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Policies to Improve Instruction and Learning in High Schools

Executive Summary¹

High school students in the United States have been taking more challenging courses in recent years, but academic achievement has been stagnant. At the heart of the matter is the quality of curriculum, instruction, and assessment. Some courses tend to be more challenging in name than in practice. High schools also have a history of autonomy that inhibits the coordination of curriculum and the development of a common knowledge base for teachers.

To improve the consistency and rigor of high school instruction, the National Governors Association Center for Best Practices (NGA Center) partnered with ACT, Inc. on a pilot project in three states: **Mississippi, Oklahoma, and Pennsylvania.**² ACT trained 98 teachers in 18 high schools on how to use state-of-the-art curriculum units and new instructional methods that were integrated with a system of assessments. The project focused on 10th grade courses—English language arts, geometry, and biology—and aimed to prepare more high school graduates for the demands of higher education and the workplace.

The pilot project found strong indication that when high school courses are well-aligned to academic standards, growth in achievement occurs. Geometry teachers who participated in the project moved into tighter alignment with the ACT standards and with each other. As a result, their geometry students gained almost half a point on the ACT math tests, which is better than 75 percent of schools in a given year.

Pennsylvania schools, which also were engaged in a complementary high school reform effort called Project 720, saw gains in all three subject areas. Their students had an average gain of +0.87 on the ACT tests, which is better than growth made by 92 percent of schools in a typical year. A participating school's growth in its score on ACT tests was as large as two points on a 36-point scale. This is more than double the gain made by the nation's best high schools in a typical year.

The project also found a relationship between the level of implementation and achievement. The top implementing schools—the teachers who attended all of the professional development and used the ACT units and assessments—made the greatest achievement gains. However, full implementation of the rigorous curriculum and assessment system was hard to achieve. Teachers need more assistance with how to blend the rigorous instruction and new assessment practices. In

addition, school leadership must secure planning time to help teachers use new assessments effectively and efficiently.

The results of this pilot project suggest that states should consider three policies to increase the consistency and rigor of high school courses:

1. Ensure that high school courses are well-aligned to challenging academic standards and that course expectations are more consistent.
2. Include end-of-course exams in a comprehensive assessment system. Such systems can signal to students what it means to be ready for college entry and success.
3. Provide teachers extended professional development to learn how to integrate new instructional methods with new assessment practices.

Introduction

At the National Education Summit on High Schools in 2005, governors and state education leaders answered the call to raise graduation requirements, improve their high school standards, and increase college-readiness rates. Nineteen states, up from only two in 2004, now require high school students to complete a college- and work-ready curriculum.³

Students were already beginning to step up to the challenge. A recent analysis of high school transcripts found that 50 percent of students completed a “midlevel” or prescribed college preparatory curriculum, up from 29 percent in 1990.⁴ However, too many students in these courses are not achieving in ways that prepare them for college and the workplace.

Among ACT test takers, 43 percent of high school students who were given a grade of A or B in Algebra II failed to score at least 22 on the math portion of the ACT, the benchmark for college readiness.⁵ Thirty-seven percent of the students who scored *Below Basic* on the 12th grade science National Assessment of Education Progress (NAEP) had completed a course in chemistry.⁶

The lack of rigor in high school courses is especially acute for low-income students. For example, in Texas, 60 percent of low-income students who received course credit for Geometry and Algebra II failed a state exam covering Geometry and Algebra I. Only 36 percent of non-low-income students failed the same exam.⁷ A student who takes algebra, geometry, and chemistry should learn enough of those subjects to score at the Basic or Proficient level on NAEP and be ready for college.

