

**COLLEGE
READINESS**



Raising the Bar

**A Baseline for College and
Career Readiness in Our Nation's
High School Core Courses**



ACT[®]

ACT is an independent, not-for-profit organization that provides assessment, research, information, and program management services in the broad areas of education and workforce development. Each year we serve millions of people in high schools, colleges, professional associations, businesses, and government agencies, nationally and internationally. Though designed to meet a wide array of needs, all ACT programs and services have one guiding purpose—helping people achieve education and workplace success.

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Introduction

How well are our nation's high schools preparing students for college and career? Recent analyses by ACT show low rates of college and career readiness among United States high school graduates. Data from postsecondary institutions reveal high remediation rates and low second-year retention rates among first-year college students. Employers lament the difficulty of finding entry-level employees with the necessary skills for success on the job. All of these suggest disparities between students' high school preparation and the level of readiness required for postsecondary education, training, and the workplace.

But the criteria for evaluating school effectiveness at preparing students are numerous, varied, sometimes conflicting, and frequently based on opinion. And too often these criteria overlook the crucial factor of what is actually going on in the classroom. Preparation for college and career occurs substantially in the classroom. What is taught and learned in the courses students take—especially the core courses in English, mathematics, and science—contributes substantially to what students are able to do once they leave high school with diploma in hand.

What is needed is evidence that not only enables us to see what the core courses in our schools currently contribute toward preparing students for college and career, but also gives us an idea of how much improvement is needed within each course if we are to help all high school graduates become ready for college and career.

This report examines the degree to which core courses, as they are currently taught in a nationally representative sample of U.S. high schools, are effective in preparing our nation's high school graduates to enter some form of postsecondary education (a two-year, four-year, trade, or technical school) without remediation or to enter workforce training programs ready to learn job-specific skills. In short, this study establishes an empirical baseline for the value added to college and career readiness by core courses in high schools across the nation.

ACT research has consistently shown that high school students who take the core curriculum recommended in *A Nation at Risk* (National Commission on Excellence in Education, 1983)—four years of English and three years each of mathematics, science, and social studies—are likely to be more prepared for college and career when they graduate than are students who do not take this number of courses (ACT, 2004). Decades of research bear out this recommendation.

ACT's Empirical Definition of College and Career Readiness

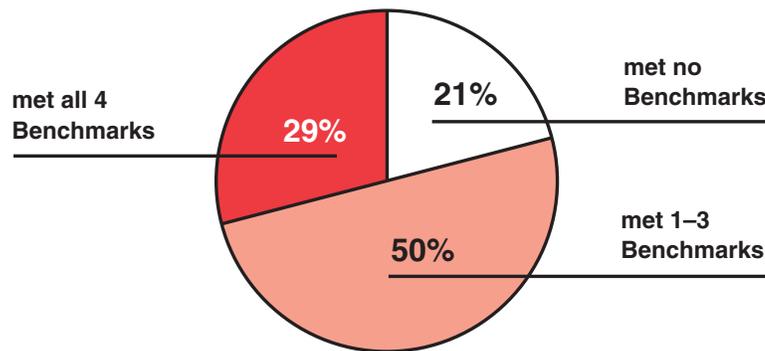
ACT's empirical research defines college readiness as acquisition of the knowledge and skills that students need in order to enroll and succeed in credit-bearing first-year courses at a postsecondary institution, such as a two- or four-year college, trade school, or technical school (ACT, 2010). Simply stated, readiness for college means not needing to take remedial courses in college.

ACT research also shows that career readiness requires the same level of knowledge and skills in mathematics and reading that college readiness does: the majority of the jobs that require at least a high school diploma, pay a living wage for a family of four, are projected to increase in number in the 21st century, and provide opportunities for career advancement require a level of knowledge and skills comparable to those expected of the first-year college student (ACT, 2006).

But while taking the right number of courses is certainly better than not, it is no longer enough to guarantee that students will graduate ready for college and career. In *Rigor at Risk: Reaffirming Quality in the High School Core Curriculum* (ACT, 2007), ACT demonstrated that many high school core courses appear to be watered down and are not focusing on the knowledge and skills that students need to succeed in college or in the workplace, where entry-level workers increasingly require the same level of knowledge and skills as college-going students.

As defined by ACT's College Readiness Benchmarks¹ for the ACT® test, only 29 percent of 2010 high school graduates who took the number of core courses recommended in *A Nation at Risk* were prepared for credit-bearing, entry-level college coursework in English, mathematics, natural science, and the social sciences (Figure 1). Half of 2010 graduates were prepared in one, two, or three of these subject areas, while 21 percent—about one in five graduates—were not prepared in *any* subject area.

Figure 1: ACT College Readiness Benchmark Attainment for 2010 ACT-Tested High School Graduates Taking a Core Curriculum, by Number of Benchmarks Attained



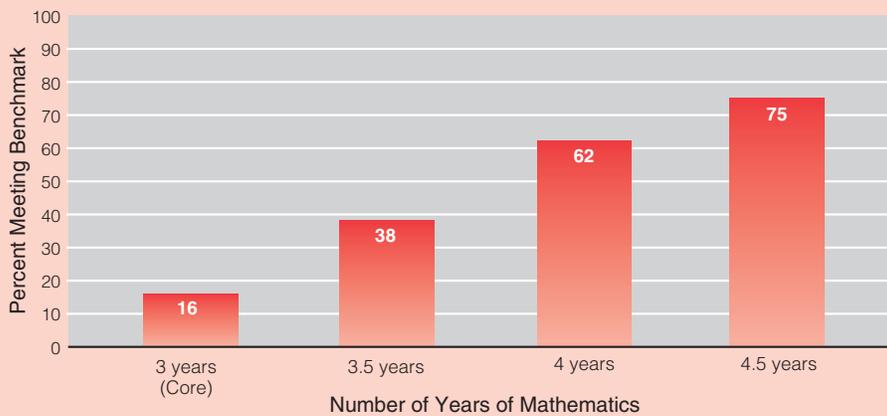
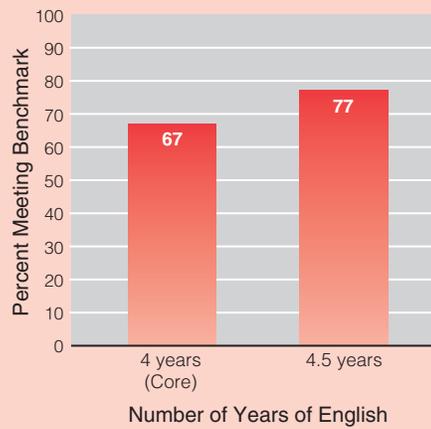
ACT research suggests that students today do not have a reasonable chance of becoming ready for college and career unless they take a number of additional higher-level courses beyond the core curriculum recommended in *A Nation at Risk*. Yet even when students take substantial numbers of additional courses, no more than about three-fourths of them are ready for first-year college coursework in English or mathematics, while even fewer are ready in natural science (see sidebar, p. 3).

¹ The ACT College Readiness Benchmarks are the minimum scores required on the ACT English, Mathematics, Reading, and Science Tests for high school students to have approximately a 75 percent chance of earning a grade of C or better, or approximately a 50 percent chance of earning a grade of B or better, in selected courses commonly taken by first-year college students: English Composition; College Algebra; social sciences courses such as History, Psychology, Sociology, Political Science, or Economics; and Biology (ACT, 2010). See the sidebar on p. 26 for additional information.

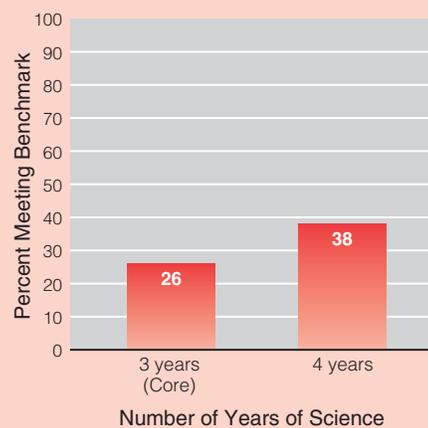
Even Additional Coursework Beyond the Core Is Frequently Not Enough to Prepare Students for College and Career

Only in English does the percentage of students who are ready for college-level work after taking additional courses in high school exceed 75 percent.

