American Association for the Advancement of Science

Project 2061

2061 today

Next Steps

Project 2061 to Focus on Building Public Support and Improving Texts

Although the standards-based reform movement has made considerable progress in determining what is needed to improve science, mathematics, and technology education, a recent survey by the opinion research organization Public Agenda reports that nearly half of all parents are not aware of standards-based reform initiatives, even in their own districts. Implementing the necessary reforms to promote science literacy will require significant changes in curriculum, textbooks, testing, and classroom instruction. But without widespread public support, there is little chance that these education reforms will succeed.

With a new grant from the National Science Foundation, Project 2061 is creating and testing an outreach campaign designed to build public support for science literacy. The campaign will target parents primarily, but will also reach educators and students, government policymakers, business and community leaders, and the media. Building on the groundbreaking work that Project 2061 began with its textbook evaluations, the $5.9 million grant will also support a concurrent effort to develop new tools for teachers, curriculum developers, and textbook authors and publishers.

Educating the Public

The four-year public outreach campaign will focus on convincing the public of the importance of science literacy and enlisting their help in taking the essential, and difficult, steps to achieve it. Particular attention will be paid to addressing the needs of African American and Latino students and parents. The campaign seeks to accomplish three goals:

- To increase public awareness of the need for literacy in science, mathematics, and technology;
- To inspire a stronger public commitment to reforms that will help students achieve literacy; and

- To provide resources that will help specific members of the public to take a more active role in supporting those reforms.

The campaign began with market research to determine what the public knows about science literacy and reform. Targeted messages will be deployed to reach the public through a

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Science Literacy for a Changing Future

Mathematics

Natural Sciences

Social Sciences

Technology

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Parents Talk about Science Education

As part of the market research for its public outreach campaign, Project 2061 conducted focus group sessions this past fall in Philadelphia to gauge parents' understanding of, and feelings about, science education. The focus groups, conducted both in English and in Spanish, included mothers and fathers from all parts of the city who had children in grades 4–10. Here, in their own words, are some of their thoughts.

On their favorite and least-favorite subjects:

"Math was easy. It has a beginning and a solution, and then you get it right." FATHER, SPANISH-SPEAKING GROUP

"I hated math. I hated science." MOTHER, ENGLISH-SPEAKING GROUP

"I had one year I was very interested in (science), and it was all about how that teacher was teaching. She would put some 'oomph' into her lessons."

MOTHER, SPANISH-SPEAKING GROUP

On the value of science:

"We use science every day, but we just don't know that it's science. If you have a load in your truck, you can't go too fast. Inertia. But you don't think about it." FATHER, SPANISH-SPEAKING GROUP

"I wasn't interested in science because I couldn't see a use in it. I was never going to be in the chemical field, so I don't need to know what a compound is."

FATHER, ENGLISH-SPEAKING GROUP

"You don't need science for contracts. You need math. Day to day, math you use, and science you don't. Ever." FATHER, SPANISH-SPEAKING GROUP

Next Steps *continued from page 1*

variety of media, from print, radio, and television public service announcements to "advocacy kits" that will include videos and training booklets. These messages will be designed to raise questions in the minds of parents and other community members, such as:

Just what does being literate in science, mathematics, and technology really mean? Why is it important?

Are children in our community now getting the kind of education in science, mathematics, and technology that they will need to be science literate?

What should the science, mathematics, and technology education programs in our schools look like?

How can I help in making these programs better?

The campaign will build on existing networks of educators, parents, and business and community leaders. Project 2061 will partner with organizations such as PTAs, Girls and Boys Clubs, science museums, the National Science Teachers Association, and the National Alliance of Business and its nationwide network of corporate executives who are working with local school districts.

A cornerstone of the campaign will be a custom web site, which will provide the public with access to an array of science-literacy resources. For example, the site will provide user-friendly summaries of and commentary on national and selected state standards and benchmarks; information on how to find out about the quality of textbooks and tests; guidelines for judging the quality of a school's science program; updates on the latest research on

On children and science:

"My daughter likes science. The teacher's great. He just makes it enjoyable." MOTHER, ENGLISH-SPEAKING GROUP

"My son's weakest subjects were my weakest subjects, and I wish I learned it better, because now I'm struggling helping him with his fifth-grade homework."

