

California Pulls Together a Science Standards Writing Team

Science standards for California's schoolchildren will be drafted jointly by members of two previously competing groups, the state's commission in charge of setting goals for academic performance decided in mid-January.

The move to tap the efforts of both the Associated Scientists, a group of about 90 teachers and scientists (including 10 Nobel laureates), and the Science Coalition, a group of similar makeup, but heavier on science educators, is widely seen as a happy resolution to a months-long squabble. Last November, California's Commission for the Establishment of Academic Content and Performance Standards had recommended that the contract to draft the state's K-12 science standards go to the Science Coalition for \$178 000. But protests by the Associated Scientists, which was offering to write them for free, had forced the commission to backtrack.

Actually, the brouhaha had started even before the commission's original award to the Science Coalition, and it reflects the ongoing and contentious nationwide debate over whether science teaching should emphasize the "what" or the "how." The "what" side of this issue is summed up by Associated Scientists cofounder Shoumen Datta, who believes that many educators, including members of the Science Coalition, would sacrifice students' depth of understanding and ability to reason in their zeal to make the curriculum accessible to all students. "I think there is public support [for the idea] that rigorous math and science are needed, in comparison to the touchy-feely teaching that's been going on," Datta says. "We don't want to dumb down anything."

But those on the "how" side refute the claim that they want to water down the curriculum. They note that different children learn things in different ways, and that traditional approaches, such as rote memorization, clearly are not

Scientists and educators from two groups will jointly draft California's science standards, which are intended to be a step toward more internationally competitive test scores and a more scientifically literate society.

working. They say that having a strong handle on science content is not sufficient for teaching it. "My experience in working with scientists generally is that many are not aware of cognitive research," says Science Coalition adviser Ramon Lopez, a space physicist at the University of Maryland and the American Physical Society's director of education and outreach. "Stressing a hands-on approach sets the bar very high. It demands that students understand concepts." Adds Rodger Bybee, of the National Academy of Sciences, "There is no science educator who is against [children's] learning fundamentals. The whole [debate] is overlain with politics. And oftentimes the issues are reduced to some form of *ad hominem* attacks."

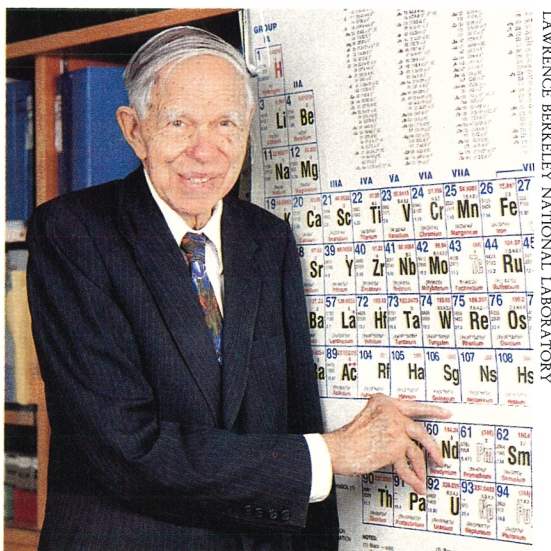
Working together

And so, with feelings running high, the two teams submitted new proposals in December. In that go-round, the Associated Scientists' *gratis* bid scored higher. But concerns that the group lacked experience in facilitating discussions and writing standards lingered, says LaTanya Wright, chair of the evaluation team. "They have tremendous expertise in content. The problem was putting together all the pieces to be able to deliver the product." Switching tactics, the commission awarded no contract and instead has hired the chairs of the contending groups as consultants: Stan Metzenberg, a biochemist at California State University at Northridge, represents the Associated Scientists, and Bonnie Brunkhorst, who holds a joint appointment in the science, mathematics and technology education and geology departments at Cal State's San Bernardino campus, represents the Science Coalition. The cost to the

state will be about \$75 000, estimates Scott Hill, who oversees the commission's work.

"This looks promising. I'm glad that it worked out like this," says Dudley Herschbach, a Nobel Prize-winning chemist at Harvard University, whose view is widely echoed. Herschbach notes that both groups beefed up their teams between proposal rounds, which is when, already a member of the Associated Scientists, he joined the Science Coalition too. "I think it speaks well that both sides are concerned about what matters. This is our future. These are our kids."

And Governor Pete Wilson's late



GLENN SEABORG

January appointment of Nobel laureate Glenn Seaborg to serve on the commission has also been broadly welcomed. An emeritus professor of chemistry at the University of California, Berkeley, Seaborg was a member of Associated Scientists before being appointed to the commission. He now chairs the commission's science committee. Seaborg is also one of the authors of *A Nation at Risk*, the National Commission on Excellence in Education's 1983 report that warned that American children were academically far behind children in other countries.

A first step

California is just one of many states that are currently grappling with the issue of science standards. And why?



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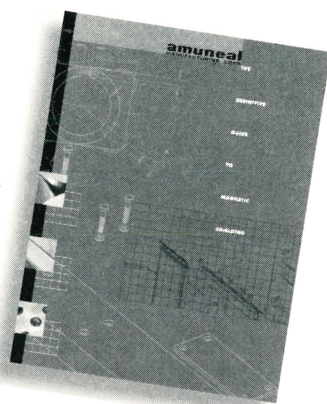
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After all, the National Academy of Sciences and the American Association for the Advancement of Science have published recommended science education standards. But in the US, education is a state, not a Federal, affair. And, while some would apply the NAS or AAAS standards as is, others see them only as guidelines. "They are not at the level of specificity that states need to produce," says Brunkhorst. "It's a matter of grain size."

According to state law, California's academic standards should set out what kids should know and be able to do, grade by grade. And, stress the commission members, the science standards must specify only content, not teaching methodology. That goes back to the debate about content versus process. Many, such as APS's Lopez, feel that the two really are not separable. As he puts it, "How you write the standards has subtle yet far-reaching implications. For example, if you set a long laundry list, that says a lot about how things will be taught." In any case, Brunkhorst and Metznerberg have to act fast: A first draft of the science standards was due shortly after this magazine went to press, and a draft for review by the public and by experts must be ready by 1 April.

The science standards that California adopts are likely to influence what's taught in other states. That's because California, with its 5.6 million schoolchildren, is one of the textbook publishers' biggest customers, along with Texas and Florida, and the publishers tend to mold their books to the demands of those states.

But setting standards is only the first step toward the real goal: improving education and performance—for all students. The standards are recommendations, and will be enforceable only inasmuch as they are linked to tests. "In California, the content of tests had always defined what was taught," says the commission's Hill. "We determined that we should start the other way, by defining what we want students to learn, and then writing the tests." But other changes are needed too. "We will probably have to have more emphasis on subject matter in the preparation of teachers, and more collaboration between science and education departments" in colleges and universities, says Seaborg. More money needs to go into teaching, he continues. For example, "salaries need to be competitive with what physicists earn in industry."

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