The heart of the problem is the degree of variation in how high school courses are taught and what students learn. Researchers have found that teachers within the same district, and who teach the same math courses, vary greatly in the amount of algebra and geometry they teach. Some high school teachers spend as much as 30 percent of class time on material that should have been learned in middle school.⁸

In an analysis of assignments around the same material in English and math courses, Education Trust, a research and advocacy organization that seeks to close achievement gaps, also discovered

great variation in the intellectual demands made of students. In one high school English class, students were asked, “What larger ideas do you see working in *The Odyssey* and *O Brother, Where Art Thou?* Do both works treat these ideas in the same way?” In another class, students were simply asked to design a crossword puzzle using the names of gods and goddesses in *The Odyssey*.⁹

Examples do exist for closing the course rigor gap, however. In 2004, the ACT-Education Trust study *On Course for Success* benchmarked course content and teaching methods in 10 high-performing and diverse high schools across the nation.¹⁰ Researchers found that students in these schools were provided four key academic resources that prepared them for postsecondary education: high-level content, qualified teachers, flexible and responsive teaching, and extra support when needed. These findings confirmed prior research. The unique contribution of this benchmarking study was to spell out what rigorous course content and instruction looked like in action.

With all of these lessons in mind, the NGA Center and ACT launched a pilot project in winter 2006 to develop solutions that would improve the quality and consistency of high school coursework. Educators and policymakers from three states—**Mississippi, Oklahoma, and Pennsylvania**—came together to accomplish two goals:

1. To investigate an empirically derived approach to increasing rigor in 10th grade English, geometry, and biology courses; and
2. To identify the essential public policies to support increased course rigor.

Project Description

The Increasing Course Rigor pilot project, which began in winter 2006 and concluded in summer 2007, sought to improve the quality of learning experiences for students in core preparatory high school courses and to learn which state policies best support these courses. ACT and the NGA Center created the following tools for 18 participating high schools in the three states:

1. A survey for teachers to measure how well their courses are aligned to ACT’s rigorous standards and the amount of consistency in the standards taught across classrooms. This tool is called the Course Analysis for Rigor and Success (CARS) survey.
2. Curriculum units in biology, geometry and 10th grade English. Six units of 15 to 20 lessons each were developed for the three courses and were meant to stand alone or supplement existing curricula. (For more detail on each unit, see the companion report by ACT.)
3. A comprehensive, integrated assessment system with a data feedback model to assist teachers’ instructional decisionmaking.
4. Professional development responsive to teacher needs.
5. State policies to increase the rigor of core courses in high school.

In the 18 participating high schools, 98 teachers in 10th grade English, geometry, and biology participated in the project. The teachers were given instructional units designed by ACT that

contained 15 to 20 lessons matched to high-level, college preparatory course objectives. These units also emphasized innovative teaching strategies and showed teachers how to modify lessons to increase their rigor. Each lesson contained suggestions for formative assessment and small-scale questioning strategies to help teachers quickly adjust teaching and learning during a lesson.

ACT and the NGA Center offered seven full days of professional development to assist teachers and administrators with implementing all of the project components. At a summer institute in St. Louis, teachers learned how to use the new curriculum units and discussed how to better align their courses to ACT standards and each other. Fall and spring followup professional development workshops took place in each state. During these workshops, teachers analyzed student work from the benchmark assessments and discussed how they might modify future lessons. They also applied a framework for examining the rigor and relevance of their own assignments. Finally, they reviewed research-based instructional strategies and modified the ACT curriculum units for their own future use. To support project implementation, ACT also held regular conference calls with teams of teachers, principals, and district leaders.

Each curriculum unit was designed to culminate in a benchmark assessment, which contained multiple choice and constructed response items. The analysis of the benchmark results across the entire school was intended to provide insight into students' understanding and misconceptions of course content. These benchmark assessments were then aligned to end-of-course exams that fit into a comprehensive assessment system.

