

News from Triangle Coalition

AAAS's Project 2061 Answers Need for High-Quality K-12 Assessment

Through its *Benchmarks for Science Literacy* and other resources, Project 2061 of the American Association for the Advancement of Science (AAAS) has influenced the way states across the country develop and use K-12 science content standards. Now Project 2061, AAAS's education reform initiative, is working to ensure that assessment is meaningfully tied to those standards. With funding from the National Science Foundation's Instructional Materials Development (IMD) Assessment Program, Project 2061 has begun a five-year, \$4.1 million project to develop a collection of high-quality middle- and early high-school science and mathematics assessment items-including multiple choice and open-response questions. The resulting bank of some 400 items will be electronically linked to state and national science content standards and accessible online.

The new effort builds on Project 2061's ongoing studies of assessment, which have found that too many science and math items are poorly written and fail to measure the knowledge for which students are being held responsible. While many existing items cover a general topic such as cells or fractions, few are aligned to the precise concepts targeted by content standards. In contrast, the items to be included in Project 2061's new collection will be specially designed to provide explicit evidence that a student has-or has not-learned a specific idea or skill. This precision and the diagnostic assessment it makes possible have new urgency given the standards-based testing requirements of the No Child Left Behind Act. To make its assessment resources widely available to teachers, curriculum and test developers, researchers, and the general public, Project 2061 will provide online access to items through an interface adapted from the conceptual strand maps in its popular *Atlas of Science Literacy*. Interactive maps will allow users to search by state standard, national standard, topic, or type of assessment item.

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Science Committee Members Introduce Bills to Improve Education and Research for Competitiveness

House Science Committee Members have introduced three bills that will strengthen U.S. economic competitiveness by improving math and science education and research. The bills would strengthen and expand existing K-12 and undergraduate education programs at the National Science Foundation (NSF) and the Department of Energy (DOE) and would strengthen and expand programs at those two agencies that fund innovative research by new faculty. The three bills are: The Science and Mathematics Education for Competitiveness Act, sponsored by Rep. John H. "Joe" Schwarz (R-MI); the Early Career Research Act, sponsored by Rep. Michael T. McCaul (R-TX); and the Research for Competitiveness Act, also sponsored by Rep. McCaul. The bills are cosponsored by Science Committee Chairman Sherwood Boehlert (R-NY), Space and Aeronautics Subcommittee Chairman Ken Calvert (R-CA), Environment, Technology and Standards Subcommittee Chairman Vernon Ehlers (R-MI), Energy Subcommittee Chairman

Judy Biggert (R-IL), Research Subcommittee Chairman Bob Inglis (R-SC) and Rep. Lamar Smith (R-TX).

- The Science and Mathematics Education for Competitiveness Act reflects testimony the Committee received at a recent series of hearings on education. The Act particularly emphasizes the importance of bolstering undergraduate math and science education programs, which witnesses at a March 13 Research Subcommittee hearing cited as a key to increasing the American technological workforce, improving overall science literacy, and especially strengthening K-12 math and science education by improving teacher training in those fields.
- The Early Career Research Act would ensure that NSF's program to help fund young faculty increases as the NSF budget grows by setting aside 3.5 percent of the agency's research funding for that purpose. Under the bill, NSF would provide grants of at least \$80,000 for up to five years to help researchers establish a lab and pursue risky research in emerging fields. The legislation authorizes \$25 million at DOE for each of fiscal years 2007 through 2011 for a similar program to support research by new faculty.
- The Research for Competitiveness Act would also fund early career researchers, but would encourage researchers to seek funds from industry. Under the program, NSF and DOE would offer \$50,000 grants for up to five years, and make an additional \$50,000 available provided the researcher raises one-to-one matching funds from private industry for the proposed research. A similar program was in place at NSF in the 1980s.

Chairman Boehlert said, "As a nation, we must do everything possible to remain competitive, and that starts with ensuring that we have the best scientists and engineers in the world. That won't be the case if we don't invest more and more wisely in attracting the best teachers, in teacher training, in improving undergraduate education, and in funding bright, young researchers with the most creative ideas. These bills, following the lead of the "Gathering Storm" and related reports, are designed to achieve all of those goals. Along with the spending increases called for in the President's American Competitiveness Initiative, these bills will help secure the nation's future prosperity." The bills have been endorsed by a wide range of business, education, science, and engineering groups, including the Triangle Coalition and many of its member organizations.

