

1987

Science Education in Minnesota: An Update

Adela S. Elwell

Science Museum of Minnesota

Follow this and additional works at: <https://digitalcommons.morris.umn.edu/jmas>



Part of the [Science and Mathematics Education Commons](#)

Recommended Citation

Elwell, A. S. (1987). Science Education in Minnesota: An Update. *Journal of the Minnesota Academy of Science*, Vol. 52 No.2, 30-32.

Retrieved from <https://digitalcommons.morris.umn.edu/jmas/vol52/iss2/6>

This Article is brought to you for free and open access by the Journals at University of Minnesota Morris Digital Well. It has been accepted for inclusion in Journal of the Minnesota Academy of Science by an authorized editor of University of Minnesota Morris Digital Well. For more information, please contact skulann@morris.umn.edu.

Science Education in Minnesota: An Update

ADELA S. ELWELL

Note: Approximately 100 people gathered at the Science Museum of Minnesota on Nov. 18, 1986 to discuss the needs of state science teachers and the resources available to them. The program, titled "What's Happening In Science Education: A Minnesota Meeting," was jointly sponsored by the museum, the Governor's Office of Science and Technology, and the Minnesota Department of Education. The meeting was convened by James Peterson, museum president, and Cynthia Quist, director of the Governor's Office of Science and Technology. Adela S. Elwell of the Science Museum of Minnesota's Opportunities in Science Program summarized the meeting for the *Journal* and offered her comments on the future of science education in Minnesota.

It is probably true that some attendees at the meeting heard things they would rather not have heard. Truman Schwartz, chemistry professor at Macalester College presently on sabbatical leave at the National Science Foundation (NSF), said that Minnesota is not recognized as a current leader in science education. In Washington, North Carolina, Arkansas, and Tennessee are among the states most often mentioned as the present-day innovators and improvers of science education.

Program emphasis has shifted at the NSF, but providing financial support for research activities is the primary thrust of the organization. Support for education has waxed and waned over the years, but in fiscal year 1987 the directorate of Science and Engineering Education will have \$99 million to spend. The current emphasis stresses developing science literacy in the general public. NSF supports educational activities from kindergarten through grade 12 as well as graduate fellowships, museums, and educational television. The division of Teacher Preparation and Enhancement supports the development of educational networks, summer workshops and institutes, teacher preparation, and the presidential award program.

Schwartz explained that in selecting proposals for funding, NSF seeks innovative projects, especially those involving partnership formation and cooperative and collaborative efforts. In the promotion of effective programs, the multiplier effect is important, and the theme "every teacher teaches a teacher" has been productive.

Representing the industrial community, William Linder-Scholer of Cray Research explored changes that must be made in science education to meet such future needs as a high tech workplace and a scientifically literate society. He said "Our country is facing an entirely new challenge, one that demands that we rethink our economic and educational policies in order to maintain our place in the world and our quality of life."

Linder-Scholer believes that, in order to make the necessary change from the economics of high-volume, standardized

industries to the economics of small-batch, precision-engineered, valuable-product industries tailored to serve individual markets, education must help develop a skilled, adaptable, and innovative work force. He doesn't think current American public education will be able to make this transition because of its dependence upon the principles of high volume and standardization, which were successful in the past. Revolution, as opposed to evolution, is needed to bring about the changes he sees as essential: "...we need a new car, not just a tune-up."

Linder-Scholer read a fragment of the Carnegie Report:

"We do not believe the education system needs repairing; we believe it must be rebuilt to match the drastic change needed in our economy if we are to prepare our children for productive lives in the 21st century."

Acknowledging that more money alone is not the answer because "more of the same would not prepare our children for their roles in the emerging business and social system," Linder-Scholer's final point stressed the need for greater accountability in education. He believes reliable and conclusive measures of current student performance do not exist and that effective accountability is not built into educational structure. School boards, administrators, and teachers have not been held accountable for declines in student performance, and little incentive for change exists.

Also emphasizing the need for change, Patricia Heller of the University of Minnesota assessed the need for modification in the pre-service education of teachers. Under pressure, overburdened teachers revert to using the same methods by which they themselves were taught. This usually means the employment of lecture and assessment of fact recollection. Heller reiterated statements made by other speakers; teaching less could accomplish much more, if better teaching techniques were used including the employment of creative problem solving.

teachers try to meet, Tlach said that at the 9th grade level, she'd like to have students who are familiar with a "hands on" approach to science. She sees a great need for teaching more science at the elementary level and advocates more workshops to help elementary teachers with science. She favors establishing mentor programs with industries and providing exchanges between students and college and university staffs.

Benedict supported the ideas of having teachers develop their own science curricula and of providing greater support to elementary teachers. Time and money are essential ingredients for science education support. Benedict would prefer that science remain an elective in high school, but would like to have business people help market science. Summer institutes taught by inspirational scientists like Hubert Alyea would be welcomed by many teachers. She also mentioned the need for teachers to have time off to restore their creativity.