Of those students who take a core mathematics curriculum, only 16 percent are ready for a credit-bearing first-year College Algebra course. It is not until students take one full year of additional mathematics courses beyond the core that we see more than half (62 percent) of ACT-tested students ready for college-level work in mathematics.



... In science, 26 percent of students taking the science core are ready for a credit-bearing college Biology course; although this percentage rises to 38 for students taking an additional year of science, that still leaves more than 6 students in 10 who are not ready for college-level science after having taken four years of science in high school. —*ACT, 2007*



This finding is in part a reflection of the quality and intensity—in other words, the rigor—of the high school curriculum. Without improving the quality and content of the core courses, it appears that most students need to take additional higher-level courses to learn what they should have learned from a rigorous core curriculum, with no guarantee even then that they will be prepared for college-level work.

These statistics suggest that for most students there is a large gap between the high school experience and meeting the expectation of college and career readiness. Closing the gap between college and career expectations and high school practice has become a priority among state policymakers. As one step in this direction, the Council of Chief State School Officers and the National Governors Association's NGA Center for Best Practices joined to coordinate the Common Core State Standards Initiative, a state-led effort to develop and adopt a common set of state education standards. The Common Core State Standards are aligned with college and work expectations, include rigorous content and skills, and are internationally benchmarked. The evidence and research base for these standards was drawn from the work of national and international institutions and organizations, including ACT.

Many of the developmental principles behind the Common Core State Standards Initiative are consistent with what ACT has long advocated given its research underlying the ACT College Readiness Standards™: that fewer, clearer, and higher high school standards are needed that focus on what is essential for college and career readiness. The results of the most recent *ACT National Curriculum Survey*® (ACT, 2009) indicate that, in many states, high school learning standards may be too numerous, forcing high school teachers to sacrifice depth for breadth when college instructors clearly want incoming students to have a solid foundation of fundamental content knowledge and skills.

These survey findings, along with the current need for high school students to take additional higher-level courses beyond the core simply in order to be minimally ready for college and career, clearly indicate that the time has come to improve the quality of the core courses so that all students have an equal opportunity to become prepared for postsecondary education—whether in a two-year, four-year, trade, or technical institution—and for careers that, at a minimum, pay a living wage for a family of four and offer opportunities for advancement.

Before we can evaluate the effectiveness of efforts to improve the core curriculum, we must first create a baseline against which such efforts may be compared. Such a baseline can be used to determine which innovations are succeeding and how well they are succeeding. This report establishes this empirical baseline by measuring and evaluating the degree to which today's core courses in our nation's high schools add value to students' academic preparation and to their readiness for college and career.

The study

This report examines growth in student achievement in eight high school core courses: three each in English and mathematics, and two in science (Table 1):

Table 1: Core Courses Examined

English	Mathematics	Science
English 10	Algebra I	Biology
English 11	Geometry	Chemistry
English 12	Algebra II	

A nationally representative sample of more than 35,000 students in public and private U.S. high schools participated in the study. Table 2 presents the characteristics of the 62 participating schools.²

Table 2: School Characteristics (n = 62)

Characteristics	Percentage of Schools
Type	Public Private
Size	400–799 800-plus
Region	East Midwest Southwest West

The goal of the study was to answer two questions:

1. How much are today's high school core courses increasing students' knowledge and skills in course subject matter?
2. How much are today's high school core courses increasing those particular skills that students need to become ready for college and career?

To measure changes in students' knowledge and skills attributable to a given course, the appropriate ACT QualityCore® end-of-course examination (see sidebar, p. 6) was administered as a pretest at the beginning of each course and as a posttest at the end of each course. QualityCore examinations focus on the knowledge and skills a student should learn in rigorous high school courses. Although QualityCore is an instructional improvement program, no interventions to improve teaching or learning were made in any of the courses. This kept the baseline measure free of confounding systematic efforts to improve student growth in achievement.

² See the Appendix for detailed information about the sampling process and the study methodology.

To measure progress in students' overall level of readiness for college and career in a given subject area, ACT's PLAN® or ACT test (see sidebar, this page) for that subject area was also administered as a pretest and posttest. The college and career readiness assessment used depended on the grade level of the course: PLAN, which is intended for students in grade 10, was administered in English 10, Algebra I, and Biology, while the ACT, for students in grades 11 and 12, was administered in English 11, English 12, Geometry, Algebra II, and Chemistry.³ PLAN and ACT scores are reported using a common scale.

All students need to graduate from high school ready for college and career. To do so, they must have the opportunity to take rigorous core courses that teach the essential knowledge and skills for college and career readiness. By creating a baseline measure of the current quality of the core courses in a nationally representative sample of our nation's high schools, this report takes an essential first step in understanding the extent to which these courses are doing the job we need and expect them to do. Knowing the value that core courses are currently offering students, we will be able to effectively determine the impact of course improvement efforts and measure the progress that schools, districts, and states need to make if we are to prepare all students for college and career.

ACT's College and Career Readiness System

The examinations and assessments used in this study are part of ACT's College and Career Readiness System, an integrated system that measures student progress at becoming ready for college and career. The longitudinal assessment component of the system consists of three aligned programs sharing a common score scale: EXPLORE®, for students in grades 8 and 9, provides early information on the academic preparation of students that can be used to plan high school coursework; PLAN, for students in grade 10, provides a midpoint review of students' progress toward their education and career goals while there is still time to make necessary interventions; and the ACT, for students in grades 11 and 12, measures students' academic readiness to make successful transitions to college and career after high school. The content of EXPLORE, PLAN, and the ACT is reflected in the ACT College Readiness Standards, sets of statements detailing what students who score in various ranges on the assessments know and are able to do, and what they are ready to learn next.

QualityCore offers end-of-course examinations, benchmark formative assessment pools, model instructional materials, and professional development training in twelve high school core preparatory courses. QualityCore is intended to increase student achievement in high school core preparatory courses and to improve the effectiveness of curriculum, instruction, and assessment in these courses.

³ Although PLAN and the ACT contain tests in both English and Reading, only the English tests were used in the English courses.

1.

How Much Are Students Learning in Today's High School Core Courses?

To answer the first question of the study—how much are today's high school core courses increasing students' knowledge and skills in course subject matter?—we administered the appropriate ACT QualityCore end-of-course examination at the start and conclusion of each of the eight courses in the study: English 10, English 11, English 12, Algebra I, Geometry, Algebra II, Biology, and Chemistry. Figures 2a through 2c on p. 8 give the average pretest and posttest scores on the end-of-course examinations for each course. (QualityCore scores are reported on a scale from 125 to 175.)

For each school participating in the study, average pretest and posttest scores were calculated based on the performance of the students on the end-of-course examinations in each course at that school. These “within-school average” scores were then averaged across all participating schools, yielding the scores reported in Figures 2a through 2c. These scores can therefore be seen as the average student performance at a “typical” high school in the study.

The average scores on the pretests were lower in mathematics and science than in English. This result might be occurring because the mathematics and science courses (and thus their corresponding end-of-course examinations) would have covered a lot of subject matter unfamiliar to students prior to taking the course, which would make each examination especially difficult when taken as a pretest. In English, on the other hand, a larger proportion of the subject matter covered in each course was likely to have been familiar to students from earlier courses, even if at a lower level of complexity. The average scores on the posttests were lowest in mathematics and highest in English.

While the average end-of-course examination scores in mathematics increased about 2 to 3 score points from pretest to posttest, and the average scores in science increased about 3 to almost 5 score points, the average scores in English 10 and English 11 increased by just slightly more than 1 score point and less than one-half score point, respectively. Most alarmingly, the average score in English 12 *decreased* 1 score point from pretest to posttest.

