Evaluation of the American Association for the Advancement of Science's Project 2061

Executive Summary

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EVALUATION OF PROJECT 2061: EXECUTIVE SUMMARY

This is a report of a year-long evaluation of Project 2061 conducted from Fall 1995 to Fall 1996 by SRI International. The evaluation focuses on the impacts of key Project 2061 documents on science education, as well as the impacts of Project 2061-sponsored workshops targeting teachers, teacher leaders, and teacher educators.

The Impacts of Project 2061 Documents at the National Level

Project 2061 has been successful at the national level in many ways. Notably, Project 2061 played a major role in the development of the *National Science Education Standards* (*NSES*). The influence of *Science for All Americans* (*SFAA*) and *Benchmarks for Science Literacy* on the *NSES* is one of the Project's most significant contributions.

Several federal agency programs begun in the early 1990s and predicated on theories of standards-based reform explicitly encouraged applicants at the state and local levels to align themselves with *Science for All Americans* and/or *Benchmarks for Science Literacy*, thereby increasing the "market" for Project 2061's ideas. Other national organizations independently have integrated the use of Project 2061 documents into their programs, including the Association for Supervision and Curriculum Development and the National Science Teachers Association.

Virtually all the nation's leading science educators believe that Project 2061 has been a positive force for improving science education. Nonetheless, some question one or another tenet, such as the salience of any national reform documents for teachers' daily concerns and classroom practice or the feasibility of having all students achieve the standards described in *Benchmarks*.

One audience with heavy national influence, textbook publishers, has yet to subscribe fully to Project 2061's vision of science literacy. Despite a recognition that Project 2061 and other national reform documents are calling for reduced content and different approaches to teaching than in the past, publishers have made only incremental changes, layered on top of existing textbook formats and content.

Taken as a whole, the evidence of Project 2061's broad influence demonstrates its positive contribution to the national climate for science education reform. The core concepts of Project 2061's vision for science literacy were derived from concepts in different stages of development and originating among different groups. Project 2061 wove these concepts together into one coherent, comprehensive, compelling vision of

science literacy and disseminated the unified vision to a greater number of communities and audiences than ever before. Importantly, the documents it has published show what the scientific community believes students should know about science.

The Impacts of Project 2061 Documents in the States

The Perceptions of State Science Education Leaders

Forty telephone interviews were conducted with state science supervisors, leaders of NSTA-affiliated state professional associations, and curriculum framework writers from 27 different states. A remarkably high percentage (90%) of the state leaders who were interviewed indicated they currently use or refer to *Benchmarks* in their day-to-day work, and nearly two-thirds (64%) indicated that they use *Science for All Americans.*

Over 80% of the state leaders said Project 2061 had played a major role in defining scientific literacy in their respective states. Many also believe that Project 2061 influenced the science education reform strategy in their states. The most influential aspects of Project 2061's strategy were judged to be that the "benchmarks" were for all students, that there should be grade-specific goals predicated on research, that defining specific outcome goals is an important first reform step, that science is best learned through performing science, and that Project 2061 tools can aid local curriculum development.

Impacts of Project 2061 on State Curriculum Frameworks

Within the theory of systemic reform, curriculum frameworks are expected to guide state policies as well as teacher practice. Curriculum frameworks therefore represent a reasonable leverage point for Project 2061. A reading of 43 state curriculum framework (or other standards-type) documents showed that, overall, such documents do exhibit evidence of influence from Project 2061, as apparent in bibliographic references to *SFAA* and *Benchmarks*, quotations establishing science literacy visions, and organizational schemas similar to that of Project 2061.

In addition, an expert group of 20 distinguished science and mathematics educators was convened to review 12 recently completed science and mathematics curriculum frameworks (of which 6 were in science) produced under a federal math and science frameworks development program. The reviewers found that the frameworks reflect national standards documents, including *Benchmarks for Science Literacy.* However, framework documents rarely treat equally the full range of concepts found in *Benchmarks*, and the reviewers found that some documents simplified the concepts found in *Benchmarks*, while others diluted them.

