Getting Energy into the Schools

Department of Energy

Watkins: *"A burning issue."*

Energy Secretary James Watkins is fast emerging as a new force in the federal government's campaign to improve science teaching in primary and secondary schools. He demonstrated his impatience for action last week at a brainstorming session in California, which he cochaired with physicist Glenn Seaborg. The Math/Science Education Action Conference, held at Berkeley's Lawrence Hall of Science, assembled leaders from education, industry, science, and government to map out programs to be implemented within the year by the Department of Energy, through its national laboratories.

"[Science education] is a burning issue with me personally," Watkins told *Science*. But he said the DOE initiative is driven by more than his own personal passion. The department faces a manpower shortage if schools fail to produce high-quality scientists and skilled technicians. "Let's put it [in terms] of need and self-serving objectives," he said. "We need these people desperately. I have had serious problems finding qualified people to fill critical positions in . . . waste management and even nuclear engineering. And I ask myself: How much worse will it get in 10 years if we don't get our act together?"

Watkins acknowledged that the Administration is unlikely to come up with large amounts of money. But he argued that by encouraging volunteerism on the part of scientists and graduate students, and by turning research resources into education aids wherever possible, DOE can be effective with little new funding. "We have the places; we have the computers; we have the minds," he said.

Indeed, many DOE laboratories have independently created education programs for both teachers and students. But this is the first time the order for such efforts has come from the top. Watkins plans to include science education "at the core" of the DOE's mission and to pay particular attention to the needs of disadvantaged, inner city, and minority students. "I expect to have the 20 national laboratories fully involved in action programs within the year," he promised.

New ideas for those action programs were to come from the participants in the conference. Among the consensus objectives: establishment of science and mathematics as "core subjects," taught to all students, every year, and a call for DOE to create communication networks through which science and math teachers could share information about high-quality resource materials.

The participants also proposed financial aid programs designed to offset the education expenses of bright students who choose teaching as a career. And Seaborg argued for changes in the teacher accreditation system to allow mid-career scientists and engineers with degrees in science or mathematics to become certified teachers without education degrees. Such a change, implemented several years ago in New Jersey, has produced an excess of precollege science and math teachers in that state, he said.

The working groups urged DOE laboratories to establish teacher training programs for the school systems in their areas and to try to reach as many as 10% of the science and math teachers in those communities annually. Effective programs could then be copied by other government agencies or scientific institutions near population areas not reached by the national labs.

Watkins promised to publish the conclusions of the meeting within 2 weeks, to get to work immediately implementing the best suggestions, and to include the plan as a chapter of the national energy strategy, to be published next spring.

How do Watkins' plans fit in with other federal efforts? He told *Science* he's not trying to "upstage" the Department of Education or the National Science Foundation. He said he plans to coordinate DOE's efforts with those of other federal agencies and will share with them the recommendations that emerged from the meeting.

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school boards, with city councils, with business leaders as well as with the public school systems, and to bring into the picture institutions of higher education."

Shakhashiri puts strong emphasis on enlisting academic scientists and engineers in the cause of education reform. However, he wants the pattern of participation to be different from that in the postsputnik period when most of those active were in teams working on major curriculum reform projects. "What we would really like to see," he says, "is faculty members of the University of Pennsylvania involved in improving the quality of teaching of physics or math or chemistry in Philadelphia. We'd like to see faculty at UCLA be concerned about Los Angeles. The University of Chicago, Columbia, Berkeley. . . ."

NSF has never made a major effort aimed specifically at improving science and math instruction in urban schools with large minority enrollments where retention rates and academic performance are generally lowest. But Shakhashiri says the agency has given the subject a "sharper focus in the past couple of years as we realized that the inner city schools problem has to be dealt with."

To carry out this mission, NSF is creating a new category of programs with the working title of state and urban initiatives. An important endeavor under this rubric is the establishment of "career access centers" for minority students in major urban areas. Three were started last year—in Atlanta, New York City, and Puerto Rico—and NSF is expected to name six more this year. Eventually, says Shakhashiri, "our goal is to have about a dozen and a half of those centers for minority students." They would cut across all levels, from kindergarten through college, but for the time being, the emphasis is on the precollege level.

If funded as he envisions, these centers would support local efforts to encourage minority students to pursue careers in science and technology. All would be expected to sponsor both in-school and out-of-school activities—such as Saturday academies—for students, programs for teachers, and activities to motivate minority students "within the context of science, mathematics, and engineering experience." The center programs will vary, however, in the prevailing spirit of letting a hundred flowers bloom.

The career access centers exemplify the change of focus and style under Shakhashiri. In the postsputnik era, NSF emphasized large-scale, centralized projects. Now, the stress is on more and smaller efforts. One thing Shakhashiri has shied away from is comprehensive curriculum reform. In his view, such projects have been too expensive and he recognizes that they have drawn