*(Editor's Note: The foregoing was excerpted from the **Triangle Coalition Electronic Bulletin** for 18 May 2006, reprinted with permission.)*

NIH Curriculum Supplements Now Aligned with State Standards

National Institutes of Health (NIH) Curriculum Supplements, available through the NIH Office of Science Education (OSE) website, are now aligned to state standards for science, math, English Language Arts, and (where available) health. The supplements were developed by teachers, scientists and curriculum experts, and field tested nationally by teachers. According to Dr. Bruce A. Fuchs, Director of the Office of Science Education, "the curriculum supplements use up-to-date, accurate scientific data, and case studies (not contrived). The supplements contain extensive background information for teachers and use creative, inquiry-based activities to promote active learning and stimulate student interest in medical topics; deepen students'

understanding of the importance of basic research to advances in medicine and health; offer students an opportunity to apply creative and critical thinking; foster student analysis of the direct and indirect effects of scientific discoveries on their individual lives and on public health; and encourage students to take more responsibility for their own health. Each supplement contains several activities that may be used in sequence or as individual activities designed to fit into 45 minutes of classroom time. The printed materials may be used in isolation or in conjunction with the websites, which offer scenarios, simulations, animations, and videos."

Barbara Houtz, an Albert Einstein Distinguished Educator Fellow working at NIH, has devoted a great deal of time to this task. "Between all the conferences, workshops, debates, hearings, meetings, and daily workload, I have been attempting to align each of the 16 supplements (15 are published - one is in final production) for all state standards in science, math, English, and health," she explains. The supplements are free and can be downloaded from the NIH website, or a hard copy can be sent to U.S. teachers (one copy per request). Three new supplements are planned per year. Click here for more information and to download the supplements.

Nation's Report Card: Science 2005

The results of the National Assessment of Educational Progress (NAEP) 2005 science assessment have been released. In addition to national results for grades 4, 8, and 12, fourth- and eighth-grade results are reported for 44 participating states and the Department of Defense schools. Assessment results are described in terms of students' average science score on a 0300 scale and in terms of the percentage of students attaining each of three achievement levels: Basic, Proficient, and Advanced. National scores at selected percentiles on the scale (indicating the percentage of students whose scores fell at or below a particular point) are also discussed, as are scores for three fields of science. The report also provides results for groups of students defined by various background characteristics (*e.g.*, gender, race/ethnicity, and students' eligibility for free/reduced-price school lunch). Comparisons are made to results from previous years in which the assessment was administered. In addition to the 2005 results, national results are reported from the 1996 and 2000 assessments.

The national results show an increase in the average science score since 1996 at grade 4, no significant change at grade 8, and a decline at grade 12. Results for participating states and other jurisdictions from the 2000 assessment at grade 4 and from the 1996 and 2000 assessments at grade 8 are also reported. Of the 37 states and jurisdictions that participated in both the 2000 and 2005 fourth-grade science assessments, nine showed gains in average scores and none showed declines. Of the 37 states and jurisdictions that participated in the 2000 and 2005 eighth-grade assessments, 11 showed gains and 4 showed declines. The report is available at <http://nces.ed.gov/NAEP/pdf/main2005/2006466.pdf>.

In response to the report, Education Secretary Spellings released a statement that noted that "studies show that more than half of all graduates leave high school unprepared for college-level math and science coursework. We must act quickly to protect another generation from this fate."

High School Graduates Need Similar Math, Reading Skills Whether Entering College or Workforce Training Programs

High school students who plan to enter workforce training programs after they graduate need academic skills similar to those needed by students planning to enter college, according to a new study conducted by ACT. The findings suggest that the math and reading skills needed to be ready for success in workforce training programs are comparable to those needed for success in the first year of college. Based on these results, ACT recommends that all high school students should experience a common academic program, one that prepares them for both college and workforce training, regardless of their post-graduation plans.

In the study, ACT looked at the types of occupations that offer a wage sufficient to support a family of four, as well as potential for career advancement, but that do not require a four-year college degree. These occupations – which include electricians, construction workers, upholsterers, plumbers, *etc.* – typically require some combination of vocational training and on-the-job experience or an associate's degree. The academic skill levels compared in the study were based on job profiles from ACT's WorkKeys program and the company's College Readiness Benchmarks on its ACT college admission and placement exam. The results show that the levels of math and reading skills needed for success in the first year of college are comparable to those needed by high school graduates to enter the vast majority (90 percent) of these profiled jobs. The full report, "Ready for College and Ready for Work: Same or Different?" may be downloaded at <www.act.org/path/policy/reports/workready.html>.

NMSA Calls Upon Policymakers to Support Appropriate Reform for Middle Schools

National Middle School Association (NMSA), the nation's largest organization focusing exclusively on the education of young adolescents, ages 10 through 14, has announced a national campaign to build collaboration between educators, families, and policymakers at the national, state, and local levels. The campaign is based on a new report, "Success in the Middle: A Policymaker's Guide to Achieving Quality Middle Level Education." "The United States still does not have a cohesive national policy for the middle grades, which represents one-third of a student's K-12 education," said Sue Swaim, NMSA executive director in announcing the report. "While policymakers have recently focused on important high school reform they have skipped over critical middle level reform, which is the gateway to successfully achieving high-performing schools at both the middle and high school levels." The report sets five goals for policymakers and provides specific action steps at the federal, state, and local levels. The goals are:

- Ensure that all middle level students participate in challenging, standards-based curricula and engaging instruction, and that their progress is measured by appropriate assessments, resulting in continual learning and high achievement;
- Support the recruitment and hiring of teachers and administrators who have strong content knowledge and the ability to use research-based instructional strategies and assessment practices appropriate for middle level students;
- Support organizational structures and a school culture of high expectations that enable both middle level students and educators to succeed;

- Develop ongoing family and community partnerships to provide a supportive and enriched learning environment for every middle level student; and
- Facilitate the generation, dissemination, and application of research needed to identify and implement effective practices that lead to continual student learning and high academic achievement at the middle level.

