BHEF 2006 Issue Brief

The American Competitiveness Initiative: Addressing the STEM Teacher Shortage and Improving Student Academic Readiness

America's leaders are increasingly concerned about U.S. competitiveness in a rapidly globalizing world. In response, during the 2006 State of the Union Address, President Bush introduced the American Competitiveness Initiative (ACI). In large part, the ACI promotes policy that bolsters student achievement in the areas of science, technology, engineering, and mathematics (STEM).

At BHEF's summer 2006 meeting, Secretary of Education Margaret Spellings discussed provisions of the ACI that address teacher shortages in critical fields such as mathematics and science, as well as student academic readiness. Specifically, the ACI education provisions include the Adjunct Teacher Corps, the Advanced Placement-International Baccalaureate (AP/IB) Incentive Program, the National Math Panel, Math Now for Elementary Students, and Math Now for Middle School Students.

Teacher Shortage: Quick Facts

Fact 1
The United States faces a shortage of 283,000 secondary math and science teachers by 2015.

Fact 2
The ACI addresses the math and science teacher shortage by recruiting 30,000 adjunct teachers.

Fact 3
Promising responses to the teacher shortage involve collaboration among business, secondary and postsecondary education, and government.

Academic Readiness: Quick Facts

Fact 1
Too few students take a rigorous college preparatory curriculum and consequently are academically unprepared for college or work.

Fact 2
Students with a rigorous foundation in STEM disciplines are more likely to enroll in and pass AP tests, attend college, and successfully graduate.

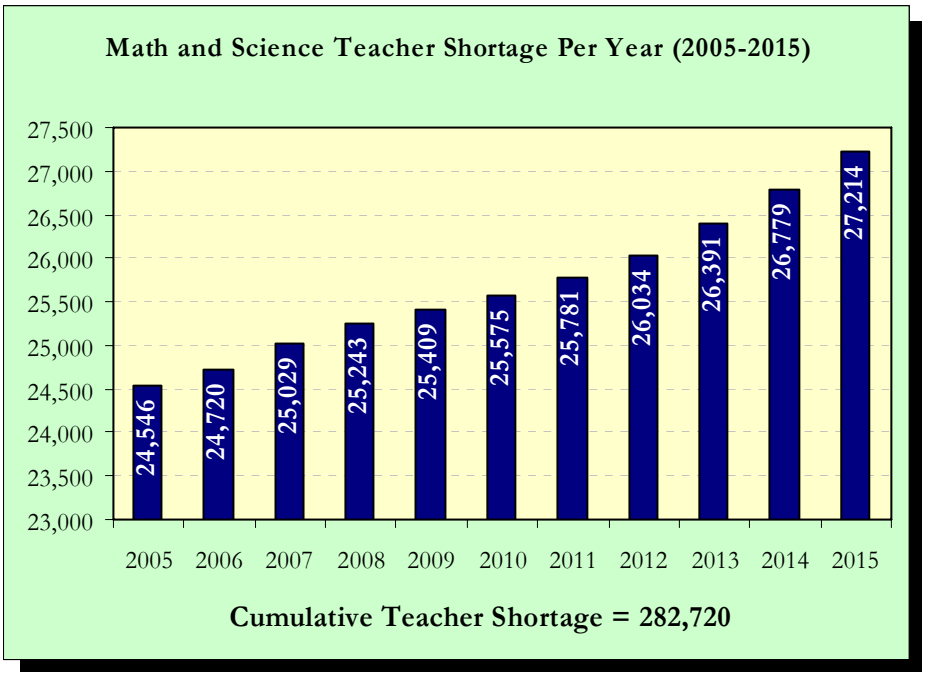
Fact 3
Few states require students to take a curriculum grounded in rigorous math and science beginning in middle school.