Figure 2: Average Pretest and Posttest Scores for End-of-Course Examinations

Figure 2a: English

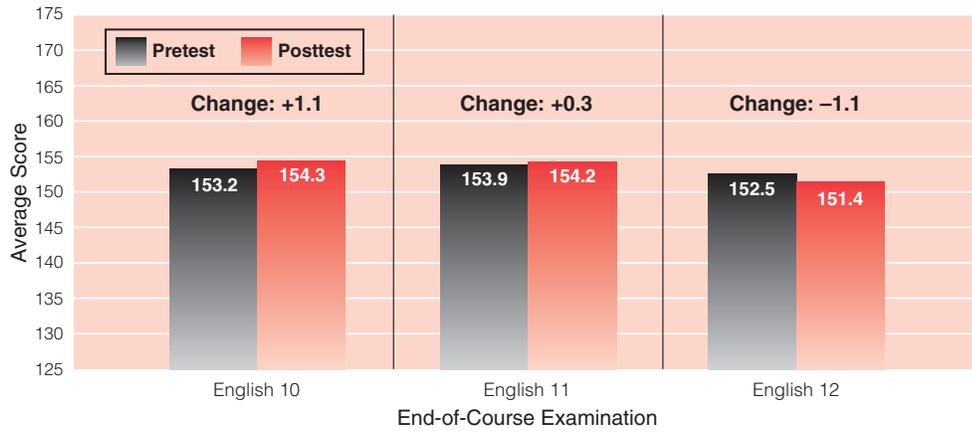


Figure 2b: Mathematics

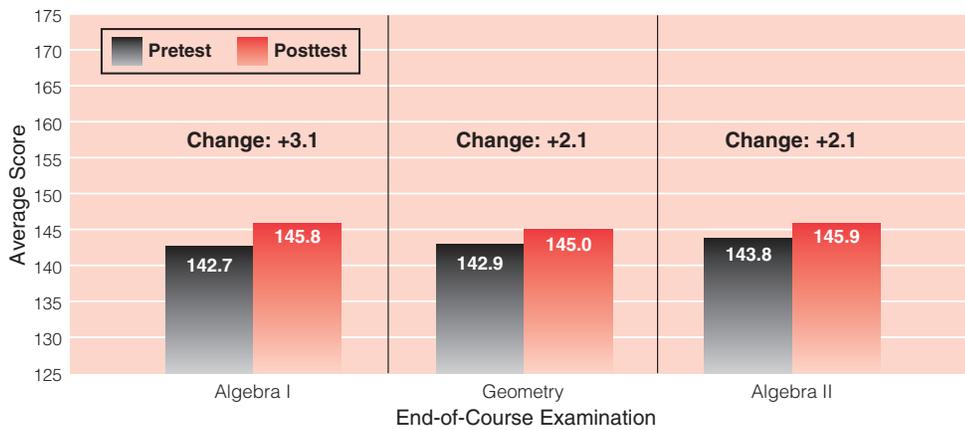
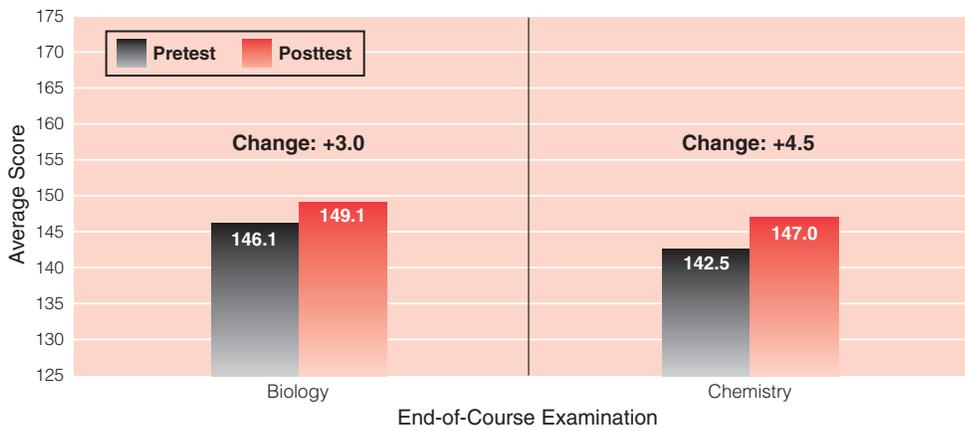


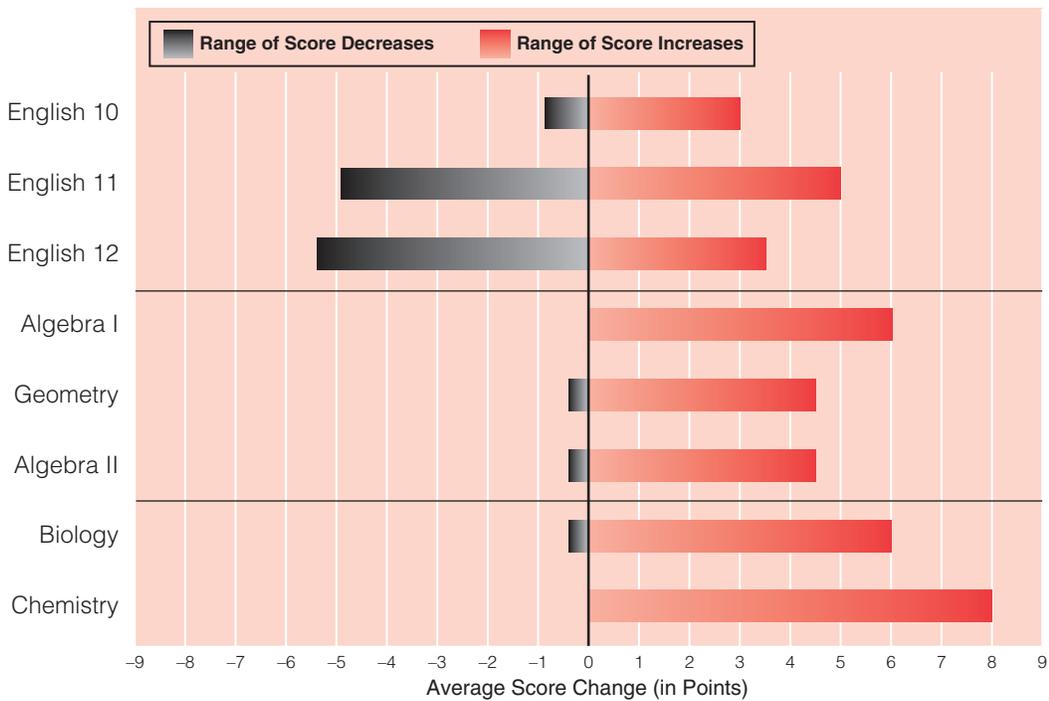
Figure 2c: Science



Wide range of average score changes across schools

Perhaps even more illuminating than the average score change for each course is the *range* of average score increases and decreases across schools for each course. This allows us to see how well all the schools in the study are doing at contributing to the content knowledge of their students. Figure 3 compares the ranges of score changes (defined as a school's average posttest score minus its average pretest score) for each course. The largest range of average score increases occurred in Chemistry, where some schools achieved gains of up to 8 score points. The smallest range of score increases occurred in English 10, where the maximum average gain in a school was only 3 score points.

Figure 3: Ranges of Average Score Increases and Decreases on End-of-Course Examinations



Now let's examine these ranges in greater detail. Figures 4a through 4h on pp.10–11 show, at half-point increments, the distributions of the average score changes for the eight courses.

Figure 4: Score Change Distributions for End-of-Course Examinations

Figure 4a: English 10



Figure 4b: English 11

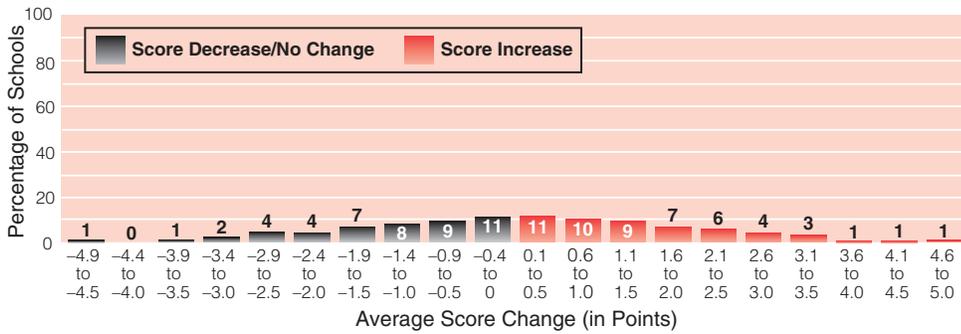


Figure 4c: English 12



Figure 4d: Algebra I



Figure 4e: Geometry

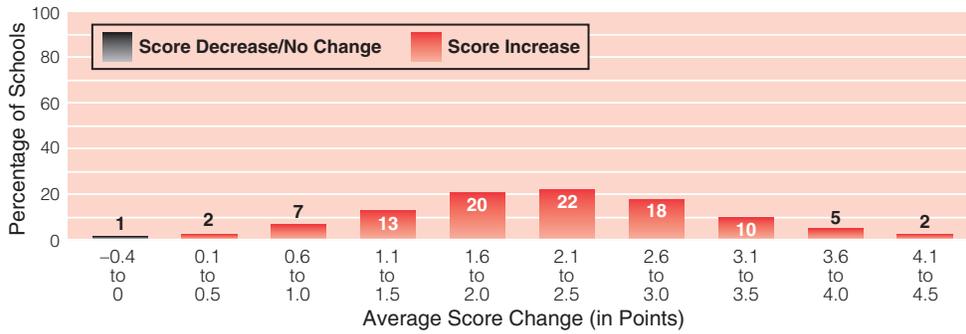


Figure 4f: Algebra II



Figure 4g: Biology



Figure 4b: Chemistry



The results in Figures 4a through 4h are summarized in Table 3.

