

NEWS

Sigma Xi, The Scientific Research Society

Contact: J. Renee Keever
 Charles Blackburn
 800-243-6534 or 919-549-4691

For Immediate Release

1994 Sigma Xi Forum Wrap-up
K-12 SCIENCE EDUCATION REFORM WILL TAKE A DECADE,
AND COMMUNITY PARTNERSHIPS HOLD BEST HOPE FOR SUCCESS

ATLANTA, GA -- Fundamental change in K-12 science education in the United States, essential for full citizenship in an increasingly technological world, will take a decade or more to accomplish, and only the sustained, cooperative efforts of people in their own communities--scientists, teachers and concerned citizens--will likely ensure success.

These were among the themes at Sigma Xi's national K-12 science education forum April 14-15 in Atlanta, titled *Scientists, Educators, and National Standards--Action at the Local Level*. Attended by about 550 scientists, teachers and policy-makers, the two-day conference was praised by participants for bringing the scientific and educational communities together to talk about shared concerns and common goals.

The implications of scientific literacy and technological know-how for the nation's economic future have given a sense of urgency to the reform movement. Without much fanfare, however, scientists and teachers have been forming alliances to improve education in many communities across the country. The progress they are making--highlighted in many forum presentations--demonstrates the practical value of community-based partnerships as a mechanism for effecting reform.

The 1994 Sigma Xi Forum encouraged collaborations among teachers and scientists through a variety of formats. Teachers discussed their classroom needs and shared approaches that have been successful. Scientists shared partnering strategies that have been productive.

Sixty K-12 teachers from 22 states received travel subsidies from the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA) to attend the forum. They were joined by many other teachers and leading educators, as well as representatives of government, industry and universities.

The forum included a poster session highlighting 72 science education initiatives in 26 states and provided a wealth of ideas for consideration in development of an ongoing program in science education by Sigma Xi.

Sigma Xi is an international scientific research society with about 93,000 members in more than 500 chapters and clubs, many of which are involved in local science education partnerships. Among other things, forum participants developed recommendations for nurturing and sustaining grass-roots educational alliances, which many have come to view as essential to the success of

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the current education movement articulated in the Goals 2000 Act.

U.S. Under Secretary of Education Marshall Smith said on Thursday that Goals 2000 is designed to stimulate standards-based education reform in all 50 states.

"We have a practical need for this to keep our economy strong," Smith said. "We hope to create a long-term productive partnership among local schools, districts, states, and the federal government, focused on bringing all students to far higher levels of achievement than in the past. Ultimately, the success of this reform agenda relies upon concerned citizens with different perspectives and points of view working together."

National Academy of Sciences President Bruce M. Alberts called the forthcoming National Research Council K-12 science education standards "ambitious and revolutionary," but emphasized that they will only be effective if applied by local citizens who are concerned about science education in their own communities. Meaningful reform will take 10 years to accomplish, Alberts said.

"The standards call for a new kind of science education, based on problem-solving rather than the memorization of facts," he said. "I've been in biology for 30 years, and I don't know all about it, yet we expect high school students to cover all of biology in one year. It's crazy. We need to give them enough to encourage them to read after they get out of school."

He urged creation of partnerships between scientists, citizens and teachers in each school district in the country to work for long-term improvement. "By combining the resources of the National Academy of Sciences with scientific societies, such as Sigma Xi, we can create an effective national network designed to inform and communicate with these local groups," Alberts said.

Noting that the preparation of tomorrow's teachers has been largely overlooked in discussions of K-12 education reform, **University of Maryland President William E. Kirwan** said the reform movement presented a unique opportunity for American universities to reclaim their teaching mission and perhaps some lost public trust along with it.

"Teachers tend to teach the way they were taught," he said. "We need new courses taught in new ways. Only by reclaiming our teaching mission can universities recover lost moral ground and restore diminished credibility."

Kirwan said the research community's involvement in science education reform may help it succeed where former efforts failed. "With the kind of commitment we're seeing from the National Science Foundation and the National Research Council, I believe we have a reasonable chance of gaining support for educational reform from the nation's major research universities," he said. "And if this occurs, I feel confident that the reform efforts will take hold nationally."