Project Findings

This project found that efforts to improve teachers' instruction leads to greater achievement and improved college readiness. Geometry was the subject where teachers' curricula became most closely aligned with each other and to the ACT standards.¹¹ At the outset of the project, 56 percent of the geometry teachers were in agreement on the standards to be taught. By the end of the school year, 84 percent of the geometry teachers' curricula were aligned to high standards and were more consistent with each other. Their students had an average test score gain of +0.45 on the ACT math tests, which is better than 75 percent of schools in a given year.^{+*} The magnitude of this gain is substantial. The typical school does not see its ACT averages change from year to year.¹²

Pennsylvania schools, which also were engaged in a complementary high school reform effort called Project 720, saw gains in all three subject areas. Their students had an average gain of +0.87 on the ACT tests, which is better than growth made by 92 percent of schools in a typical year. Averaged across the three participating states, science achievement decreased slightly. The science scores were weakened by the fact that in one state, the biology standards did not align well with ACT's standards. However, Oklahoma and Pennsylvania saw gains in science scores.

^{+ *} The ACT is comprised of four tests in English, Mathematics, Reading, and Science with a total of 215 questions. Scores on each test are placed on a scale that ranges from 1 (low) to 36 (high). The Composite Score is the average of all four test scores, rounded to the nearest whole number.

Full implementation of a rigorous curriculum and assessment system was hard to achieve for all participants. One goal of the pilot project was to have teachers give at least three of the benchmarks, or interim assessments, yet only 29 of the 98 teachers gave them as intended. There are several reasons for this. First, ACT and the NGA Center did not mandate or require the units to be taught in their entirety, so teachers used both their original course materials and the new lessons. Second, there were too many testing systems layered on top of one another. These included teachers' own course-based tests, district quarterly exams, high stakes state exams in Oklahoma and Mississippi, as well as the ACT pilot tests. Teachers were asked to score the benchmarks (rather than sending them out to be scored), then forward the results to ACT. Third, not all teachers were given stipends for the extra work the project involved.

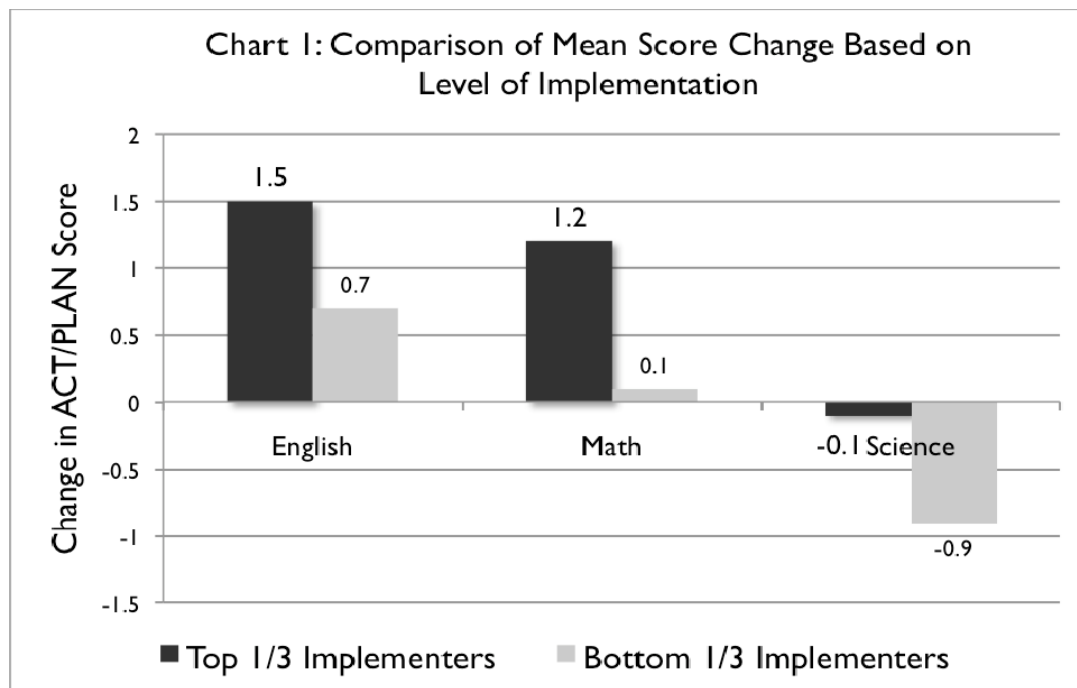


Chart 1 above shows the change in achievement, displayed by implementation levels. Each state had at least one top implementing school in the project. The top implementing schools—where teachers attended all of the professional development and used the ACT units and assessments—made greater achievement gains than the bottom implementers. When well-implemented, a system of aligned curriculum, instruction, and assessments can improve student learning.

