



HONORING PROGRESS



AN UPDATE ON THE NGA CENTER HONOR STATES

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This bimonthly newsletter is about the progress of the Honor States Grant Program, a \$23.6 million, governor-led effort to improve college and work ready graduation rates. Launched at the NGA 2005 High School Summit, this initiative includes 26 states and is supported by a consortium of eight foundations.

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In This Issue

In this issue we explore science, technology, engineering, and math education—or STEM—a priority for governors as they try to enhance workforce competitiveness in a global economy. We also highlight the progress that three states have made in the area and list some resources for policymakers interested in learning more.

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Facts at a Glance

- Twenty-four states require three or four years of science for students in the class of 2006 to graduate from high school.
- Twenty-seven states will require three or four years of science for students in the class of 2011 to graduate.
- Four of the 10 states that have received funding from the NGA Center for comprehensive high school policy reform through the Honor States Grant Program are directing grant funds to advance a STEM agenda.
- All 50 states have instituted a National Science Foundation—funded Math and Science Partnership for the purpose of enhancing the content knowledge and teaching skills of classroom teachers through partnerships between high-need school districts and higher education institutions.

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Giving Science and Math Priority in North Carolina, Rhode Island, and Texas

North Carolina, Rhode Island, and Texas are three Honor States taking action to improve high schools, and particularly to improve STEM (science, technology, engineering, and mathematics) achievement. The need is clear: U.S. twelfth-graders scored below the international average and among the lowest of 21 nations in both mathematics and science general knowledge on the Third International Mathematics and Science Survey (TIMSS). Poor STEM preparation becomes evident earlier, however. One-third of the nation's eighth-graders have below-basic math skills, as measured by the National Assessment of Education Progress (NAEP); half of African American and Hispanic students lack basic math skills.



The three states' STEM initiatives leverage recommendations in NGA's ***An Action Agenda for Improving America's High Schools***. Four common themes emerge across the three states:

- An independent, public-private partnership manages each statewide STEM initiative, with policy oversight and leadership from the governor's office.
- Each state is requiring more rigorous math and science training for all students to graduate from high school.
- STEM instruction occurs in redesigned charter schools, traditional public schools, and early colleges (high schools connected to colleges).
- All three governors make a direct link between improved STEM achievement and state economic opportunity.

North Carolina Governor Mike Easley has put in place an aggressive and ambitious agenda for reforming the state's high schools and preparing all students for the demands of college and work in the 21st century. In 2003, using an \$11 million grant from the Bill & Melinda Gates Foundation, Governor Easley launched the N.C. New Schools Project to create small high schools with an economic development theme and a focus on STEM fields. The New Schools Project opened 11 schools in 2005 that concentrate on fields and occupations experiencing economic growth, such as health and life science, engineering, and biotechnology. Six schools with an information technology theme are set to open in 2006-2007. A total of 75 of the new schools will open by 2008.

In September 2004, Governor Easley launched the Learn and Earn early college high schools initiative as part of the New Schools Project. Learn and Earn high schools allow students to graduate in five years, with a high school diploma and an associate's degree or two years of college credit. The Learn and Earn schools are expected to recruit first generation college attendees and students who perform poorly in the conventional high school. Students have work-based learning experiences focused on STEM fields. For example, the Learn and Earn site at North Carolina Central University, in Durham, focuses on both curriculum and work experiences in partnership with biotech companies in Research Triangle Park. There are 13 Learn and Earn high schools currently in operation across the state. Governor Easley plans to have Learn and Earn sites serving students in all 100 North Carolina counties by 2008.

North Carolina is increasing both course and assessment requirements in its high schools. Effective with the class of 2010, students must take at least three years of science (including biology, a physical science, and an earth/environmental science) and complete a senior project based on state-adopted rubrics. Students must also pass standardized, end-of-course state exams in biology and Algebra I (among other subjects), beginning with the class of 2010.

Texas is working on several STEM fronts. The state is increasing math and science course requirements for high school graduation. Effective with the class of 2008, Texas high school students must complete the recommended programs for math (three courses, including Algebra I and II and geometry) and science (three courses, including biology and chemistry or physics) unless the student, parent, and school counselor or administrator agree to a less-rigorous curriculum. The state board of education recently passed a measure to require four years of science; it will be effective with the class of 2011, provided that the state board determines by August 2007 that the legislature has appropriated funding sufficient to implement it.