Table 3: Summary of Score Change Distributions for End-of-Course Examinations

Course (Average Score Change, in Points)	Distribution of Score Changes		% of Schools Showing Score Increases
	All Schools	Majority of Schools (% of Schools Represented)	
English 10 (+1.1)	-0.9 to +3.0	+0.1 to +2.0 (81)	90
English 11 (+0.3)	-4.9 to +5.0	-1.4 to +1.5 (58)	53
English 12 (-1.1)	-5.4 to +3.5	-2.4 to 0.0 (55)	24
Algebra I (+3.1)	+0.1 to +6.0	+2.1 to +4.0 (62)	100
Geometry (+2.1)	-0.4 to +4.5	+1.6 to +3.0 (60)	99
Algebra II (+2.1)	-0.4 to +4.5	+1.1 to +2.5 (59)	99
Biology (+3.0)	-0.4 to +6.0	+2.1 to +4.0 (59)	99
Chemistry (+4.5)	+0.6 to +8.0	+3.6 to +5.5 (54)	100

While Table 3 shows that nearly all schools showed score increases in mathematics, science, and English 10, there is much room for improvement, particularly in English 11 and 12.

Summary

End-of-course examinations focus on the knowledge and skills that students should learn in rigorous high school courses. In this study, the average scores on these examinations were lowest in mathematics, slightly higher in science, and highest in English.

But from pretest to posttest, average scores in mathematics increased about 2 to 3 score points, and average scores in science increased about 3 to almost 5 score points. Average scores in English 10 and English 11 increased by only about 1 score point and less than one-half score point, respectively, while the average score in English 12 decreased by about 1 score point.

The maximum average score increase occurred in Chemistry, and the maximum average score decrease occurred in English 12. The ranges of score-change distributions show that, in all courses except English 12, a majority of the schools are demonstrating gains, although most of these gains are modest. In English 10 and in all the mathematics and science courses, the percentage of schools showing achievement gains exceeds 90 percent; in Algebra I and Chemistry, all of the schools in the study demonstrated gains.

In our nationally representative sample, end-of-course examinations give an indication of the magnitude of the achievement gains that students make on a course-by-course basis at the typical U.S. high school. In the next chapter, we look at the value added by these courses to the college and career readiness of the students who take them. That is, while students for the most part make positive gains in achievement by taking core courses, how much value do these gains actually contribute to students' readiness for college and career at the typical high school?

2.

How Much Are Today's High School Core Courses Helping Students to Become Ready for College and Career?

To answer the study's second question—how much are today's high school core courses increasing those particular skills that students need to become ready for college and career?—we administered the relevant subject tests from ACT's college and career readiness assessments at the start and conclusion of each of the eight courses studied. The PLAN English Test was administered in English 10, the PLAN Mathematics Test in Algebra I, and the PLAN Science Test in Biology; the ACT English Test was administered in English 11 and English 12, the ACT Mathematics Test in Geometry and Algebra II, and the ACT Science Test in Chemistry. These assessments focus on the knowledge and skills that students need to learn in high school in order to enroll and succeed in credit-bearing first-year courses at a postsecondary institution such as a two- or four-year college, trade school, or technical school, or in targeted workforce training programs.

Figures 5a through 5c on p. 16 give the average pretest and posttest scores earned by students at a typical high school on the college and career readiness assessment in the relevant subject area for each course. The scores reported in these figures were calculated using the same method described in chapter 1 for calculating the average end-of-course examination scores in Figures 2a through 2c on p. 8. PLAN and ACT subject test scores are reported on a common scale of 1 to 36, with 32 the highest possible score on a PLAN subject test.

Figure 5: Average Pretest and Posttest Scores for College and Career Readiness Assessments

Figure 5a: English

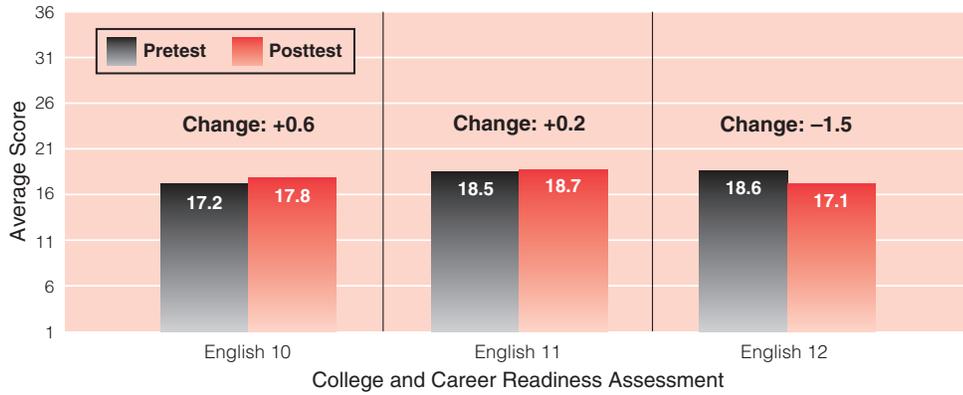


Figure 5b: Mathematics

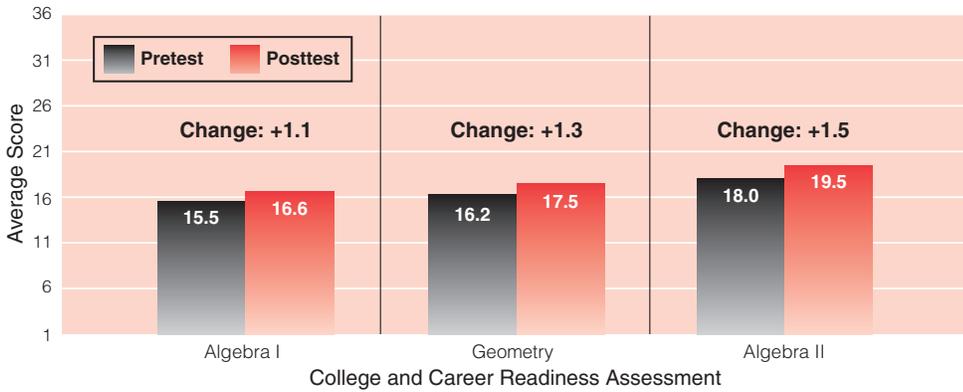
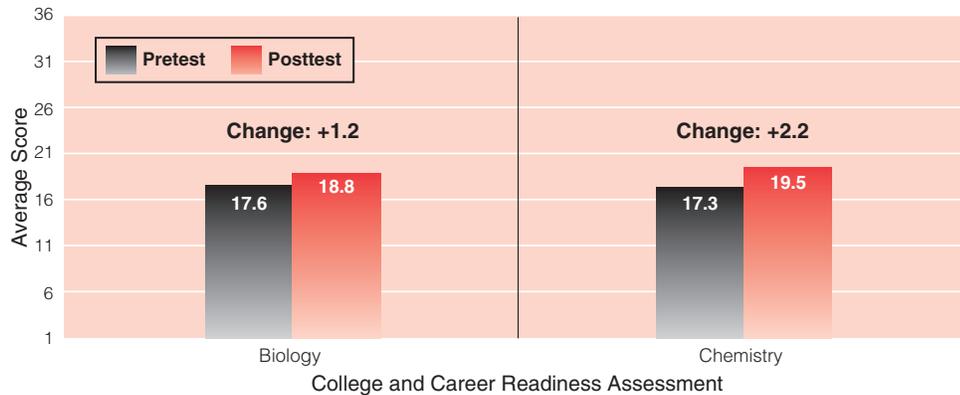


