



Testimony of Laura Slover
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Thank you Chairman Miller and members of the Committee for the opportunity for Achieve to testify today at this hearing to discuss the importance of mathematics for all students and the significant progress that has occurred in the states on this front. We also want to commend the work of the National Mathematics Panel for their excellent work.

Created by the nation's governors and business leaders, Achieve is a bipartisan non-profit organization that helps states raise academic standards, improve assessments and strengthen accountability to prepare all young people for postsecondary education, careers, and citizenship. Achieve was created to address the expectations gap: the alarming trend that allows students to graduate from high school without the requisite skills and knowledge necessary for success in college and the workplace.

From 2001 to 2004, Achieve undertook a major research endeavor to identify the must-have skills and knowledge all students need in the core subjects of mathematics and English to be prepared for life after high school. The result of this project – known as the American Diploma Project (ADP) – was an agreed upon set of benchmarks in mathematics and English that all students should know by the time they graduate high school, as defined by the postsecondary and business communities. To cover the content in the ADP benchmarks, high school students need to take four years of grade level English and four years of mathematics with content equivalent to a sequence that includes Algebra I, Geometry, Algebra II, Data Analysis, and Statistics. In 2005, Achieve launched the American Diploma Project Network, then a group of 13 states dedicated to a college- and career-ready policy agenda. Today, the Network includes 33 states, reaching 80% of our public school students.

WHY HIGHER-LEVEL MATH FOR ALL STUDENTS?

As revealed by Achieve's research, there are many specific skills and competencies that young people will need to succeed, but more than particular skills, students need the cognitive capacity to educate themselves throughout their entire lives. Young people need the ability for complex reasoning and the self-confidence to apply it in any and all situations. These are precisely the skills that are developed in higher-level mathematics courses, beginning with the foundational Algebra I and extending beyond Algebra II, in which students begin to use abstract reasoning to solve complex problems.

Beyond the unmistakable intellectual benefits of students taking higher-level math courses, there are a number of practical benefits of engaging in rigorous math coursework. Achieve and others

have found that Algebra II (or an integrated course that covers the same content) is a gateway course for higher education and teaches quantitative reasoning skills important for the workplace. Achieve's research shows that higher level mathematics courses such as Algebra II improve access to postsecondary education, are critical for college success, and are important to many careers – including those that don't require a four-year college degree. Students that complete such coursework are not only better prepared for work, they earn higher salaries. Achieve's conclusions, as reflected in its mathematics benchmarks (*Ready or Not: Creating a High School Diploma That Counts*)), have been reinforced by other research, such as ACT.

Unfortunately, there is still a large achievement and opportunity gap in mathematics. Disadvantaged and minority high school students earn fewer mathematics credits than their socio-economically advantaged peers, and are less likely than those peers to enroll in higher-level math courses, such as trigonometry and calculus. The gaps in course-taking by population subgroup mirror those seen in test scores and other measures of educational outcomes. Black and Hispanic students are twice as likely as their White and Asian peers to take no math beyond the basic level, for example. Additionally, many minority students and girls, of all races and ethnicities, lack access to advanced math classes or are discouraged from enrolling in them. Under these circumstances, higher-level math courses function not as the intellectual and practical boost they should be, but as a filter that screens students out of the pathway to success.

PROGRESS IN THE STATES

Since 2005, when the ADP Network was first formed, we have seen significant progress from the states in moving forward a rigorous college- and career-ready policy agenda, particularly in the areas of academic standards and graduation requirements.

High School Mathematics Standards

Rigorous college- and career-ready academic standards are critical as they provide a foundation for decisions on curriculum, instruction and assessments, and they community core learning goals to teachers, parents and students. Although the standards-based reform movement has been going strong since *A Nation at Risk* was published, the concept of anchoring end-of-high school academic standards to the expectations of the postsecondary and business communities is a relatively new one, yet it has a lot of momentum across the country.

Nineteen states have aligned their high school math standards with the expectations of college and industry and another 25 states and the District of Columbia are in the process of, or plan to, align their standards in coming years, including 13 states that anticipate adopting new math standards by the end of 2008. Put another way, all but six states are looking to improve the transition from high school into postsecondary and workplace settings through the adoption of college- and career-ready standards. An interesting byproduct of aligning to college and career ready mathematics expectations is that the states also share a common core.

High School Graduation Requirements

In 2005, just two states had set their high school graduation requirements at a college and career – ready level, which includes four years of grade level English and four years of rigorous math, including content typically found in Algebra II. Today, 19 states and the District of Columbia

have set their graduation requirements to the college- and career-ready level, ensuring students will be prepared for whatever challenges they face upon graduation. 11 more states report plans to move in this direction in coming years.

Even more broadly, there has been a trend across the nation for states to become more specific about the math content and courses they require all students to complete before graduating. In 2005, 30 states did not require students to complete even Algebra I, let alone higher-level courses such as Algebra II. Now, 30 states and the District of Columbia have specific course-taking requirements in mathematics. Nineteen of those states, and the District of Columbia, require students to complete Algebra I, Algebra II, and Geometry, or an equivalent sequence, and two of those states (Arkansas and Alabama) require students to take a fourth math course beyond Algebra II.