Evidence from case studies conducted in six states (Colorado, Georgia, New Jersey, New York, South Carolina, and Wyoming) consistently supported the finding that the greatest influence of Project 2061 in the states has been on the development of state and district curriculum frameworks. Among the six case study states, four made direct use of Project 2061 documents in putting together their state-level frameworks or standards.

Impacts on Other State Policies and Practices

There are many other state policies that could be influenced by Project 2061. However, politics, including controversies about curriculum frameworks and such hot-button topics as human evolution, is a common barrier to Project 2061's having a stronger influence in states. For example, attempts to change the way that states assess students' learning is a long, difficult, expensive, and often politically charged process. When assessments are not aligned with reform efforts, as in Georgia and New York, teachers may feel that they must spend a lot of time preparing students for "basic skills" tests.

Professional development can help teachers to put standards and frameworks to use in their classrooms. Five of the six case study states have made use of Project 2061 documents in large-scale professional development activities, such as those that are linked to systemic change projects (called Statewide Systemic Initiatives) sponsored by the National Science Foundation.

Perceptions of Project 2061 and the *National Science Education Standards*

When asked whether they "see any important differences between the *NSES* and *Benchmarks* in terms of their respective visions for science education reform and definitions of science literacy," almost all interviewees, including 81% of the state leaders surveyed, responded that there are no differences or only minor ones. They believe that the content standards overlap greatly and, where they do not, that they enhance each other in important ways. However, there is some concern that competition between the national documents will weaken the coalition for a single set of science education goals and standards, and there is also concern about fragmentation of the science disciplines.

Many of the people interviewed for this evaluation believe that teachers will use other documents, such as state and district curriculum frameworks, much more often than any of the national documents. State teacher association leaders and the teachers themselves are most concerned about the usability of national reform documents by rank-and-file teachers. Nonetheless, about half of the interviewees believe that the

development of national science education standards will have greater impact on science education than the mathematics standards have had in that discipline.

Project 2061 Workshops

Project 2061 developed, tried out, and revised a variety of workshops with the dual purpose of informing key audiences and learning from them. Three separate groups were identified as especially important participants in workshop activities since September 1994: teachers, teacher leaders (members of the Project 2061 Leaders Network), and preservice teacher educators. Mail surveys from more than 180 participants in Project 2061 workshops were analyzed.

Results of the Teacher and Teacher Leader Surveys

An examination of the teachers' and the leaders' backgrounds demonstrates that they are above-average teachers. The teacher respondents indicated two main reasons for attending a workshop: they were involved in curriculum development or were particularly interested in learning about Project 2061. The leaders had more varied reasons for attending, of which the most common was that they had been invited by Project 2061.

The great majority of the leaders (74%) found the workshop of significant or major benefit to their work, whereas only about a third (36%) of the teachers held the same opinion. One probable explanation of this difference is that teachers did not perceive a very strong linkage of the workshop ideas to classroom practice. Still, when asked only about increasing their familiarity with Project 2061, the vast majority of both teachers and leaders agreed that what they learned was beneficial.

The workshops clearly conveyed many main ideas of Project 2061 to both teachers and leaders, but more successfully with the leaders than with other teachers. However, relatively few teachers strongly agreed with some central reform ideas, such as "less is more" or that science education reform should be driven by learning goals.

In some areas, teachers who attended the workshops did report a modest amount of change in teaching practices. For example, an additional 8% of the teachers reported that they used student discussion and inquiry in almost every class after the workshops. However, much larger percentages of the leaders reported that they changed classroom practices after the workshops.

A high percentage of the leaders reported that they have engaged in training others, and two-thirds of the leaders planned to conduct additional training sessions in the future.

Nonetheless, the number of training sessions per leader per year is relatively low, and the leaders believe they are an untapped resource for their districts and for Project 2061.