Policy Recommendations

More states are requiring the typical high school student to take more challenging courses by raising graduation requirements and developing new content standards. When these policies are in place, schools and teachers need guidance on *how* they will make courses more consistent and rigorous with the new standards. Research finds considerable variation in the content taught

within the same school and the same district. As it stands now, some students are taught real geometry or chemistry while others only get pseudo-geometry or chemistry-lite.

The ACT-NGA Center project found that raising rigor can begin with showing teachers the gaps between the course content they actually teach and the content expected in state standards and assessments. This suggests that there is benefit to states ensuring that high school courses are well-aligned to state standards. Second, the alignment efforts need to be supported by a comprehensive assessment system that includes end-of-course exams at its core, which signal to teachers and students what it means to be college ready in each subject area.

Finally, the pilot project found that student learning improves when teachers have time to learn how to make their instruction more challenging. With these new rigorous expectations, high school teachers across the country are being asked to do something they have never done before and have not been trained to do.¹³ They are now being asked to teach *all* students analytical and reasoning skills and to apply content knowledge that prepares them for college. This suggests that states need to provide teachers with extended time and support to learn and practice challenging instruction.

Ensure Courses Are Well-Aligned to High Academic Standards

The course alignment survey (CARS) developed by ACT as part of this project has the power to help teachers and schools achieve more consistency in expectations, both across classrooms within schools and across schools within states.

An analysis of high school course syllabi from across the nation found that there is extremely wide variation in the intellectual demands made of students.¹⁴ Jean Rutherford of the National Center on Education Achievement likens this variation in expectations to serving students orange drink rather than orange juice.¹⁵ How do students and parents know whether they're getting real juice—geometry—or a watered-down course that never requires proofs or fails to teach the Pythagorean Theorem? Any company selling real orange juice must meet 11 common criteria, and their product is awarded one of three grades (U.S. Grade A, B, or Substandard) by the U.S. Department of Agriculture.¹⁶ The voluntary standards, which have been in place since 1946, ensure that consumers can be confident about the quality of the orange juice they purchase.

Several states have already begun to enact similar “truth in labeling” laws in education by requiring an audit or rating of high school courses against high standards. However, these actions do not mandate a single curriculum throughout the state. Under this process, high school teachers can design their own approaches while ensuring that their courses meet common standards for college readiness.

Maine has developed a Course Pathways project, which requires every high school teacher to submit a course syllabus for peer review. The state has developed exemplary syllabi for each course in all subject areas. Teachers can collaborate on developing their syllabi and submit them electronically for review. If the syllabus is not approved, the state gives a teacher one month to

revise and resubmit. In **New Hampshire**, all high school teachers in English language arts, mathematics, and science submit syllabi for review by the state department of education. If the state sees a gap in test scores, it reviews a school's syllabi and the school's process for determining whether students have mastered core academic competencies.

The College Board also instituted an audit system for its Advanced Placement (AP) courses. The recent rapid growth in the volume of AP courses created the need to assure colleges that the College Board can maintain the high quality of its AP programs. To label a course "AP," a high school must demonstrate how the course meets or exceeds curricular and resource requirements. In 2007, the College Board audited the syllabi of 134,000 AP teachers; 88 percent of the syllabi were approved in their first review.