Like North Carolina, Texas is designing and implementing whole-school changes in the STEM area. The Texas Science, Technology, Engineering, and Math Initiative (TSTEM), supported by Governor Rick Perry, is a central component of the Texas High School Project, a \$180 million, public-private partnership committed to increasing high school graduation and college enrollment rates in every Texas community. TSTEM is being launched with \$20 million in state funds; \$50 million in new contributions from the Bill & Melinda Gates Foundation, the Michael & Susan Dell Foundation, and the Communities Foundation of Texas; and \$10 million in federal money. The initiative will create 35 specialized math and science academies, a mix of charter schools, traditional public schools, and



schools operated in conjunction with a college or university (early college). These academies will provide a rigorous math and science curriculum to 25,000 mostly low-income and minority students, beginning in the sixth grade, and will graduate 3,500 students each year with the preparation to pursue study and careers in STEM-related fields. Five to six STEM Centers, located at universities, regional service centers, and other nonprofit organizations, will support the academies with instructional materials and professional development. The centers will be the foundation of a statewide best practices network, to share the work of the academies and the centers with all Texas middle and high schools.

Rhode Island has launched Physics First, a STEM initiative that will be piloted in five (10 percent) of the state's high schools this fall. Teachers, principals, and superintendents of the five schools agreed to reorder the traditional high school science curriculum sequence to physics in the ninth grade, microchemistry in the 10th grade, and biology in the 11th grade. They believe that this more logical sequencing of science instruction will give students a stronger foundation in science. They also believe the new curriculum will encourage greater participation and success in more rigorous coursework prior to graduation.

The Physics First model in Rhode Island is consistent with the national Physics First agenda that Leon Lederman identified in the national report "ARISE" (American Renaissance in Science Education). Funded in part by an NGA Center Honors State grant, the initiative provides intensive professional development and a mentoring structure for science department chairs and teachers. The East Bay Educational Collaborative, an independent, nonprofit organization in the state, will provide professional development for teachers, including day-long institutes every month for science department heads. The governor's proposed state budget also includes funds for physics texts and other instructional materials.

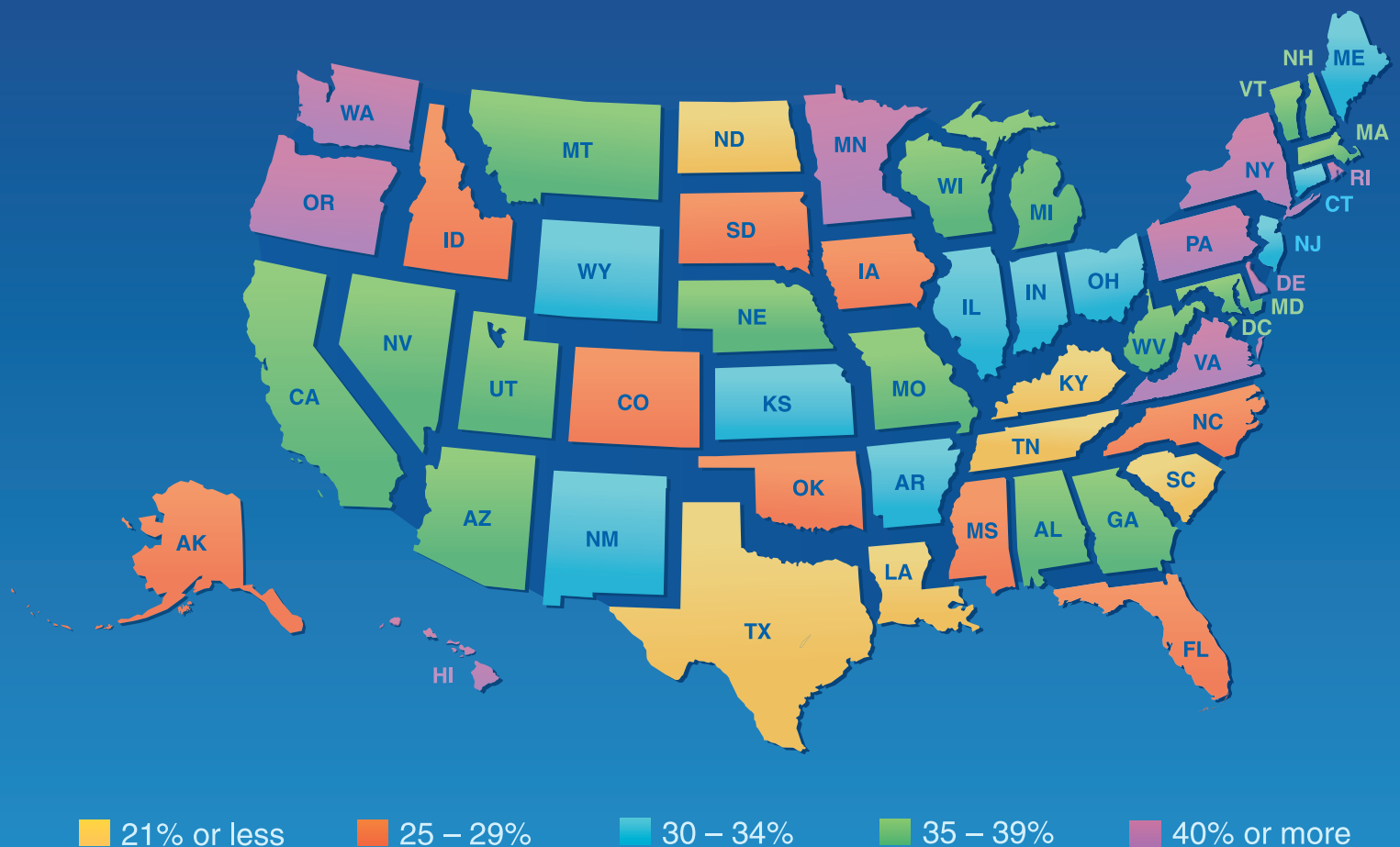
To further advance student performance, Governor Donald Carcieri has proposed a statewide math and science curriculum and an increase in the high school graduation requirement to three years of lab science. Rhode Island recognizes that its efforts to revamp its curriculum and teaching must be consistent with its broader high school reform agenda, which includes individual literacy plans for students and new, graduation-by-proficiency requirements beginning with the class of 2008. The governor's STEM initiative includes a proposed Center for Science, Technology, Engineering, and Mathematics at Rhode Island College, which will be a statewide clearinghouse for professional development. The governor also proposes to allow math and science professionals to teach a limited number of courses as adjunct faculty in the K—12 system and to create a pilot project for alternative certification for math and science teachers.