FATHER, ENGLISH-SPEAKING GROUP

On science education today:

"It's a lot of memorization, I think. A lot of formulas and stuff." MOTHER, ENGLISH-SPEAKING GROUP

"Today they have a lot more interactive audio-visual stuff to teach them the basic theories. And I think that helps them to understand things better." FATHER, SPANISH-SPEAKING GROUP

"It's not as boring as it used to be. It's not just about memorizing the molecules." MOTHER, SPANISH-SPEAKING GROUP

"I think the kids like it because it's hands-on. When we did it, everything was in the book. Now, it's hands-on, going out there and doing things." MOTHER, ENGLISH-SPEAKING GROUP

"It's a holistic approach. They put these kids in the world. It's different than when I was in school." FATHER, ENGLISH-SPEAKING GROUP

"When we were little, we all did the same projects. Today, it's your own idea, and you work on it, and they take off with it."

MOTHER, ENGLISH-SPEAKING GROUP

learning; summaries of newspaper and magazine articles focused on science literacy and goals-based learning; and links to other web sites with compatible, high-quality science, mathematics, and technology learning resources for K–12 students and their families. The interactive site will also put users in touch with educational leaders in their own states as well as other interested parents and community members around the country.

To build a more cohesive network of advocates, over the four-year campaign Project 2061 will host town meetings to discuss community issues that are relevant to science education reform. Project 2061 will also develop a set of workshop presentations especially for parents, school board members, and other influential community members to be offered through the Project 2061 web site and through partner organizations. The workshops will introduce community leaders to: the need for science, mathematics, and technology literacy; the qualities that make science and mathematics programs successful in helping students achieve literacy; what good science and mathematics textbooks and instruction look like; and how to work effectively with the schools to support literacy.

Over the next few months, Project 2061 will be seeking additional campaign funding from private and corporate foundations and in-kind support from partner organizations.

Supporting the Next Generation of Curriculum Materials

The results from Project 2061's curriculum materials evaluations have been reported

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On building a science curriculum:

"First of all, I would get rid of all the textbooks." MOTHER, ENGLISH-SPEAKING GROUP

"Science is more interesting when it's like an emergency thing. Like figuring out how to not mix water and oil." FATHER, SPANISH-SPEAKING GROUP

"School should not just always be job-related. It should be to help a person grow." FATHER, ENGLISH-SPEAKING GROUP

"Do projects that kids would be interested in doing rather than dreading it." FATHER, ENGLISH-SPEAKING GROUP

"With science, there's some flexibility. You have to memorize it, but you also have to figure things out." FATHER, SPANISH-SPEAKING GROUP

"Teach them how a computer works from the inside out, or a TV, or a rocket, or a video."

FATHER, ENGLISH-SPEAKING GROUP

"Make it like a salsa. Put some spice in it."

MOTHER, SPANISH-SPEAKING GROUP

Next Steps *continued from page 3*

widely in the media, contributing to a growing consensus that teachers and students need better materials—and soon. The results have already begun to influence the development, selection, and use of textbooks and other instructional materials. Project 2061 will now build on its evaluation work by creating tools that can be used to create the next generation of science and mathematics textbooks. These tools will include a set of interrelated on-line databases of instructional components—summaries of the latest cognitive research, good and bad examples of representations, descriptions of phenomena that support learning goals, and questions/tasks for teaching specific ideas—that developers can use to create K–12 goals-based textbooks and other materials.

To strengthen the conceptual framework for materials design, Project 2061 will build on the conceptual strand maps that it published last year in *Atlas of Science Literacy*, creating new maps on such important topics as weather and climate, basic functions of living things, energy conservation, and electricity and magnetism. Illustrating how students' understanding and skills build from grade to grade, the maps will offer developers an innovative tool that enables them to see the "big picture" of student learning in K–12.

Extension of Project 2061's scope of work to earlier grades and to additional topics is sorely needed to support current curriculum reform. The Project's experience with evaluating curriculum materials has been focused thus far on middle-grades science and mathematics and high-school biology and algebra. The Project has not yet tested the applicability of the evaluation criteria for these same topics in earlier grades or for other important, but less traditional topics, such as scientific inquiry, mathematical modeling, technological design, manipulation and observation, or critical-response skills. Project 2061 will use this grant to customize its curriculum materials evaluation criteria for these new applications.

For more information on Project 2061's tools, training, and research endeavors, visit www.project2061.org.

After Apartheid

Science and Mathematics Education in South Africa

The need for reform in science, mathematics, and technology education in post-apartheid South Africa is acute. A history of racial, political, and economic segregation and discrimination has left a void in the education of many black South African children. For years, many were denied the first-class education their white peers received. South Africa is now aiming to level the playing field for *all* students. To this end, the South Africa Department of Arts, Culture, Science, and Technology (DACST) is working in cooperation with numerous organizations in South Africa and abroad to improve teacher preparation and professional development, particularly in the areas of science, mathematics, and technology. As a part of this effort, DACST has begun a long-term collaboration with Project 2061. The purpose of this collaboration is to create a leadership cadre of science and mathematics educators from the provinces of Eastern Cape, Mpumalanga, Northern, and Northern Cape. Students in these provinces are among the lowest-scoring on national matriculation examinations.