If states take steps to ensure that courses are well-aligned to state standards, teachers also need to be able to connect their curriculum survey results to students' test scores. Linking inputs (the taught curriculum) with outputs (achievement) allows schools and teachers to decide how much time to spend on topics within each course.¹⁷

Include End-of-Course Exams in an Assessment System

The end-of-course exams at the center of this pilot project were intended to signal to teachers and students what it means to be "college ready." In classrooms with strong implementation of rigorous lessons and assessments, that goal was achieved. When included in a comprehensive assessment system, end-of-course exams can also:

- Lead to improved student performance;
- Allow for more accurate alignment between state standards and assessments;
- Offer feedback to teachers and students; and,
- Provide data to improve teacher quality.

First, the consistency in instruction created by end-of-course exams leads to improved performance. New York's end-of-course exams, the Regents, have been found to give students a 40-point advantage on the SAT-I. Minority and low-income students in New York also perform much better than similar students in 36 other states where the SAT is the most-used college-readiness exam.¹⁸ Students in countries that take end-of-course exams also have higher levels of achievement. A study of individual student scores of 15-year-olds from 31 countries finds that end-of-course exams correlate with a 19-point improvement on the Programme for International Student Assessment (PISA).¹⁹

Second, end-of-course exams are more accurately aligned to state standards than are most high school exit exams. Critics have complained for more than a decade that American high school courses are "a mile wide and an inch deep."²⁰ Most high school exit exams perpetuate that problem. Because they have to cover several years of high school courses in a single test, the exams can only take a superficial sample of the standards. Assessment experts say that for a test to properly cover the standard, each standard should have at least six questions attached to it. Yet

in a typical state where students take a 10th grade mathematics test, there may be six geometry standards, but only seven geometry questions on the test. End-of-course exams can minimize such shallow testing practices and allow the standards to be covered broadly and deeply.

Third, an end-of-course exam system provides feedback to teachers and students. To prepare students for end-of-course exams, especially those with challenging open-response questions, teachers often construct interim or benchmark assessments. Teachers find the open-response questions challenging and worth teaching to. These assessments generate much-needed feedback, both to teachers, to guide their teaching, and to students, to guide their learning.

The benchmark assessments designed for the pilot project contained multiple choice and open-ended or constructed response questions. The latter questions asked students to explore concepts in greater depth and to work on more cognitively demanding tasks. When teachers scored these questions, they gained new insight into students' understandings and misconceptions. Teachers were able to give students much-needed diagnostic feedback about their performance as well as the opportunity to correct their mistakes and revise their work to meet the standards.

Finally, end-of-course exams generate data for improving teacher quality. While there is wide agreement that a high-quality teacher is essential to improving student learning, the knowledge base is thin on what qualities make a high school teacher more effective.

Data from end-of-course exams can be used to change the way a state or school district builds teacher and school effectiveness. Researchers in the Wake County school district in **North Carolina** have used end-of-course exam data to identify the most and least effective teachers of algebra, biology and U.S. history. In algebra, the district uses 8th grade scores on the math exam to predict 9th grade performance on the Algebra I test, then compares the difference between actual and predicted scores. The teachers are then ranked on these residuals from most to least effective. Teachers whose students start out with identical 8th grade scores can see who is most effective at adding value to student learning and can potentially learn from their colleagues.

As a result of this research, Wake County schools have begun to make changes in how they assign teachers to classes, in some cases partnering lower-performing teachers with more effective teachers. They also have asked the district central office for help in working with teachers on effective instructional techniques. Only when the district combined the end-of-course data with classroom observations that explained *why* the performance differences existed did they begin to change the conversation about how to improve teacher effectiveness.

State use of end-of-course exams is rising. In collaboration with Achieve, Inc., 14 states have developed an end-of-course exam for Algebra II.²¹ Additionally, eight states have implemented their own end-of-course exams for multiple subjects. In four of these states—**Mississippi, New York, Tennessee, and Virginia**—students cannot earn credit by only completing seat time; they also must pass end-of-course exams to earn course credit and graduate. Over the next eight years, five states are moving completely to end-of-course exams.²² Given the wide range of advantages

in improving instruction, teacher quality, and student achievement, more states should consider using end-of-course exams as part of a comprehensive assessment system.