Figure 5c: Science

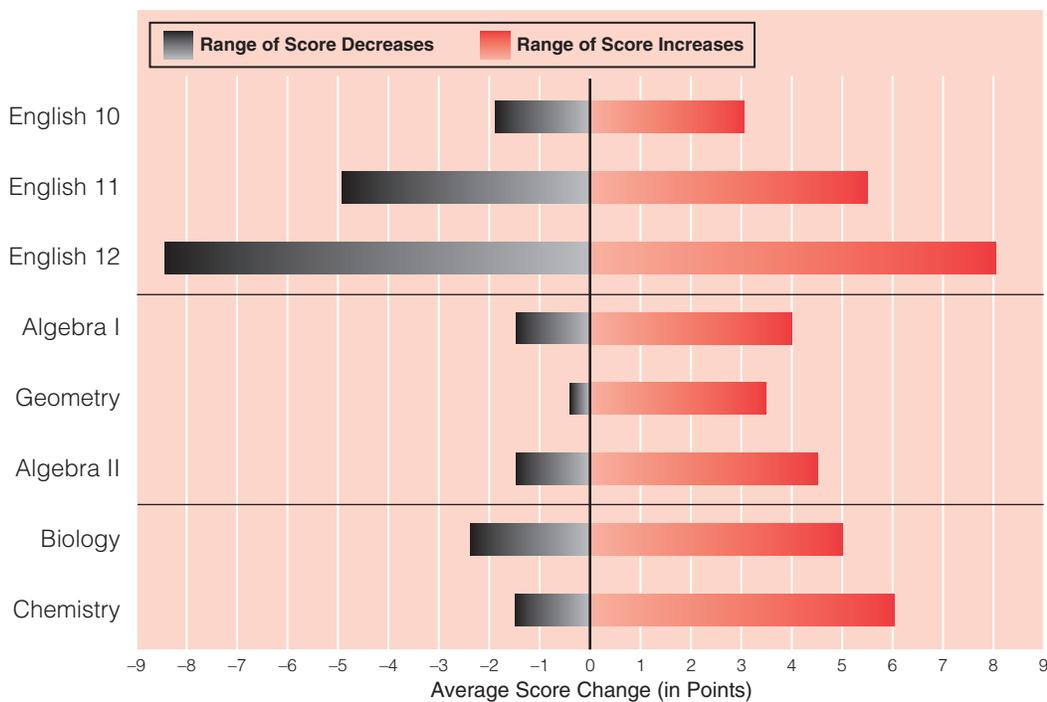


For the most part, the college and career readiness assessment results were similar to the end-of-course examination results, with pretest scores in English generally higher than those in mathematics and science, and overall growth in English much lower than in the other two subject areas. Students gained a maximum of more than 2 score points in science and as many as 1.5 score points in mathematics, but less than 1 score point in English—with, again, the average score in English 12 decreasing from pretest to posttest.

Score-change ranges across schools

Figure 6 compares the ranges of score increases and decreases for each college and career readiness assessment. Interestingly, both the largest average score increase and the largest average score decrease occurred in English 12, where some schools achieved gains of 7.6 to 8 score points and other schools showed decreases of 8 to 8.4 score points.

Figure 6: Ranges of Average Score Increases and Decreases on College and Career Readiness Assessments



Figures 7a through 7h on pp. 18–19 provide the distributions of the average score changes for the college and career readiness assessments in the eight high school courses.

Figure 7: Score Change Distributions for College and Career Readiness Assessments