For more information, please contact Charlie Toulmin at ctoulmin@nga.org or 202-624-7879.

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A Bird's-Eye View: Preparation for Math Portion of ACT Exam Varies Significantly by State



This map shows the percentage of 2005 ACT-tested graduates in each state who took trigonometry and/or calculus. Taking upper-level math courses improves the achievement of all students, regardless of gender, family income, and racial/ethnic background, on the math portion of the ACT test. Students who take either trigonometry or another advanced mathematics course (excluding calculus) score about 2.5 points higher than those who take only Algebra I, geometry, and Algebra II. Moreover, students who take both trigonometry and calculus, in addition to Algebra I, geometry, and Algebra II, score 6.8 points higher. Higher ACT scores win students greater access to college and scholarships (“Benefits of a High School Core Curriculum,” ACT, 2006).

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Leading the Charge: Leon Lederman, Nobel Physicist and Founder of Physics First

The discovery of neutrinos led to the Nobel Prize for physicist Leon M. Lederman. But that is far from the only significant contribution he has made to science.



Responding to long-standing concern that the traditional course sequence of biology-chemistry-physics did not suit the needs of today's students, Lederman designed the "Physics First" initiative. More than a reordering of courses, Lederman's initiative shifts the focus of conceptual science to make it more accessible to the students.

Lederman believes that to make physics suitable for first-year students, the curriculum must be restructured to focus on concepts rather than on math. The subsequent chemistry and biology classes must be similarly updated to reflect the concepts students will have mastered by the time they enter the course.

The foundation of Lederman's efforts is his firm belief in the value of stories. "You have to tell students how science works. How do you make a discovery? Who are scientists? What happened to them?" Physics First will enhance students' interest in science by finally putting in place the appropriate storytelling order.

Lederman describes his own introduction to science as a love story. He was fascinated by the field, devouring newspaper articles about scientists. He read a children's book written by Einstein called *The Meaning of Relativity*, which portrayed scientists as detectives, trying to put things together.

"There is a moment when you realize you are learning something that nobody else knows. . . the world is very different from the way the four billion people or so that are on the planet know about it."

Lederman is proud to have introduced the next generation of students to a new way of thinking about science. He stands behind the Physics First curriculum but encourages states to adopt a more comprehensive long-term solution. "The reform we envision must eventually include K—8 and even the first years of college. The sense of science is to seek for underlying order in apparent chaos. . . it is to change the graduate forever: to install an intuition as to how things work, an attitude of expectation and skepticism, a habit of thought, an encouragement of curiosity and a respect for innovation and imagination."

Physics First is being implemented in several schools in Rhode Island (see feature story) as part of its Honor States grant. For more information about Leon Lederman and Physics First, [click here](#).



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Federal Update: \$790 Million Available to Students this Fall

Congress has approved a new \$790 million program in the Deficit Reduction Act (Public Law 109-171) that would provide Academic Competitiveness and National SMART (Science and Mathematics Access to Retain Talent) Grants to low-income undergraduate students who meet specific criteria.