ACI Department of Education Provisions: Targets, Goals, and FY2007 Budget Requests

	Targets	Goals	FY 2007 Budget Request
Adjunct Teaching Corps	Professionals with math and science content knowledge	30,000 math science adjunct teachers by 2015	$25 Million
AP/IB Incentive Program	• AP/IB teachers • High school students	• 70,000 new AP/IB teachers over the next 5 years • 700,000 passed AP/IB exams annually	$122 Million
National Math Panel	• Experts in math curriculum • Teachers	Create a research base to improve math instruction	$10 Million
Math Now for Elementary Students	• Teachers • Elementary students	• Promote research-based math instruction • Prepare students for rigorous math courses in middle and high school	$125 Million
Math Now for Middle School Students	• Teachers • Middle school students	• Provide a research-based math curriculum • Prepare students performing below grade level for higher level math courses	$125 Million

Teacher Shortage

Fact 1: The United States faces a critical shortage of highly qualified mathematics and science teachers that will require an additional 283,000 teachers in secondary school settings by 2015. This shortage is particularly pronounced in low-income, urban school districts. As BHEF reported in *A Commitment to America's Future: Responding to the Crisis in Mathematics and Science Education,* high teacher turnover in conjunction with increasing student enrollment and lower student-to-teacher ratios will cause annual increases in the mathematics and science teacher shortage culminating in a 283,000-person shortage by 2015.



SOURCE: Derived from data in National Center for Education Statistics, *Projections of Education Statistics to 2014* (2005) and Council of Chief of State School Officers, *State indicators of science and mathematics education 2005: State-by-state trends and national indicators* (2005).

Fact 2: The ACI addresses the math and science teacher shortage by proposing to bring 30,000 working professionals with content knowledge in mathematics and science into the classroom as adjunct teachers. The ACI's Adjunct Teacher Corps will bolster the number of secondary math and science teachers by recruiting 30,000 math and science professionals into secondary schools as adjunct teachers by 2015. Under the program, competitive grants will support partnerships between school districts and local and state organizations. Teaching duties, while not specified, could include full-time or part-time instruction either in person or through a distance learning option. For FY07, the Department of Education (ED) requested $25 million to fund this program.

Fact 3: At the state level, models that involve collaboration among business, secondary and postsecondary education, and government have shown promise in addressing the shortage of highly qualified STEM teachers. As discussed during BHEF's winter 2006 meeting in Scottsdale, AZ, California Teach aims to place an additional 1,000 math and science teachers annually into California's classrooms through an innovative partnership between business, government, and public education.

North Carolina has proactively addressed its teacher shortage for the past decade through community and state level partnerships. In conjunction with the State Board of Education's Quality Teachers priority area, the University of North Carolina system has developed a strategic plan to increase teacher supply and

teacher retention. Moreover, North Carolina receives substantial support from the Bill and Melinda Gates Foundation, in the form of an $11-million New Schools Project grant, and the Z. Smith Reynolds Foundation, which identifies training, placing, and retaining highly qualified teachers in North Carolina as a top priority. The State Board of Education actively supports 12 advisory councils that include representatives from business, local communities, higher education, government, teachers, and parent groups. As a result of these activities, *Education Weekly's* 50-state report card has consistently ranked North Carolina among the top-tier states in efforts to improve teacher quality.