Figure 7a: English 10

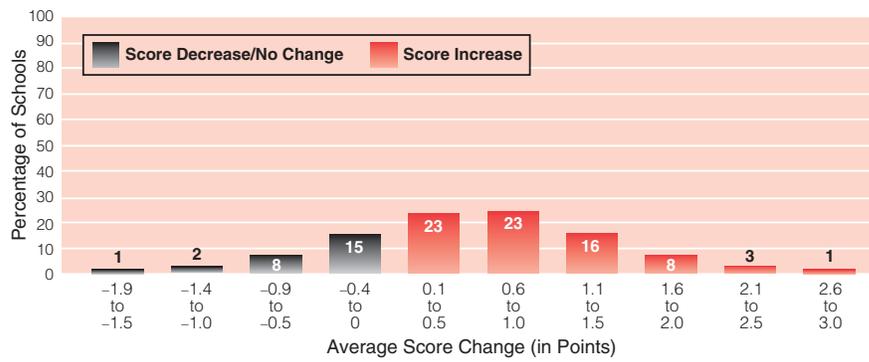


Figure 7b: English 11



Figure 7c: English 12

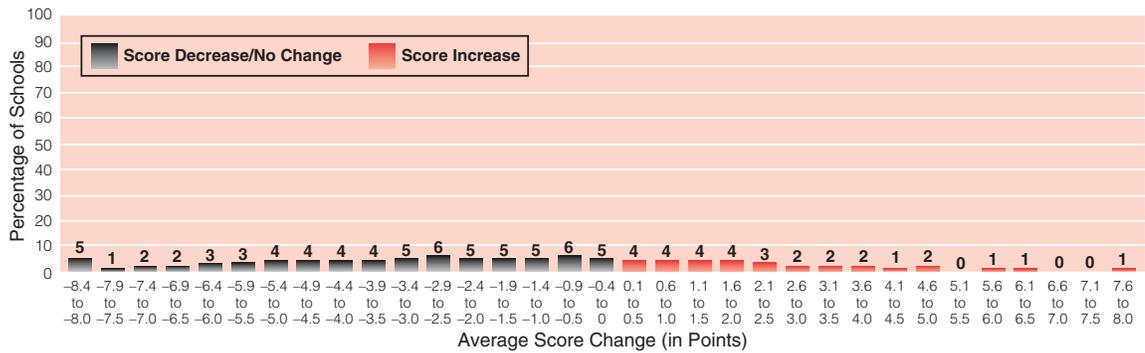


Figure 7d: Algebra I

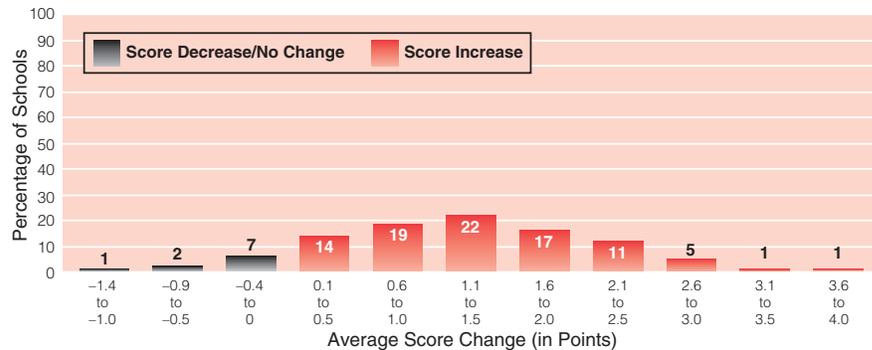


Figure 7e: Geometry

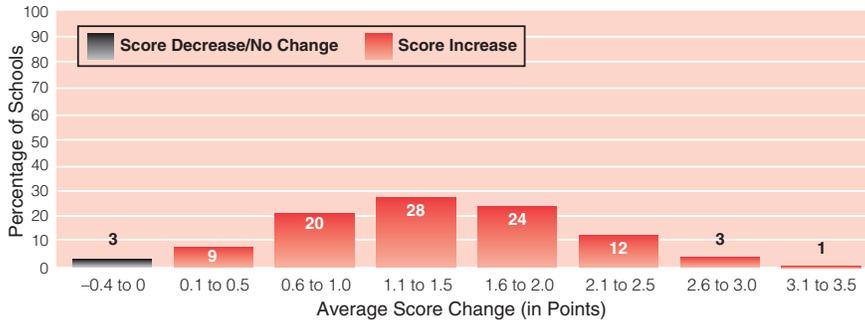


Figure 7f: Algebra II

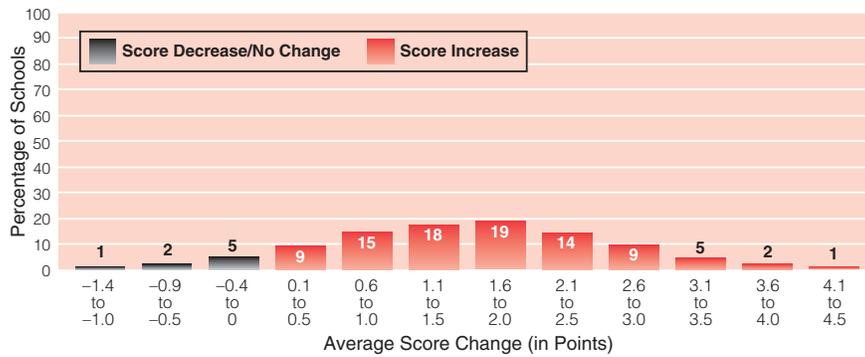


Figure 7g: Biology

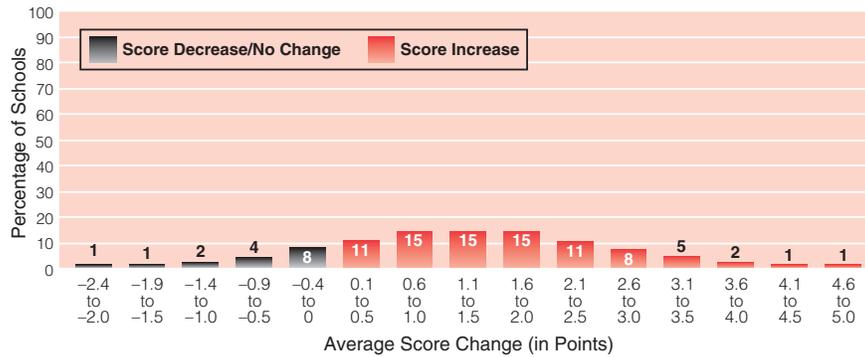


Figure 7h: Chemistry



The results in Figures 7a through 7h are summarized in Table 4.

Table 4: Summary of Score Change Distributions for College and Career Readiness Assessments

Course (Average Score Change, in Points)	Distribution of Score Changes		% of Schools Showing Score Increases
	All Schools	Majority of Schools (% of Schools Represented)	
English 10 (+0.6)	-1.9 to +3.0	+0.1 to +1.5 (62)	74
English 11 (+0.2)	-4.9 to +5.5	-1.4 to +1.5 (54)	54
English 12 (-1.5)	-8.4 to +8.0	-4.4 to +1.0 (53)	31
Algebra I (+1.1)	+1.4 to +4.0	+0.6 to +2.0 (58)	90
Geometry (+1.3)	-0.4 to +3.5	+1.1 to +2.0 (52)	97
Algebra II (+1.5)	-1.4 to +4.5	+0.6 to +2.0 (52)	92
Biology (+1.2)	-2.4 to +5.0	+0.1 to +2.5 (67)	84
Chemistry (+2.2)	+1.4 to +6.0	+1.1 to +3.0 (52)	94

The results shown in Table 4 suggest that, as with the score distributions for the end-of-course examinations, those for the college and career readiness assessments indicate that much work is needed to bring all schools up to the level of the highest-performing schools.

Summary

College and career readiness assessments measure the knowledge and skills a student should learn in high school to graduate prepared for any form of postsecondary education or to enter workforce training programs ready to learn job-specific skills. Overall, the changes in scores between pretest and posttest for these assessments in this study were comparable to those for the end-of-course examinations. While the pretest scores in English were generally higher than those in mathematics and science, overall growth from pretest to posttest was much lower in English than in the other two subject areas.

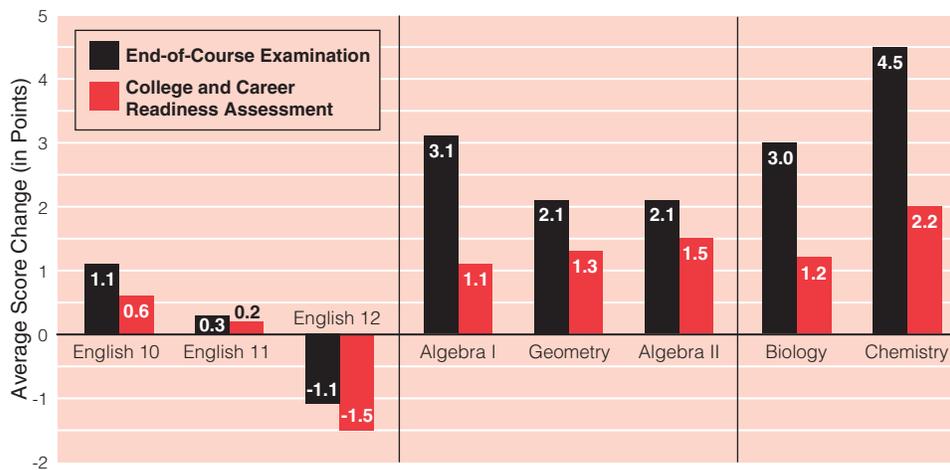
In the previous chapter, we examined student achievement gains in terms of end-of-course examinations that tell us how much course knowledge students acquired during a course. In this chapter, we have noted the degree to which these changes in course knowledge and understanding have contributed to students' college and career readiness. In the next chapter, we compare and contrast the results for the end-of-course examinations and the college and career readiness assessments in greater detail to determine the net effect of value that core courses are adding to student preparation overall.

3.

Are Today's High School Core Courses Adding Value to Both Student Achievement and College and Career Readiness?

Now that we have examined the results for each assessment type in isolation, let's look at them in combination to get an idea of the schools' *overall* progress at adding value to their students' educational experience. Figure 8 compares the average score changes for both the end-of-course examinations and the college and career readiness assessments in each course.

Figure 8: Changes in Average Scores for End-of-Course Examinations and College and Career Readiness Assessments (Pretest to Posttest)⁴



The figure shows that, for example, on the Algebra I end-of-course examination, the average increase is about 3 score points on a scale from 125 to 175. This can therefore be thought of as the “typical” end-of-course gain in Algebra I: that is, the typical school is currently adding that average value to its students’ knowledge and skills with respect to the requirements for a rigorous Algebra I course. Similarly, at the typical school, Algebra I is currently adding about 1 score point on a scale of 1 to 32 to its students’ college and career readiness in mathematics.

⁴ Because scores on the end-of-course examinations and the college and career readiness assessments are reported on different scales, no conclusions should be drawn about the relative sizes of the score changes on the two types of test for a given course.

The typical end-of-course examination gains for Geometry and Algebra II are 1 point smaller than the typical gain for Algebra I. The typical gain for Chemistry is 1.5 points larger than the typical gain for Biology. The typical gain for English 10 is almost 1 point

Study Results at a Glance

1. Score increases were largest in science and smallest in English.
2. In all courses except English 12, a majority of the schools are demonstrating gains, although most of these gains are modest.
3. Too many schools are making no progress at all at raising student achievement.
4. In English and mathematics, successive courses in a sequence are sometimes adding progressively less value to student achievement.

larger than the typical gain for English 11, while for English 12 the typical school shows a *decrease* in average score of more than 1 score point—a decrease, in fact, exactly as large as the increase for English 10. Results for the college and career readiness assessments within subject areas are similar to those for the end-of-course examinations, with the exception that the largest gain in mathematics is for Algebra II and the smallest is for Algebra I, while in English the decrease for English 12 is comparatively even larger than the gains seen in English 10 and 11.