Provide Extended Professional Learning and Measure Its Impact

The ACT-NGA Center project provided teachers with four days of professional learning in the summer and three days of followup during the year. In surveys, teachers said it was extremely valuable for helping them to rethink their teaching practice. However, raising rigor does not happen overnight. Teachers also said they needed more time, particularly to learn how to analyze students' constructed response questions.

Pennsylvania was the sole state in this project whose schools made gains in all three subject areas. In part, this was because the teachers had previously worked on ways to raise rigor as participants in a statewide high school reform known as Project 720. In earlier state-funded professional development, the Pennsylvania teachers had learned to customize instruction to help all students complete a college preparatory curriculum. The ACT-NGA Center professional development built on and expanded the foundational knowledge Pennsylvania teachers brought with them.

Recent research has found that incorporating college readiness tests into accountability by itself is not an effective strategy. Efforts need to be made to improve teachers' instruction.²³ However, teachers and policymakers generally are skeptical about the value of spending more money on professional development. In a national survey, 50 percent of teachers report that the professional development they participate in does not make much difference for them as teachers.²⁴

Policymakers also are frustrated by the lack of a return on their investments. The problem is that, too often, professional development is fragmented and offers generic strategies that do not help teachers solve problems in their classroom practice. It also frequently lacks follow-through. Yet the need for professional learning has never been greater: More than two-thirds of the current teaching force in the United States entered the classroom before the introduction of more rigorous standards.²⁵

When done right, there is great value in the investment in teachers' learning. Countries that outperform the United States on PISA—Finland, Singapore, and Korea—devote significant time to teachers' professional learning. Singapore's National Institute of Education provides all teachers in the city-state with 100 hours of professional development every year.²⁶ Research indicates that high-quality professional learning is intensively focused on academics, sustained over time, and integrated into teachers' daily lives.²⁷

Boston Public Schools offer evidence that the right kind of investments in sustained professional learning can have an enormous impact on student achievement. In 2002, 51 percent of Boston 10th graders scored at "warning/failing" levels on the mathematics portion of the state exam. The district put in place a strategy that included raising graduation requirements, aligning materials to new standards, and professional learning and coaching. The coaches modeled the rigorous lessons for teachers, gave them feedback on how to ask students more challenging questions, and led

teams of teachers in their observations of colleagues' teaching. Over the course of a year, high school math teachers participated in as many as 20 days of training. The district spent 8 percent of its total budget on the training, and paid for it by combining federal Title I and Title II funds, along with grants from foundations.²⁸ In 2007, the number of students scoring at "proficient and advanced" levels had climbed to 55 percent, while the number at "warning/failing" levels dropped to 18 percent.

States committed to increasing high school course rigor need to redirect funds to more effective forms of professional learning. Teachers need extended time over several years to learn the new content and to practice the new teaching methods. For example, in these sessions, teachers could teach part of a rigorous unit, followed by video study of expert instruction, which would help them to analyze and refine their own practices. Teachers then need multiple opportunities to learn how to use students' answers from test items to inform instruction - something that is missing for many in their pre-service training. Finally, coaches or master teachers could model the new teaching practices on site and provide feedback. Evidence is emerging that these supports can produce large improvements in teaching practice and student achievement.²⁹

As states make these new investments in professional learning, they should also measure the impact in terms of teachers' knowledge and student achievement. Such analyses are rare even in the private sector.³⁰ But in a time where states are under significant pressure to reduce spending, a return on investment analysis can help ensure that current funds are spent effectively by tying training to specific teacher needs.

Conclusion

In this project, a third of the teachers enthusiastically attended the professional development, piloted the new curriculum units, asked their students more analytical and interpretive questions, gave the benchmark assessments, and saw the greatest gains in student learning. Schools with supportive leadership and teachers who had previous training in how to raise the rigor of their courses saw scores on the ACT tests rise by as much as two points on a 36-point scale. (The typical score averages tend not to change from year to year.)

