mathematicians can help by clarifying the important, big ideas of mathematics. But if this results in an emphasis on formalism to the exclusion of thinking about how all students (not just the top few) can access ideas, it can cause great harm. We need to recognize that, without a trained eye, our adult perspectives may tell us that some activities seem to trivialize the mathematics, yet from a developmental view are an essential experience for children. (See [T] for a discussion of his early understanding of division with remainder.) While I do not understand the origin of the SBE obsession with the ratio-fraction distinction, I do know that it contributed to the rejection of a program which had as its greatest strength the development of proportional reasoning. Because of a bizarre notion of divisibility, the SBE overlooked the value of a program that expects students to engage in thoughtful problem solving—something that mathematicians value most highly. These outcomes were a tremendous tragedy. In spite of their lack of accuracy, the two documents [N1; N2] are being used in attempts to prevent districts from using these Dale Seymour programs. Standards Commissioner Bill Evers presented them both to the Palo Alto School Board prior to its March 31 meeting when they considered adoption of [INDS] in grades 1 and 2.

The importance of an open process in setting public policy. Both of California's 1997 Adoption and Standards controversies included substantial last-minute changes initiated by the SBE. In each case, a single (and the same) board member played the determining role. While the SBE has the authority to make these decisions, the haste and lack of public input into its actions has undermined public confidence in the process. (For example, Profs. Farrand and Moore state in [FM] "Our input has so little value that we have six hours to respond to" the Standards. Charles Weis, Ventura County Superintendent of Schools, writes in [We]: "In my opinion, this back-room rushed revision process, though legal, is not in keeping with the public nature of governance afforded our public education system". Luther Williams, Assistant Director for Education and Human Resources at the NSF is quoted in [La] as saying: "The board action is, charitably, short-sighted and detrimental to the long-term mathematical literacy of children in California." Superintendent of Public Instruction Eastin is quoted in [Wa] as saying, "I urge you to ignore the board's standards and reach for the higher standards.")

In the case of the Standards, mathematicians played key roles in the back-room changes. (We may be headed for a repeat performance. Janet Nicholas has recently informed the CC that a group of mathematicians will prepare the instructional examples for the Framework revision, but did not reveal who is doing the work or when it will occur. As in the case of the Standards revisions, this appears to in conflict with Sec. 11121.8 of California's Bagley–Keane Open Meeting Act, and the approach will certainly heighten the current tensions.)

In the case of the adoption process described in this article, the SBE's documents are so seriously flawed that we are led to question the integrity of the board. (In contrast, [Ro] describes a potentially analogous process in New Jersey, where the time and care invested paid off, resulting in an apparent consensus absent in the California situation.) We need to demand that state decisions be open and public, that time and care be allocated and that the approaches taken balance the views of all parties. Without this intrinsic fairness, Secretary Riley's call for peace will be in vain.

Appendix: The California Math Wars

The main institutions and documents. Like most states, California has a *State Board of Education* (SBE) which is appointed by the Governor subject to Senate approval. The *Superintendent of Public Instruction* (SPI) is elected by popular vote and heads the *California Department of Education* (CDE). The CDE provides administrative support for the other agencies listed here (including the SBE), disseminates documents, answers questions, etc. Due to recent court decisions, the SPI has little authority over Standards, Frameworks or adoptions, with the final say in these areas now resting with the SBE.[5] Established by legislation in 1995, the *Standards Commission* has 21 members (twelve appointed by the Governor, six by the SPI, two by the legislature, plus the SPI), and prepares grade-level-specific content standards for SBE approval. Although the standards are voluntary for school districts, the state's new testing program must be aligned with the standards in 1999.