The most notable difference between the course achievement results and the college and career readiness results was found in mathematics: while growth on the college and career readiness assessments was lowest in Algebra I, greater in Geometry, and greatest in Algebra II, growth on

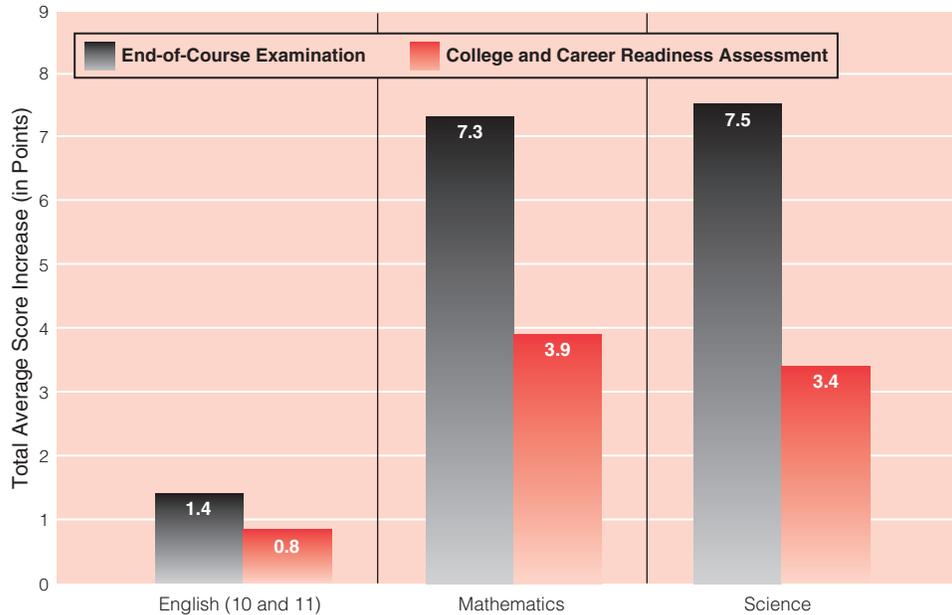
the end-of-course examinations was greatest in Algebra I and lower in the later two courses. These results suggest a possible area of concern regarding the overall rigor of these courses and raise the following question: why aren't the more advanced courses in a hierarchically structured curricular sequence such as mathematics adding at least as much to students' content knowledge as the earlier courses in the sequence?

While course material in English typically does not follow a clear sequential structure in the same way that mathematics does, something similar may be happening in English. Both the end-of-course examinations and the college and career readiness assessments in English indicate the possibility of a potentially serious issue: the decline of added value as students progress from English 10 through English 12.

Results for the end-of-course examinations were highly related to those for the college and career readiness assessments: schools that achieved above-average score changes on the end-of-course examinations were about 80 percent more likely to also achieve above-average score changes on the college and career readiness assessments than schools whose score changes on the end-of-course examinations were average or below average.

Figure 9 combines the average score increases within each subject area.

Figure 9: Total Average Score Increases (Pretest to Posttest) for End-of-Course Examinations and College and Career Readiness Assessments, by Subject Area



The figure shows that, in mathematics, the typical high school is adding 7.3 points to its students' average course achievement and 3.9 points to its students' average college and career readiness assessment score. In science, the typical school is adding at least 7.5 points to its students' average course achievement and at least 3.4 points to its students' average college and career readiness assessment score. (Because most students take more than two science courses in high school, the actual increases are likely higher.) And in English, between English 9 (which was not examined in this study) and English 12 (in which the average score changes were decreases), the typical school is adding 1.4 points to its students' average end-of-course examination score and 0.8 point to its students' average college and career readiness assessment score. Clearly, the subject area in which courses most urgently need to show substantial improvement is English.

The special case of English 12

It may justifiably be argued that the results for English 12 indicate a lack of motivation, rather than a “loss” of knowledge or skills. It is to some extent true that it is difficult to get seniors to put forth their best efforts in a low-stakes testing environment. However, analysis of both the end-of-course and the college and career readiness results for the other four courses in the study that were taken by a significant number of twelfth graders (Geometry, Algebra II, Biology, and Chemistry) shows that the seniors in those courses achieved average score increases—

Teachers of English 12 Are Likely to Teach a Higher Percentage of Skills as “Review”

According to the most recent results of the *ACT National Curriculum Survey* (ACT, 2009), high school teachers of English 12 report having to teach a higher percentage of skills as “review” than did teachers of English 10 or English 11 (see table below). This may be because these were skills that should have been learned in earlier courses, or perhaps because in English, unlike in mathematics and science, course content often does not require being taught in a particular sequence and so may need to be revisited more frequently. This may be borne out by the fact that the percentage of skills taught as review by teachers of English 12 was also much higher than the percentages of skills taught as review in mathematics or science courses.

Course	% of Skills Taught as Review
English 10	29
English 11	38
English 12	41
Algebra I	14
Geometry	26
Algebra II	26
Biology	28
Chemistry	29

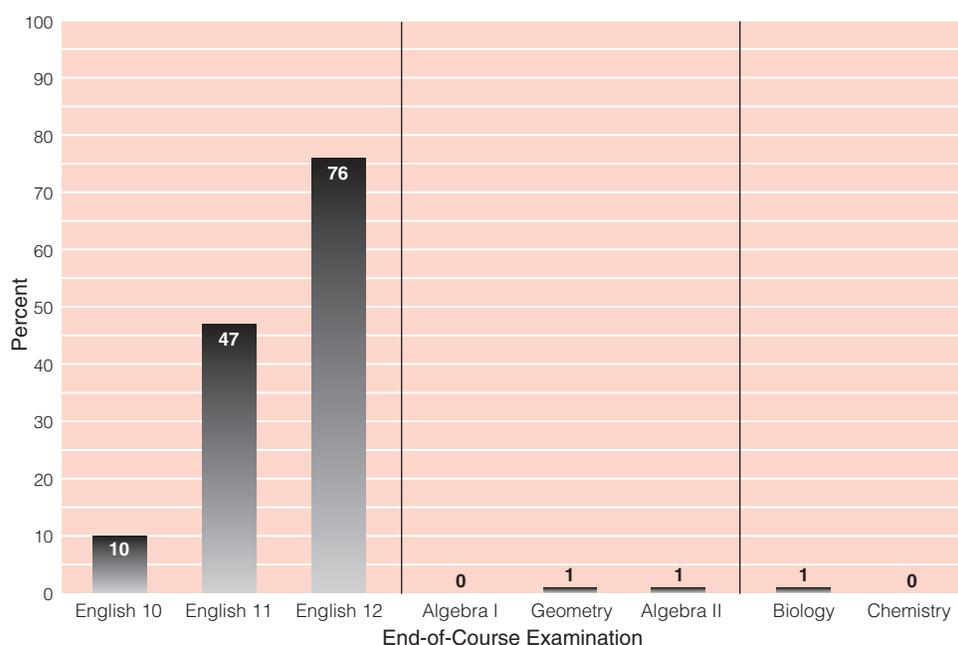
sometimes substantial ones—from pretest to posttest rather than the average decrease seen among the students in English 12. In addition, much smaller percentages of seniors in those courses showed a decrease in score from pretest to posttest than did the students taking English 12.

These results suggest that the negative average score change seen in English 12, while it cannot be said to mean that students “go backward” in terms of what they know, may well be at least as much a function of failing to learn the necessary skills as of lack of motivation. It is also possible that the course content for English 12 is not as rigorous as in the other courses, or not as well aligned with the requirements of college and career; that teachers of English 12 may spend more of their time than teachers in other courses spend re-teaching material that should have been learned in prior courses in the same subject area (see sidebar, this page); or that the quality of teaching in English 12 is not as high as in the other courses. More research will be necessary to identify whether any of these or other factors explains the much poorer average performance of students in English 12 relative to student performance in the other core courses in the study.