The Effects of Apartheid

South African history reveals numerous causes for the low performance of many black students. During apartheid, eleven education systems operated in South Africa, each defined by language as well as race. Standards were set by the central government in Pretoria, and the curriculum was, in theory, the same for all students. In reality, there were mechanisms in place that perpetuated the inferior education of black students. The language of instruction was Afrikaans, while in most black townships children spoke one of the many native South African languages. Matriculation exams, which were required for all students, became discriminatory, as private schools and other elite groups developed their own rigorous exams, while black students were simply prepared for a much less rigorous general matriculation exam.

During the early 1970s the government permitted the formation of independent homelands, communities empowered to determine their own language and course of education. Most rural communities, however, did not become part of the homelands and instead maintained their township status. In the homelands, expatriates were recruited from abroad, particularly the United Kingdom, to teach language, science, and mathematics and to empower the local black community. Black children in the homelands were far more privileged than those in the townships: Their schools had well paid and highly qualified teachers and the resources and equipment to support a strong education. Most completed high school and many went on to study at segregated universities, while children in township schools dropped out at an early age.

Since the overthrow of apartheid in 1994, black South Africans have struggled to improve educational opportunities for their children. Many communities, though, are still segregated along economic and, therefore, racial lines, and schools lack resources. Teachers are not always qualified in the subjects they teach, particularly science and mathematics; textbooks are scarce, classes are crowded, and schools are not adequately equipped. While

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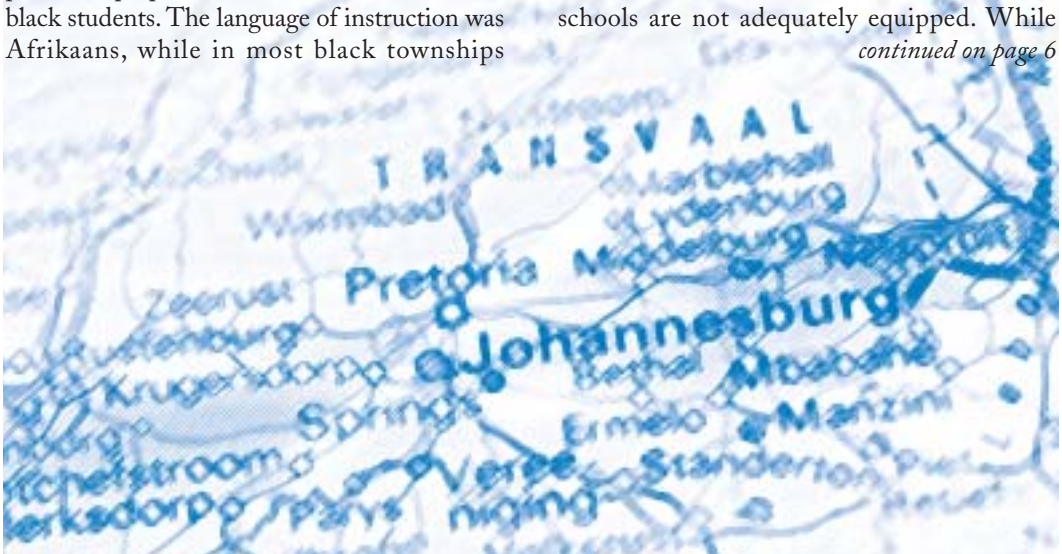


Photos: Kathleen Morris

About AAAS and Project 2061

Publisher of the peer-reviewed journal ***Science***, the American Association for the Advancement of Science (AAAS) is the largest general scientific organization in the world. Its education initiative, Project 2061, has been at the forefront of the K–12 reform movement

- Defining science literacy and promoting it as a goal for all Americans;
- Developing K–12 benchmarks for student learning in science, mathematics, and technology;
- Producing a wide range of innovative tools for educators—books, CD-ROMS, and on-line resources—to guide their reform efforts; and
- Creating unique professional development experiences to help educators improve teaching and learning.

AAAS gratefully acknowledges the following Project 2061 supporters: Carnegie Corporation of New York, Hewlett-Packard Company, John D. and Catherine T. MacArthur Foundation, David and Lucile Packard Foundation, The Pew Charitable Trusts, Siemens Foundation, and the National Science Foundation.