ACHIEVE: SUPPORTING STATES TO CLOSE THE MATH EXPECTATIONS GAP

However, as more states make strides in improving the rigor of their academic standards and their graduation requirements, a number of challenges emerge, particularly in the development of college-ready assessments and supporting materials for educators and students to ensure all students are prepared for higher-level math course-taking. Achieve is engaged in a number of efforts to help states address these challenges, more notably the common Algebra II end-of-course exam.

ADP Algebra II End-of-Course Exam

In 2005, a number of states in the ADP Network began exploring the possibility of collaborating on a common Algebra II assessment to:

- Measure “college-ready” content;
- Ensure consistent content and rigor in Algebra II courses within and among states;
- Enable comparisons in performance among the states;
- Reduce test development costs; and
- Develop a possible instrument for placement into postsecondary courses.

By 2006, nine states joined the common Algebra II end-of-course consortium, representing an unprecedented multi-state effort. Since then, five additional states have joined this group. These 14 states have worked together—with high school and higher education mathematics faculty—to agree on the content and design of the assessment, as well as common performance levels to be used across the states. The assessment includes multiple choice, short answer and extended response items and is aligned with the ADP mathematics benchmarks. This represents a significant change for some states as many existing high school exit exams only cover math content taught at the 8th-, 9th- or 10th-grade level.

Beyond the core Algebra II assessment, the group of states also created items for modules that would extend the rigor and scope of the exam. The modules cover topics such as Data & Statistics, Logarithmic Function, and Matrices.

The first administration of this exam occurs this spring, from May 1-June 13, 2008. Over 110,000 students across the participating states will take the exam. States are still crafting

policies around which students will be required to take the exam, what stakes they will attach to it, and how the assessment may be used to place students into credit-bearing postsecondary courses. Achieve expects there to be a range of policies adopted throughout the 14 states.

All participating states hope to use the common Algebra II exam to improve curriculum and instruction in high schools. They are also interested—and working with postsecondary leaders—to determine whether the exam can serve as a measure of readiness and placement in credit-bearing college courses.

Moving forward, a subset of the Algebra II end-of-course consortium are now working to develop an Algebra I end-of-course exam to improve curriculum and instruction, help schools determine if students are ready for Algebra II and other higher-level math courses, and compare performance and progress among the participating states. This assessment will be field tested in fall of 2008 and first administered in spring 2009.

Mathematics Benchmarking and Additional Tools

As the ADP benchmarks are intended to cover the four years of high school, over the years, states requested more detail about the progression of content and skills students would need to master through the grades in order to meet the end-of-high school ADP benchmarks. To address this, Achieve has "backmapped" the ADP Mathematics benchmarks from grade 12 down through Kindergarten.

Achieve also has partnered with the Charles T. Dana Center at the University of Texas, Austin to develop accompanying tools and resources to support these backmapped benchmarks. The joint Achieve/Dana Center website includes:

- The ADP benchmarks and back mapping;
- Model math course sequences and grade level standards;
- A supply of sample instructional tasks;
- Criteria and models for fourth-year capstone math courses for students who have completed Algebra II or its equivalent;
- Workplace tasks tied to the application of mathematics; and
- Practices Worthy of Attention that highlight promising programs and instructional models.

Math Works: Advocacy Kit

In addition to the technical assistance Achieve provides to states, Achieve also offers advocacy tools to promote higher-level math course-taking. Most recently, Achieve developed a series of Mathematics at Work brochures to examine how higher-level mathematics is used in today's workplaces. The brochures present case studies drawn from leading industries nationwide to illustrate the advanced mathematics knowledge and skills embedded in jobs that offer opportunities for advancement and are accessible to high school graduates.

Achieve has also recently published a new policy paper – *The Building Block of Success: Higher-Level Math for All Students* – to synthesize the current research base on why math is so important to all students in regards to college access and success, workplace- and career-readiness, and personal and U.S. competitiveness.

Both the brochures and policy paper, along with to-be-developed one-pagers, PowerPoint slides, and a resource bank, will be included in Achieve's Math Works advocacy kit, which will be rolled out in the summer of 2008. The goal of Math Works is to provide states with the resources they need to ensure all students have the opportunity to engage in rigorous math course-taking throughout their high school experiences.

EMERGING THEMES IN MATHEMATICS EDUCATION

I'd like to leave you with a few major trends in mathematics education that Achieve has encountered as we work with states to reform their mathematics requirements so that more high school graduates are prepared for college and career:

- Algebra II is the new Algebra I, but not your grandpa's Algebra II.
- More states and districts are contemplating organizing high school mathematics in integrated courses rather than the traditional sequence.
- Finding new ways to present and make mathematics relevant to students (integrated courses, career and technical education) without diluting rigor will enable more students to be prepared for college and good careers.
- Employers and postsecondary faculty place a high value on statistics, probability and data analysis.
- States are increasingly interested in ensuring that their mathematics standards are internationally benchmarked to the highest performing countries in the world. Achieve is currently conducting a study to benchmark our mathematics standards and NAEP against the highest performing countries.
- Teacher capacity is one of the greatest challenges in making more advanced mathematics classes available to more students at the secondary level.