A copy of "Success in the Middle: A Policymaker's Guide to Achieving Quality Middle Level Education" is available at <www.nmsa.org>.

CCSSO Announces New Task Force on Mathematics and Science Education

Triangle Coalition member, the Council of Chief State School Officers (CCSSO), has announced a newly created Task Force on Mathematics and Science Education. This CCSSO task force has been assembled in order to examine policy and practice to improve mathematics and science education across the P-12 system, particularly at the middle and high school levels. The group of chief state school officers, deputies, practitioners, representatives of the business community, and researchers will work collectively to identify for widespread dissemination current successful models and practices in P-12 mathematics and science education. Furthermore, the task force will seek to identify principles of practice in high-quality professional development and delivery of instruction in P12 mathematics and science education.

CCSSO's Board of Directors agreed at the Legislative Conference in April 2006 to create the Task Force on Mathematics and Science Education. CCSSO President Valerie Woodruff now has announced the formal creation of this group and its co-chairs Judy Jeffrey, Iowa director of education, and Patricia Wright, Virginia acting superintendent of public instruction. Woodruff remarked, "It is vital that we have a task force that looks closely at the critical issues of math and science. I am delighted that based on nominations from our members around the country we have a strong and diverse group of practitioners and research experts to lead this important work." The task force will convene its inaugural session on June 7 in Washington, DC. More details and a list of all taskforce members may be found at www.ccsso.org.

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Commission on 21st Century Education in Science, Technology, Engineering and Mathematics Holds First Meeting

The National Science Board, the 24-member independent advisory body to the President and Congress on matters of national science and engineering policy, recently established a commission to set new directions for U.S. education from early childhood through undergraduate education (preK-16). The board also serves as the oversight and policy-setting body of the National Science Foundation. The newly formed Commission on 21st Century Education in Science, Technology, Engineering and Mathematics (STEM) held its first meeting August 3-4 at

Last year, Congress asked the National Science Board to evaluate the need to reconstitute its 1982-83 Commission on Pre-college Education in Mathematics, Science and Technology. In

response, the board held three public hearings nationwide to assess the need and interest within the STEM education community for a new commission. The response was overwhelmingly strong to create such a panel to address what many called a national crisis in STEM education. After reviewing the public hearing comments and testimony, the board established the commission on March 30, 2006, and soon thereafter announced its membership and chairs. The new commission's charter already points to an agenda that goes beyond those of many previous studies documenting detailed systemic issues in STEM education and offering recommendation-based but not action-heavy conclusions. This commission is working toward a specific plan for nationwide action that the National Science Board will report to Congress as well as public and private stakeholders in the educational system. More details on the meeting and the National Science Board are at <www.nsf.gov/nsb>.

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Major Changes Needed to Boost K-8 Science Achievement

Improving science education in kindergarten through eighth grade will require major changes in how science is taught in America's classrooms, as well as shifts in commonly held views of what young children know and how they learn, says a new report from the National Research Council. After decades of education reform efforts that have produced only modest gains in science performance, the need for change is clear. And the issue takes on even greater significance with the looming mandate of the Federal No Child Left Behind Act, which says that states must measure students' annual progress in science beginning in 2007. Being proficient in science means that students must both understand scientific ideas and demonstrate a firm grasp of scientific practices. The report, *Taking Science to School: Learning and Teaching Science in K-8*, emphasizes that doing science entails much more than reciting facts or being able to design experiments.

In addition, the next generation of science standards and curricula at the national and state levels should be centered on a few core ideas and should expand on them each year, at increasing levels of complexity, across grades K-8. Today's standards are still too broad, resulting in superficial coverage of science that fails to link concepts or develop them over successive grades, the report says. Teachers also need more opportunities to learn how to teach science as an integrated whole – and to diverse student populations. Four intertwined and equally important strands comprise the committee's definition of proficiency in science. First, students should know, use, and interpret scientific explanations of the natural world. Second, they should be able to generate and evaluate scientific evidence and explanations. Third, they should understand the nature and development of scientific knowledge. And finally, students' work should include active participation in scientific collaboration and discussion. The full report is available at <<http://newton.nap.edu/openbook/0309102057/html>>.

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