For more information contact: AAAS/Project 2061, 1200 New York Avenue, NW, Washington, D.C. 20005; Phone: 202-326-6666; Fax: 202-842-5196; E-mail: project2061@aaas.org; Web site: www.project2061.org. To order Project 2061 products call 1-888-PDP-2061 or visit www.project2061.org/tools.

After Apartheid *continued from page 5*

English is the official language of instruction in schools, in many cases de facto segregation persists because white children are taught in Afrikaans and black children are taught in English. Further, the integration of educators in schools has not been successful. Most black teachers work in predominantly black schools. Black teachers who work in predominantly white schools are limited to teaching native South African language classes.

Improving Learning for All Students

In July 2001, Michele Lee and Kathleen Morris of Project 2061 traveled to Pretoria to present a five-day leadership institute to about 70 grades 3–12 science and mathematics educators from the four provinces. The objective of the institute was to introduce participants to Project 2061's principles, strategies, and tools as a means of improving science and mathematics education. The institute focused on several key areas, including student learning, instruction, curriculum materials, and assessment.

During the five days, participants explored the challenges associated with implementing a coherent set of standards while maintaining a focus on teaching for understanding. Participants studied South African and U.S. national standards and research to deepen their understanding of the powerful and important scientific and mathematical ideas they are to teach and to broaden their understanding of standards as a network of related ideas. They took part in lessons that have been designed to address specific ideas and learned and practiced the use of research-based instructional strategies that support student engagement with scientific and mathematical ideas.

Each leadership group, guided by a coordinator/liaison, created its own action plan to build a local learning community where teachers can come together to study, share ideas, reflect on common experiences, and contribute to appropriate and necessary changes in their classrooms. They also outlined ways to bring colleagues from their schools into the learning community.

The new leaders were assigned to focus on a key strategy explored during the institute. Project 2061 staff reviewed the products, offered feedback to teachers, and designed subsequent assignments based on individual needs. Project 2061 will return to South Africa in July 2002 for a follow-up institute.

The response from institute participants was overwhelmingly positive. Project 2061 is eager to see the results of the teachers' efforts and to continue working with them as they work to strengthen science and mathematics teaching and learning in their communities.

Project 2061 gratefully acknowledges the contribution of Kebogile Dilotsotlhe, Director: Science and Society, South Africa Department of Arts, Culture, Science, and Technology, for her assistance in writing this article.

Visit Project 2061's exhibit booth at the following conferences in 2002:

American Association for the Advancement of Science
February 14–19, 2002, Boston, MA
www.aaas.org

National Association of Secondary School Principals
March 1–4, 2002, Atlanta, GA
www.nassp.org

Association for Supervision and Curriculum Development
March 9–11, 2002, San Antonio, TX
www.ascd.org

National Science Teachers Association National Convention
March 27–30, 2002, San Diego, CA
www.nsta.org

National School Boards Association
April 6–9, 2002, New Orleans, LA
www.nsba.org

National Council of Teachers of Mathematics Annual Meeting
April 21–24, 2002, Las Vegas, NV
www.nctm.org

National PTA
June 22–25, 2002, San Antonio, TX
www.pta.org

Director's Notes

Reflections on Five Years, Past and Future

I've surely had more luck than I deserve. A kid from Willmar, Minnesota, named Pinky has no natural claim to a Ph.D., or a seat on the Space Shuttle, or the privilege of directing Project 2061. The last five years at AAAS have surpassed all of my expectations for intellectual stimulation, collegial collaboration, and fun. I wish I could say that the riddle of how to achieve universal literacy in science, mathematics, and technology is now solved. What I can say is that the world has made some progress and that AAAS has contributed. As I leave to tilt at the windmill of reforming higher education (my colleague Jo Ellen Roseman calls it Project 3061!), I want to pause briefly and reflect on what we've accomplished and where the Project is going.

Looking Back

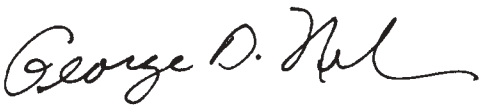
Inside the front cover of *Benchmarks* is a wonderful diagram of Project 2061's original plan for its reform products. The vision of its founder, Jim Rutherford, and the design of its chief architect, Chick Ahlgren, still underlie the Project's work. We now have first versions of *Science for All Americans*, *Benchmarks for Science Literacy*, *Blueprints for Reform*, *Designs for Science Literacy*, and *Resources for Science Literacy: Professional Development*. The first set of strand maps, Chick's brain child and not part of the original plan, has been published in the extremely popular *Atlas of Science Literacy*. Careful examinations of curriculum materials, a review of early childhood science and mathematics education, and an agenda for research in technology education have all been published. We are providing long-term professional development to a growing number of educators who are using our tools to explore learning goals, to choose and use better curriculum materials, and to understand the elements of effective instruction and assessment.