Under the Academic Competitiveness Grants program, first-year college students in a two- or four-year degree program, who are eligible for the Pell Grant and who completed a rigorous high school program of study, would receive \$750 in addition to the original Pell Grant. Second-year students who meet the same criteria and who maintained a 3.0 grade point average in their first undergraduate year would receive \$1,300 in addition to the original Pell Grant.

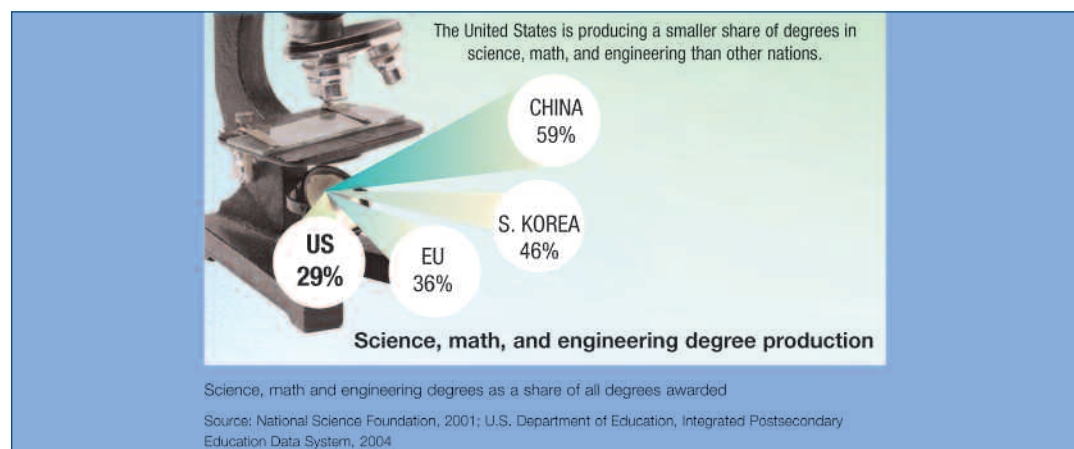
Under the new National SMART Grants program, third- and fourth-year undergraduate Pell-eligible students pursuing a major in science, computer science, mathematics, technology, engineering, or a critical foreign language, and who maintain a cumulative GPA of 3.0 would be awarded \$4,000 in addition to the Pell Grant.

On March 21, 2006, the nation's governors sent a **letter** to U.S. Secretary of Education, Margaret Spellings, expressing enthusiasm for the new programs and clarifying the authority of states to define rigorous curricula. The U.S. Department of Education released eligibility requirements for the Academic Competitiveness and National SMART Grants on April 5, 2006, on its **website** and followed up with a **letter** from Secretary Spellings. Further information will be available to students by July 1, 2006. Awards would be available for the upcoming 2006-2007 school year.

For more information, please contact Kathryn Hoffman at khoffman@nga.org or 202-624-5305.

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Graduation Pays Snapshot: United States Comparative Innovation Capacity



For this and other *Graduation Pays* indicators for each state, [click here](#).

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Resource Box

The Charles A. Dana Center, University of Texas at Austin

The Dana Center demonstrates the expertise that university mathematics and science departments can provide to improve STEM education in a state through policy assistance, research, and professional development. The Dana Center helped formulate Texas state standards for mathematics and science and now conducts research, provides research- and standards-based curriculum materials, and assists classroom teachers and higher education mathematics and science faculty involved in teacher preparation. Its professional development support includes online science and math lesson plans aligned to the state standards and assessments, ongoing assessments, and institutes for schools and districts.



Rising Above the Gathering Storm, Report on U.S. Competitiveness, Prosperity, and Security in the Global Economy

The Committee on Prospering in the Global Economy of the 21st Century, formed by the National Academies, issued a **report** outlining concrete recommendations for K—12 and higher education, research, and economic policy. Some of the recommendations for improving K—12 science and mathematics education include recruiting and training more science and mathematics teachers and increasing the number of students taking and passing Advanced Placement (AP) and International Baccalaureate (IB) science and mathematics courses.

National Association of State Science and Mathematics Coalitions (NASSMC)

NASSMC is a network and advocate for coalitions of business, education, and public policy leaders in 41 states that are working to improve STEM education in their states. With support from the U.S. Department of Education and the National Aeronautics and Space Administration (NASA), NASSMC gives states financial and technical assistance to host meetings of high-level officials to address STEM education. To date, 11 NASSMC statewide science and math summits have been held. NASSMC also provides professional development, connects coalitions to NASA resources, and assists states in implementing STEM improvement plans. NGA Center senior policy analyst Charlie Toulmin presented an overview of best STEM practices in the states and NGA's technical assistance in the STEM area to NASSMC's national meeting on March 29, 2006.