Teaching science as a process, rather than a body of knowledge, and thereby helping students learn how to answer their own questions, is the real aim of inquiry-based science education reform, according to **National Science Resources Center Director of Outreach Jan Tuomi**, a former elementary school teacher.

Many of the teachers present echoed her contention that teacher education and support, such as providing basic classroom materials with which to do hands-on science, are critical elements of reform.

"The ability of scientists to write grants and acquire resources is something the schools desperately need," said **California Institute of Technology Associate Professor of Biology James M. Bower**, who has been involved for nine years in a model program that is helping his local school district upgrade the quality of science education. "The NSF should stop funding curriculum development," he said, "because the real need is in teacher training and support and materials."

California high school physics teacher Penny Moore said that teachers must be treated as full and equal partners by scientists or they will quickly lose interest in educational alliances. This idea resonated with many teachers and scientists in the audience.

NSF Assistant Director of Education and Human Resources Luther Williams said his agency is realigning a large part of its resources for education to support comprehensive, multifaceted programs in statewide public schools and individual school districts. In particular, two new NSF programs are aimed at correcting "the imbalances and deficiencies that permeate a substantial fraction of urban and rural school systems."

"The Urban Systemic Initiative and the Rural Systemic Initiative are designed to counter the patently unequal opportunity to learn science and mathematics that exists in this country," Williams said. "This new and fundamentally different order of resourcefulness and productivity expectations obligate the shift from inadequate, insufficient and perhaps even ill-defined objectives to emphasis on documentable measures of progress toward the achievement of specific goals."

He also said those who are calling for the construction of a national, computer-driven "information superhighway" would do well to remember that "many American schools could be aptly termed telecommunications ghettos."

Stanford University Education Professor J. Myron Atkin, who chaired the forum planning committee, said that the long-range nature of education reform has begun to sink into the public consciousness. "We are beginning to realize that, as with environmental concerns, improving education takes constant effort," he said.

Forum workshops included summaries of success stories from scientists in academic settings, industry, and government labs, describing how effective partnerships with K-12 teachers and schools were created and sustained.

Breakout groups developed recommendations on such issues as building a national network and improving undergraduate teaching for science teachers.

Among the recommendations:

- Sigma Xi was urged to take a leadership role in bringing together officers and committee chairs from scientific and educational associations, business groups and government agencies to share information and work together toward common goals.

- Priority should be given to developing an easily accessible database for communicating information among the scientific and educational communities.

- Textbooks, curricula, teacher training and assessment tools should be consistent with national science education standards.

- As we promote science literacy for all, we must be sensitive to the fact that there are different kinds of cultural knowledge in our diverse society, and therefore we must try to break down social barriers and biases.

- Sigma Xi was also urged to convene a task force to research which community-based alliances between scientists and educators work best and act as a clearinghouse for this information.

- Forum participants were urged to continue this dialogue at home and begin to build coalitions to identify problems and formulate action plans.

- In critiquing the NRC's draft science education standards, further simplification was urged, on the grounds that the current level of detail in some areas implies that the standards will be based on the memorization of facts instead of hands-on experimentation.

- Support new and future teachers through scholarships, community resources and internships.

In addition to NSF and NASA, other forum funders included the U.S. Department of Energy, the Carnegie Corporation of New York, the National Institute of Environmental Health Sciences, the Coca-Cola Foundation, the Cray Research Foundation, the General Electric Foundation and the Office of Army Research.

Also during the forum, Massachusetts Institute of Technology physicist **Philip Morrison** delivered a talk titled "Nothing is Too Wonderful to be True" as this year's recipient of Sigma Xi's John P. McGovern Science and Society Medal. Harvard University's **Stephen Jay Gould** spoke on "Exploiting Dinomania, or How Not to Sink Under Its Weight" in honor of receiving Sigma Xi's William Procter Prize for Scientific Achievement.

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