Given the complex set of changes this pilot project asked teachers to make in their instruction and assessment practices, it is not surprising that implementation was mixed. In a third of the classrooms, teachers were reluctant to change their teaching; as a result, the ACT units and tests were not used much or were layered on top of existing classroom, district, and state curricula and tests. U.S. public schools have a long history of adopting reforms without genuine implementation or follow-through, especially when teachers and students are asked to fundamentally alter what they do in classrooms.³¹

Policy changes informed by this project are already underway in two of the three pilot states. Mississippi has upgraded its high school standards, made its end-of-course exams more challenging, and benchmarked student performance against the rigorous standards of the National Assessment of Education Progress (NAEP). Pennsylvania has proposed changes to its state

education code to create a system of end-of-course exams. Yet it is insufficient for a state to think that auditing courses or adding new exams can raise rigor. Only when states complement these policies with extended opportunities for effective professional learning will they see the improvements in instruction that lead to greater achievement.

Taken together and when done well, these three policies—ensuring courses are well-aligned to state standards, including end-of-course exams as part of a comprehensive assessment system, and providing extended opportunities for professional learning—can lead to improved student learning. Working with educators on how to make courses more rigorous will ensure that more students are prepared for college and high-paying careers.

Endnotes

¹ This brief describes the results of the 17-month pilot project that took place from Spring 2006 to Summer 2007. Qualitative and quantitative findings are presented, along with a discussion of lessons learned and implications for policy and practice. Readers who want to learn more about technical details of the project should consult ACT's companion publication, *Increasing Course Rigor: A Technical Report*.

² The Michael and Susan Dell Foundation, the GE Foundation, State Farm Insurance, and ACT, Inc. generously provided support for this project.

³ Achieve, Inc., *Closing the Expectations Gap 2008*. Washington, DC: Author, February 2008.

⁴ U.S. Department of Education, *America's High School Graduates: Results from the 2005 NAEP High School Transcript Study*, National Center for Education Statistics, NCES 2007-467, 2007. A "midlevel" curricula is generally regarded as college and includes four years of English, three years each of history, science (at least two of biology, chemistry or physics), and math (including algebra and geometry), and one year of a foreign language.

⁵ ACT, Inc., *Crisis at the Core: Preparing All Students for College and Work* (Iowa City, IA: Author, 2005).

⁶ Wendy S. Grigg, Mary A. Lauko, and Debra M. Brockway, *The Nation's Report Card: Science 2005* (Washington, DC: U.S. Department of Education, Institute for Education Sciences, May 2006).

⁷ Chrys Dougherty, Lynn Mellor, and Shuling Jian, "Orange Juice or Orange Drink? Ensuring that 'Advanced Courses' Live Up to Their Labels," *NCEA Policy Brief No. 1*, February 2006.

⁸ Neelam Kher, et al., "High School Mathematics Trajectories: Connecting Opportunities to Learn with Student Performance," Paper presented at Annual Meeting of the American Education Research Association, Chicago, IL, April 9-13, 2007.

⁹ Education Trust, "2005 Grade 12 NAEP Achievement and High School Transcript Study," PowerPoint presentation, February 22, 2007.

(URL: <http://www2.edtrust.org/edtrust/Product+Catalog/recent+presentations>)

¹⁰ ACT and The Education Trust, *On Course for Success: A Close Look at Selected High School Courses that Prepare All Students for College and Work* (Iowa City, IA: Author, 2004).

¹¹ Alignment of 10th grade English teachers to each other and ACT standards also improved from 33 to 67% between 2006 and 2007.

¹² ACT, Inc., "Monitoring Changes in High School Average ACT Composite Scores Over Time," *Information Brief 2000-2* (Iowa City, IA: Author, 2000).

¹³ Leslie Santee Siskin, "Achievement and Attainment: The Comprehensive High School and the Problem of Reform," Chap. 6 in *Crucial Issues in California Education, 2006* (Berkeley, CA: Policy Analysis for California Education [PACE], 2006).