New Tech High School Model

New Tech High Schools combine teamwork and technology to create an atmosphere in which all students are achieving at high levels. The student-to-computer ratio is 1:1, and technology is an integral part of students' learning. Through the **New Tech Foundation** a network of small high schools are being created based on the New Technology High School Model. The network includes schools in Alaska, California, Colorado, Illinois, Louisiana, and Oregon, with more schools opening in New York, North Carolina, and Texas over the next two years.

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Foundation Corner: Intel Foundation Supports STEM

A number of foundations are supporting STEM initiatives across the country. A leader is the Intel Foundation, which strives to improve learning opportunities and increase access to technology by partnering with communities worldwide. Intel provides a diverse set of programs and support to foster innovation in the teaching of science and math. They include:

■ Intel International Science and Engineering Fair

The Intel International Science and Engineering Fair (Intel ISEF) is the world's largest pre-college science competition. Every year more than one million students in grades 9—12 compete in regional science fairs and nearly 500 Intel ISEF-affiliated fairs held around the world. In 2006, NGA Center Honors State recipient Indiana will host the Intel science fair.

■ Intel Science Talent Search

The Intel Science Talent Search (Intel STS) recognizes and rewards U.S. high school seniors for their innovative science research.

■ Improving Algebra Teaching through TIMSS Video Study Research

The Trends in International Mathematics and Science Study (TIMSS) 1999 Video Study analyzed teaching practices in more than one thousand eighth-grade classrooms in seven countries.

■ Intel *Cyberchase* Sponsorship

Intel is sponsoring the award-winning PBS Kids television series titled *Cyberchase*, now in its third season, as part of the effort to improve math and science education.

More information about Intel's commitment to growing the next generation of scientists and innovators can be found [here](#).

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The Honor States Shared Commitments: National Education Data Partnership

All Honor States grant recipients have committed themselves to improve transparency and raise public will around the national need to increase college and work ready graduation rates. One of the shared commitments is to participate in the National Education Data Partnership to help transform the way educators, policymakers, superintendents, and parents use education information. The National Data Partnership is a collaboration among the Council of Chief State School Officers, Standard & Poor's (S&P) School Evaluation Services, and the National Data Quality Campaign. Full state participation in the National Data Partnership includes submitting all disaggregated assessment data to S&P and giving S&P access to state ACT and College Board data. The table below

summarizes the progress that the 26 states in the Honor States Grant Program have made on those commitments:

State	Have Submitted All Disaggregated Assessment Data to S&P	Have Submitted Letters that Give S&P Access to State ACT and College Board Data
AL		Yes
AR	Yes	Yes
AZ		Yes
CT		
DE	Yes	Yes
FL	Yes	
GA	Yes	Yes
IA	Yes	
IN	Yes	
KY	Yes	Yes
LA		
MA	Yes	Yes
ME		Yes
MI	Yes	Yes
MN	Yes	Yes
MS	Yes	Yes
NC	Yes	Yes
NH	Yes	
NV	Yes	
OK	Yes	
PA	Yes	Yes
RI	Yes	Yes
TN	Yes	Yes
VA	Yes	Yes
WI	Yes	
WY		

More information about the Honor States shared commitments can be found [here](#).

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So Now What? How to Make STEM a Priority

- 1) Define a statewide college preparatory curriculum for high school graduation to encourage all students to take advanced science and math.
- 2) Target teacher recruitment and retention incentives—such as signing bonuses, increased pay, better work conditions, and paid moving expenses—to the high-needs areas of science and math.
- 3) Create a statewide data system to track student attainment. It is only possible to gauge the success of state efforts to attract more students into STEM careers with a longitudinal data system that links K—12 education, postsecondary education, and work.
- 4) Create a permanent P—16 education roundtable or commission to integrate STEM-focused policymaking across all levels of education in the state.

These recommendations are taken from existing NGA Center publications and resources, found on the **NGA Center Web site**.

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The NGA Center for Best Practices is the nation's only consulting firm dedicated to governors and their key policy staff. The Center's mission is to develop and disseminate innovative solutions to public policy challenges.

The Honor States Grant Network is supported by a consortium of foundations: the BellSouth Foundation, the Bill & Melinda Gates Foundation, the Ewing Marion Kauffman Foundation, the GE Foundation, Lumina Foundation, the Michael & Susan Dell Foundation, Prudential Foundation, and State Farm Insurance.

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