The Project's impact has spread to other countries as well. Panama, Guatemala, Thailand, China, and South Africa are currently collaborating with us as they begin the long process of improving science and mathematics education for their students.

Looking Ahead

In the coming years, we will publish new *Resources* volumes focusing on curriculum materials and assessment. A completed *Atlas* will contain strand maps that include all of the benchmarks and an updated summary of the learning research that applies. New analysis of elementary science and mathematics materials will be performed and published. Our work on alignment—how curriculum materials and assessment items target the detailed learning goals that make up topical understanding—is poised to impact profoundly the way everyone thinks about teaching and testing. Our longitudinal study of the role of professional development in helping teachers implement promising mathematics materials could lead to new insights into how to achieve significant improvement in student learning on large scales. And our new public outreach program will help give parents and communities an authentic role in sustaining effective reforms.

I am proud of all that Project 2061 and its terrific staff have accomplished during the last five years. It has been an honor to serve as director. Thank you, Jim Rutherford, for giving me the opportunity; thank you, Chick Ahlgren and Jo Ellen Roseman, for leading and holding us all to such high standards; thanks to the talented staff; thanks to all of our collaborators; and thanks to AAAS for initiating and supporting Project 2061. The work has just begun.



George D. Nelson

George D. Nelson is the new Science, Mathematics & Technology Education (SMATE) director at Western Washington University.

The last five years at AAAS have surpassed all of my expectations for intellectual stimulation, collegial collaboration, and fun.

FYI

New CEO at AAAS

Dr. Alan I. Leshner, former director of the National Institute on Drug Abuse at the National Institutes of Health, has been appointed the new CEO of the American Association for the Advancement of Science. A psychologist and neuroscientist, he has played a highly visible role in providing the public with a scientific explanation of the disease of addiction, while promoting the benefits of science-based treatment. He replaces Dr. Richard S. Nicholson, who held the CEO position since 1989 and retired in December 2001.

Roseman New Acting Director

Dr. Jo Ellen Roseman has been named acting director of Project 2061. A member of the staff since 1989, she participated in the development of *Benchmarks for Science Literacy* and directed the creation of *Resources for Science Literacy: Professional Development*. She oversaw Project 2061's evaluation of middle- and high-school science textbooks and the development of the analysis procedure. She is currently working to complete the Project's newest reform tool, *Resources for Science Literacy: Curriculum Materials*.

Introducing. . .

Dr. George E. DeBoer joins the staff as deputy director. He has a Ph.D. in science education from Northwestern University and holds an appointment as Professor of Educational Studies at Colgate University. He most recently served as program director in the Division of Elementary, Secondary, and Informal Education at the National Science Foundation. **Katrina Haynie** is the new administrative support specialist for Project 2061 Professional Development Programs. She previously worked for Ernst & Young LLP. **Serita Henderson**, a former employee of Marriott International, Inc., is Project 2061's new secretary. **Patricia Lee** joins the communications department as a writer. Previously she worked as press secretary for the Honorable Ileana Ros-Lehtinen, U.S. Representative from Florida, and editorial coordinator for The Institute of Electrical and Electronics Engineers. Administrative support specialist **Kahlizsa Lewis** comes to the Project from health care alliance VHA Central Atlantic.

Improving Teacher Practice and Student Learning in Math

With a new $5.8 million grant from the National Science Foundation's Interagency Education Research Initiative, Project 2061 will study how to provide, on a large scale, the professional development and continuing support teachers need to improve student learning of key ideas and skills in middle-grades mathematics. Over five years of a longitudinal study, Project 2061, in partnership with the University of Delaware and Texas A&M University, will examine how the use of specific research-based instructional strategies in the classroom—supported by professional development and highly-rated textbooks—relate to lasting improvements in student learning. An experimental study in years four and five will test the feasibility of delivering professional development and ongoing support cost-effectively on a large scale.

Siemens Foundation Gift

The Siemens Foundation has given $25,000 to Project 2061 Professional Development Programs. The gift will be used to help pay for special workshops for kindergarten teachers in Maryland and to provide scholarships to teachers in Tennessee and Ohio to attend workshops on *Atlas of Science Literacy*.

2061 *today*

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