¹⁴ David T. Conley, *College Knowledge* (San Francisco: Jossey-Bass, 2005.)

¹⁵ Chrys Dougherty, Lynn Mellor, and Shuling Jian, "Orange Juice or Orange Drink? Ensuring that 'Advanced Courses' Live Up to Their Labels," *NCEA Policy Brief No. 1*, February 2006.

¹⁶ U.S. Department of Agriculture. *United States Standards for Grades of Orange Juice*, (Washington, DC: Author, January 10, 1983).

¹⁷ Several district-level projects already accomplish this. The best is the *Surveys of the Enacted Curriculum* developed at the University of Wisconsin. For more on how the surveys are designed and used, see http://www.ccsso.org/Projects/Surveys_of_Enacted_Curriculum.

¹⁸ John Bishop, Joan Moriarty, and Ferran Mane, "Diplomas for Learning: Not Seat Time," *Economics of Education Review*, 19 (3), 2000.

¹⁹ Thomas Fuchs and Ludger Woessman, "What Accounts for International Differences in Student Performance? A Re-Examination Using PISA Data," *CESInfo Working Paper No. 1235*, July 2004.

²⁰ William H. Schmidt, et al., *Facing the Consequences: Using TIMSS for a Closer Look at U.S. Mathematics and Science Education* (Dordrecht, Netherlands: Kluwer, 1999).

²¹ The original states—**Arkansas, Indiana, Kentucky, Maryland, Massachusetts, New Jersey, Ohio, Pennsylvania, and Rhode Island**—came together in 2005. Five additional states—**Arizona, Hawaii, Minnesota, North Carolina, and Washington**—have joined the partnership. The first full administration of the Algebra II exam was in May and June 2008. States will give the exam in both the fall and spring.

²² The five states are **Indiana, Maryland, New Jersey, North Carolina, Tennessee,** and **Texas. Massachusetts, South Carolina,** and **Washington** will blend end-of-course exams with a comprehensive test. For more, see Center on Education Policy, *State High School Exit Exams: A Move Towards End-of-Course Exams*. (Washington, DC: Author, August 2008).

²³ Elaine Allensworth, Macarena Correa, and Steve Ponisciak, *From High School to the Future: ACT Preparation--Too Much, Too Late*. Chicago: Consortium on Chicago School Research, May 2008.

²⁴ Steve Farkas, Jean Johnson, and Ann Duffett, *Stand by Me: What Teachers Really Think About Unions, Merit Pay and Other Professional Matters*. New York: Public Agenda, 2003.

²⁵ Stephanie Hirsh and Joellen Killion, "Making Every Educator a Learning Educator," *Education Week*, April 16, 2008, pp.24-25.

²⁶ Michael Barber and Mona Mourshed, *How the World's Best Performing School Systems Come Out on Top* (London: McKinsey & Company, September 2007). For more on how Singapore's National Institute on Education structures professional development see

<http://www.nie.edu.sg/nieweb/programmes/loading.do?id=Professional&cid=8716291>

²⁷ Michael Garet, et al., "What Makes Professional Development Effective? Results from a National Sample of Teachers," *American Education Research Journal*, 38(4), 915-45.

²⁸ J. Chris Coxon, "A Systemic Approach to Improving Math Teaching and Learning in the Boston Public Schools." Paper presented at The NGA Center for Best Practices Institute for Governors' Education Policy Advisors, New Orleans, LA, October 28, 2007.

²⁹ Richard Correnti and Brian Rowan, "Opening Up the Black Box: Literacy Instruction in Schools Participating in Three Comprehensive School Reform Programs," *American Educational Research Journal*, 44(2), 2007.

³⁰ Michael Laff, "Elastic Training Dollars," *T+D*, May 2008, pp.10-11.

³¹ See among others, David Tyack and Larry Cuban, *Tinkering Toward Utopia* (Cambridge, MA: Harvard University Press, 1995).