An innovative program, Helping Able Kids (HAK), continues to have a significant impact upon the teaching of science at Grand Rapids Middle School. Miner outlined the program incentives that draw students into an invigorating science curriculum, which employs activities from "Olympics of the Mind" and higher order thinking skills. A special room set aside for the program is used for teacher training. Guest lecturers, field trips, and weekly logic problems are used to enhance the program. Miner also emphasized the need to limit class size.

One of the spin-offs from the Grand Rapids HAK program is that Miner is available to substitute for teachers who take students on all-day field trips or who attend a workshop during the school day. This has resulted in loosening lines of communication among the teaching staff, and 7th and 8th grade teachers have been more willing to help with elementary science curriculum.

In her summary, Thornton made several points. She reemphasized time and money requirements for curriculum development and in-service educational offerings. She also noted that a serious problem teachers face is that they tend to become locked into a specific area after five years and lose tenure and status if they change. Beginning teachers should receive help from their more experienced and accomplished colleagues. Also, science must not frighten students but should be presented in an appropriate context.

Presentations concerning the provision of resources to schools were made by the Minnesota Science Teachers' Association, the High Technology Council, the Alliance for Science, the Minnesota Academy of Science, the Science Museum of Minnesota, Northern States Power, and the Minnesota Naturalists Association. A packet provided to participants at the conference contained similar information from the Minnesota Earth Science Teachers Association, the Minnesota Higher Education Coordinating Board, Minnesota Environmental Sciences Foundation, the Twin Cities and South Western and South Central Educational Cooperative Services Units, the Raptor Research and Rehabilitation Program, the Bakken Library of Electricity In Life, the Department of Natural Resources Scientific and Natural Areas Program, the College of St. Thomas, and the Minnesota Environmental Education Board (on behalf of the Regional Councils).

Providing meaningful educational opportunities for teachers was a lively topic of discussion. Recognizing the damage that a poor teacher can do in "turning kids off in science," the audience turned its attention to how to make courses and workshops effective. Participants recognized that some kind of follow-up is essential, but incentives may be needed to assure cooperation. Holding back some component of academic credit, sending out a continuing newsletter,

preparation of a useful and ongoing notebook, and providing some sort of support system were all mentioned as potentially useful. Responsibility for effective workshops must be accepted by both the providers and participants.

Clark described two different kinds of teacher workshops: one involves the provision of useful information about a specific topic, the other provides background information for the teacher. Workshops are most useful when they relate directly to classroom activities, the equipment is readily available, and follow-up is provided. If one of these elements is missing, "then the workshop doesn't fly."

Audience members also addressed the lack of a state science requirement. This complex issue continues to require cooperative study. Teachers and other educators are divided on the issue as they attempt to weigh the value of introducing more students to science against the reality of already strained resources. Clearly, a need exists for meaningful discussion and action that will improve science education in Minnesota. Representatives of the Alliance for Science, the Science Museum, the Minnesota Department of Education, the business community, and many others affirmed their willingness to work towards this goal.

Benedict stated that more science, if it's bad science, isn't good for anyone. Given the proper tools and environment, science should sell itself.

Summaries of the day were given by Dwight Lindbloom, assistant commissioner of the Department of Education, and James Peterson, president of the Science Museum of Minnesota. Lindbloom stated that his department intends to renew its quest for professional development funds and will explore methods by which experienced teachers can be used more effectively to assist less experienced teachers.

And where does all this leave us? Presently it leaves us where we came in: with overburdened and generally unappreciated teachers who are trying their best to provide our future voters and workers with the basic rudiments of skills that will determine our state's and nation's intellectual and economic success, survival, or defeat. Is it possible to convince school boards and administrators — and the voters who keep them in office — that we must have policy changes that will allow well-prepared, intelligent teachers, with access to essential resources, to challenge our young people to find for themselves the beauty and discipline and satisfactions of science?

I think it is possible to make these essential changes, but not without hard work, lobbying, and continuing constructive dialogue among the interested actors. Will we meet again and again to chant the canticle of barriers to effective science education: public apathy, troubled children, classes that are too large, unprofessional treatment of teachers, poor textbooks, inadequate funding and resources, inadequate teacher education and selection, too little preparation time, and the failure to employ more effective teaching techniques such as those involving problem solving?

There have been constructive changes, and there are indeed very bright spots in what may otherwise be a pretty dismal landscape. There are wonderful, enlightened teachers who daily pass on the precious flame of knowledge to excited students. There are administrators and school board people and business people who have worked long and hard to effect local and state changes in some of the items we have discussed. But not enough: we can do better, and we will. Let us come together as caring citizens, parents or professionals and plan how to reach into the complex machinery of our state and local systems and make sure that our children will have access to the keys of future success.