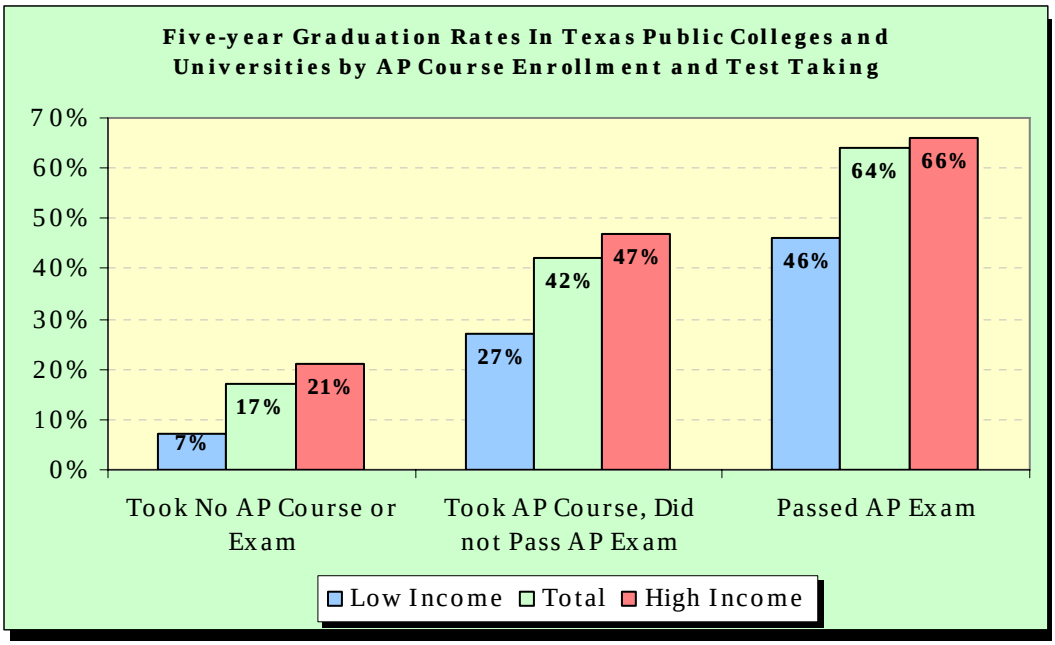
State level P-16 councils represent another promising model to address teacher shortage and quality issues. Currently, 30 states are engaged in P-16 activities that encourage business, education, community organizations, and government to collaborate in redressing systemic problems. The most successful councils encourage participation from numerous stakeholders—particularly from business and higher education—to strengthen educational outcomes, teacher training and preparation, and curricular alignment from pre-school through college.

Academic Readiness

Fact 1: Too few students take a rigorous college preparatory curriculum and consequently are academically unprepared for college or work. In *Crisis at the Core,* ACT found that less than 70 percent of high school graduates were ready to pass college English Composition and only 40 percent were ready for college-level algebra. African Americans, Hispanics, and Native Americans demonstrated even lower results on these measures. Nearly one-third of all college students take at least some remediation, costing institutions and state governments between $260 million and $1 billion annually.

Fact 2: Students who take a rigorous curriculum are more likely to enroll in and pass AP tests, attend college, and successfully graduate. As early as the seventh grade, certain students begin taking rigorous college preparatory courses that naturally culminate in AP classes. As reported by the National Center for Education Statistics in *Mapping the Road to College,* of those students who took advanced math in high school, over three quarters of them had completed Algebra in the 8th grade. Enrolling in Algebra while in middle school increases the likelihood that students will enroll in advanced math. However, high-income students are significantly more likely to be placed on this academic track than low-income students. Subsequently, high-income students are more likely to take and pass an AP exam.

Gaining a solid foundation in mathematics and science has serious ramifications for students. Research from Texas demonstrates that students who take and pass AP exams are significantly more likely to graduate college within five years than students who do not pass AP exams. This trend is especially pronounced with low-income students.



SOURCE: National Center for Educational Accountability, *Orange Juice or Orange Drink? Ensuring that "Advanced Courses" Live Up to Their Labels* (2006).

In response to this evidence, the Department of Education's Advanced Placement-International Baccalaureate (AP/IB) Incentive Program offers competitive grants to state educational agencies to pay AP/IB test fees for low-income students and to make pre-advanced and AP courses more widely available to these students. ACI seeks to triple the number of students who pass AP and IB tests over the next five years by expanding the AP/IB program to also recruit, train, and reward 70,000 new AP/IB teachers over the same time period. ED requested $122 million for this program in FY07.

Fact 3: Few states require students to take a curriculum grounded in rigorous math and science beginning in middle school. While there is general agreement that curricular decisions and college planning choices made in middle school affect educational outcomes in high school and beyond, few states have linked high school curriculum directly to middle school coursework.

ACI proposes to bolster student preparation in elementary and middle school by focusing on math curriculum and instruction. The National Math Panel will empirically evaluate elementary and secondary math teaching approaches and disseminate the most promising practices in mathematics education, laying the groundwork for the Math Now program. Math Now for Elementary School Students would promote research-based instruction strategies and prepare students for more rigorous math coursework in middle school and high school, while the Math Now for Middle School would provide research-based curriculum to improve mathematics education specifically for students performing below grade level. Each program would award competitive grants to partnerships to implement scientifically-based interventions as identified by the National Math Panel. For FY07, ED requested $125 million for each program.