The SBE appoints the *Curriculum Commission* (CC) whose task is to oversee the drafting of Frameworks, the instructional materials adoption process, and to make recommendations to the SBE. The majority of the Curriculum Commissioners are K–12 teachers, administrators, or resource specialists, with a few from higher education. The CC nominates, subject to SBE approval, the members for two types of panels to help them with their work, the *Instructional Resources Evaluation Panels* (IREP) and the *Framework Committees.* Most IREP members are K–12 teachers or resource specialists but they also include higher education specialists. The IREP work will be detailed below. The Framework Committees spend 6 to 8 months revising or drafting curriculum frameworks, and their

[5] The legislative report [LHC, cover letter] called for such changes, stating that "the Superintendent of Public Instruction has assumed the role of policy maker and the State's schools are without the benefits associated with an educational policy governed by a strong state board" and then recommends "The Attorney General should file an action ...". This debate hasn't ended — see for example [Wa], which reports on the SPI criticism of the Mathematics Standards and states "(SBE President) Larsen says the board may ask (Governor) Wilson to cut (SPI) Eastin's budget as punishment."

drafts are revised, following public input by the CC prior to submission to the SBE for final approval. The SBE also approves *Instructional Materials Criteria* (the "Criteria") and an accompanying *Instructional Resources Evaluation Form* which must be used by the IREP, the CC, and the SBE in materials adoption decisions, and which by law must be set in place 30 months prior to an adoption.

The instructional materials adoption process. California's K–8 instructional materials adoptions are highly formalized, due in part to public scrutiny over the years[6]. The process is set by law [Ed Code 60200] and is sketched next in a series of nine steps.

Step 1. Adoption criteria and evaluation forms are approved by the SBE in accordance with Ed. Code 60200 and are supposed to be fleshed out in the Frameworks. By law, this approval must precede the adoption by 30 months.

Step 2. Publishers submit instructional materials to the CDE. Instructional materials include everything they expect the state to pay for, including teacher's manuals, texts, manipulatives, software, workbooks, etc.

Step 3. The SBE-approved IREP members meet for one week with a CC subcommittee for training on criteria and legal requirements. The sections of the Framework which explain the meaning of the criteria are a central focus of discussion. IREP legal instructions are to judge programs against the criteria, not to simply "pick what you might personally like." The review is not a competition. Potentially all programs can pass, or possibly no programs will pass. The week concludes with publisher presentations on their materials. All sessions are public.

Step 4. IREP members spend 8 to 10 weeks at home reviewing submissions and preparing citations to document their evaluation according to the criteria. Law prohibits any contact between publishers and panel members. (The author devoted, on the average, 20 to 30 hours preparation for each program, evaluating 8 programs between April 23 and June 18 in 1994.)

Step 5. IREP members meet for one week to deliberate and score each program on each criterion using the *Instructional Resources Evaluation Form*. Publishers are given an opportunity to answer questions, and IREP members prepare a *written* report for the CC. The meetings and the IREP report are public.

Step 6. The CC prepares its recommendations for the SBE, building upon what they learned from the IREP. Publishers may meet with commissioners during this process. This process takes approximately 3 months and includes formal public hearings.

Step 7. Concurrent with IREP and CC deliberations, the CDE prepares and notifies publishers about legal compliance issues, to which they can respond.

[6] See, for example, commentary by Richard Feynman in [F].

Step 8. The SBE makes its decision after reviewing the CC presentation and formal public hearings, using the criteria set 30 months in advance as prescribed in Code 60200.

Step 9. Once the SBE approves programs, successful publishers market their products and local districts generally test them through pilot programs. The local decision process can vary from several months to several years. No less than 70% of a district's Instructional Materials Fund must be spent on adopted materials, while 30% may be spent on non adopted materials. Waivers to the 70% rule can be obtained from the SBE. (Between 1994 and 1997 most mathematics waiver requests were granted.)

Discussions of the six sections of the Instructional Materials Criteria, as used in the 1994 and 1997 adoptions, can be found in Appendix A of the Framework [MF 92]. The Instructional Resources Evaluation Form (not found in the Framework) consists of a rubric for each section, which contains 3 columns characterizing top (5 points), passing (3.5 points), and bottom (1 point) scores. IREP members must come to consensus on an integral score between 1 and 5, and these scores are multiplied by a weighting and summed to produce a score out of 100. A score of 70 is considered passing. The sections and their respective weightings are:

1. *Mathematical Content*	score $\times 4$
2. *Program Organization and Structure*	score $\times 3$
3. *The Work Students Do*	score $\times 5$
4. *Student Diversity*	score $\times 2$
5. *Assessment*	score $\times 2$
6. *Support for the Teacher*	score $\times 4$

Bill Jacob
University of California Santa Barbara
Department of Mathematics
Santa Barbara, CA 93106-0001
United States
jacob@math.ucsb.edu