Results of the Teacher Educator Survey

The great majority of participants work at institutions of higher education, where approximately equal numbers are on the education faculty and in science departments. There were three main reasons for attending the workshop: they were invited to attend; they worked on an education reform project; and they wanted to improve preservice teacher education.

Nearly half of the teacher educators found the workshops to be of significant or major benefit to their work. Increasing their familiarity with the ideas of Project 2061 was considered an important benefit, as was the opportunity to discuss science education reform with colleagues from many backgrounds. The participants largely agreed with the core ideas of Project 2061. Most of these respondents make use of *Science for All Americans* (92%) and *Benchmarks for Science Literacy* (90%). The *National Science Education Standards* (89%) and a variety of other documents are also heavily used.

Reflections and Recommendations

During its first 10 years, Project 2061 has been highly productive. Thus, leaders of the Project are faced with the question of what initiatives in the future would continue to make a significant contribution to science education reform. Some of the evaluation findings may prove useful to inform those choices.

Among the key national groups identified for the evaluation, those that developed the *National Science Education Standards* and others developing state curriculum frameworks have used the documents most extensively. Science curriculum materials developers have made far less constructive use of the documents, to date. At the local level, there is some direct use of Project 2061 documents (for example, several districts in Georgia use *Benchmarks* to assist in selecting textbooks). However, the evaluation data show that serious constraints govern the process of systemic reform in the states.

These findings suggest that, having made a major impact on science standards and frameworks, Project 2061 now may constructively focus on other components of the education system where progress is needed. Systems for assessing students' learning and for developing (and adopting) science instructional materials are examples.

Future Project 2061 initiatives might also be designed in light of the skepticism of teachers and certain leadership groups, notably leaders of state science teacher professional organizations. It appears that the closer the groups are to the classroom, the less likely they are to know how to use the Project 2061 documents well.

Assessing Future Initiatives for Project 2061

On the basis of the evaluation findings, seven criteria are proposed by which to judge whether initiatives would be suitable to be conducted by Project 2061:

- Address problem areas where the opportunities are great.
- Make use of the scientific and educational expertise of AAAS.
- Be well matched to the amount of resources (budget and staff) available.
- Make use of, and leverage, existing networks working in science education reform.
- Be designed to survive political realities at the state and federal levels.
- Be consistent, and be *perceived* as consistent, with the *National Science Education Standards*.
- Build on the successes of *Science for All Americans* and *Benchmarks for Science Literacy*.

Combining these criteria with reflections on the evaluation findings leads to three main options recommended for consideration as future Project 2061 initiatives:

1. Carry out further work on key components of standards-based reform. Particularly productive opportunities may exist for Project 2061 to focus on textbooks and other instructional materials, or on assessments of student learning. A variety of tools might be produced, such as a means of analyzing assessments (similar to the curriculum analysis tool under development).

2. Use other leverage points in the K-12 education system. Project 2061 might profitably work with selected professional networks, even assigning a half-time staff member to act as a liaison with such groups. School districts, particularly urban districts, may also be a key entry point for the Project. Also, alliances with projects creating new technology tools for teachers and students may prove useful, as the impact of technology on education continues to grow.

3. Focus on the undergraduate level. Undergraduate education has a significant influence on elementary and secondary schools. Project 2061 might address issues of science literacy at the undergraduate level—e.g., by extending *Benchmarks* to that level.

Additional Information

The full report of the evaluation is published in two volumes. Volume I is the technical report; the appendices are published separately, in Volume II. Copies of the report are available from:

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SRI International has also conducted a number of related evaluations focusing on reform in mathematics and science education, including an evaluation of the National Science Foundation's Statewide Systemic Initiatives (SSI) Program, and two evaluations of the U.S. Department of Education's Eisenhower Mathematics and Science Education Program. A list of reports and papers resulting from SRI's evaluations of education programs is available from:

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