Lack of progress at learning high school core course content

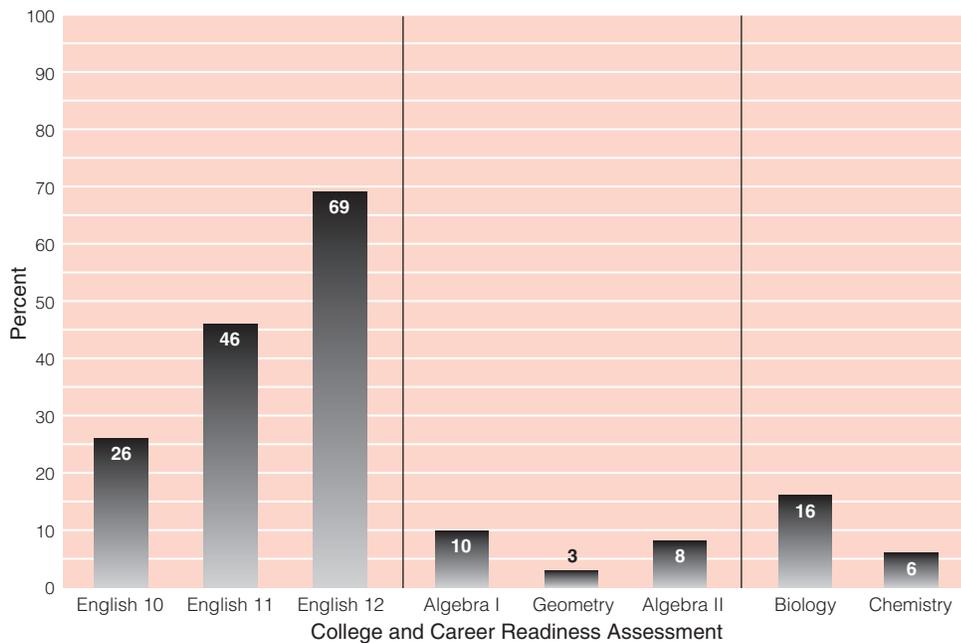
Far too many students are making little or no progress in the core courses. In Figure 10, we see that across the English courses, an average of about 44 percent of schools showed either no gain in average end-of-course examination score or a decrease. That is, more than 4 schools in 10 are making *no progress at all* at helping their students learn the rigorous material necessary for success in college-level English coursework. In mathematics and science, by contrast, the percentages of schools showing either no gain in average end-of-course examination score or a decrease are just 0.67 percent and one-half percent, respectively.

Figure 10: Percentages of Schools Whose Average End-of-Course Examination Scores Showed No Gain or a Decrease from Pretest to Posttest



The comparable results for the college and career readiness assessments are cause for even greater concern. In Figure 11 (p. 26), across the mathematics courses, an average of 7 percent of schools showed either no gain in average college and career readiness assessment score or a decrease. In science, an average of about 1 in 10 schools (11 percent) are making no progress. And across the English courses, an average of 47 percent—nearly half—of schools are making no progress at all at helping their students become ready for college and career in English.

Figure 11: Percentages of Schools Whose Average College and Career Readiness Assessment Scores Showed No Gain or a Decrease from Pretest to Posttest



What percentage of students is making progress toward college and career readiness in each course?

ACT’s College Readiness Benchmarks

The ACT College Readiness Benchmarks are scores on the ACT that indicate likely attainment of the minimum level of knowledge and skills needed to be ready for credit-bearing first-year college coursework in English, mathematics, social science, and natural science.

ACT has also established College Readiness Benchmarks for EXPLORE and PLAN. These scores indicate whether students, based on their performance on EXPLORE (grade 8) or PLAN (grade 10), are on target to be ready for first-year college-level work when they graduate from high school.

Test	EXPLORE	PLAN	The ACT
English	13	15	18
Mathematics	17	19	22
Reading	15	17	21
Science	20	21	24

While examination of school progress necessarily involves discussions of student performance on assessments, it can tend to minimize the effect that classroom instruction is having on the students themselves. Another way of evaluating school progress at improving students’ readiness for college and career is to look at how school performance on college and career readiness assessments affects the overall percentages of students who are ready, or on target to be ready, for credit-bearing first-year college coursework in each subject area. Figures 12a through 12c show the percentages of students in each course in the study whose average pretest and posttest scores on the college and career readiness assessment in the relevant subject area met or exceeded this level of readiness. These percentages were determined using ACT’s College Readiness Benchmarks (see sidebar, this page).

Figure 12: College Readiness Benchmark Attainment Represented by Average Pretest and Posttest Scores for College and Career Readiness Assessments

Figure 12a: English

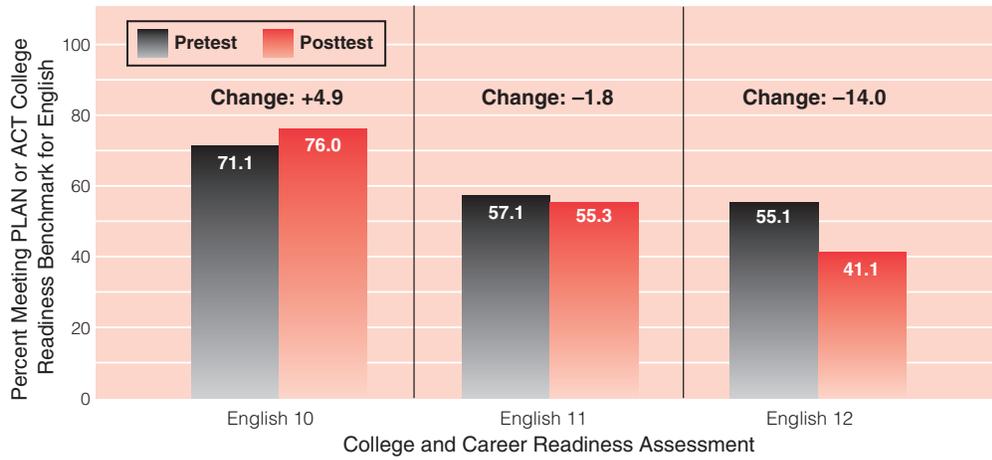


Figure 12b: Mathematics

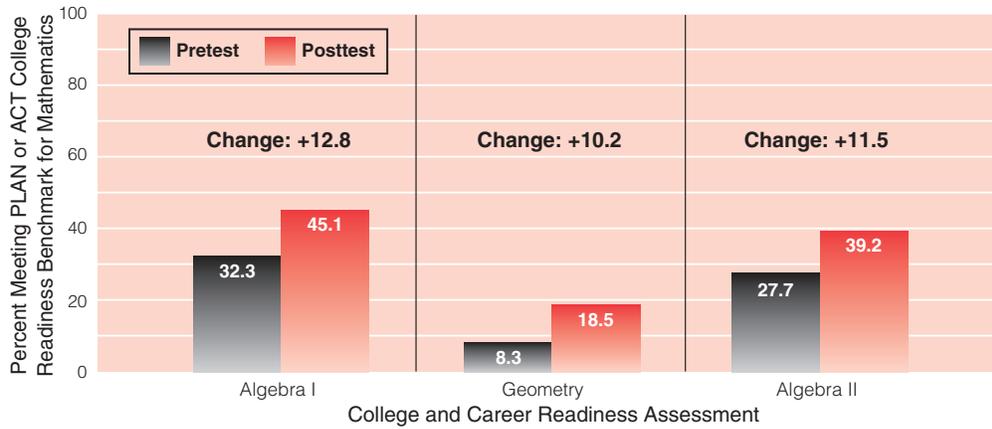


Figure 12c: Science

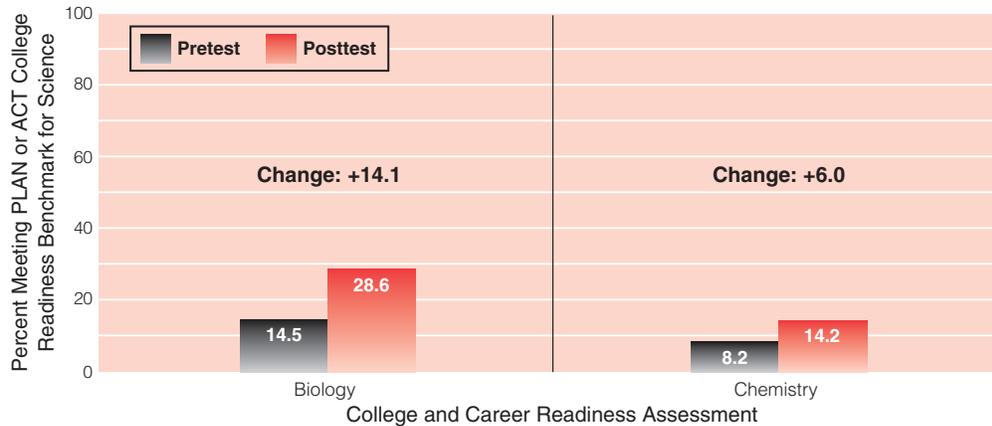
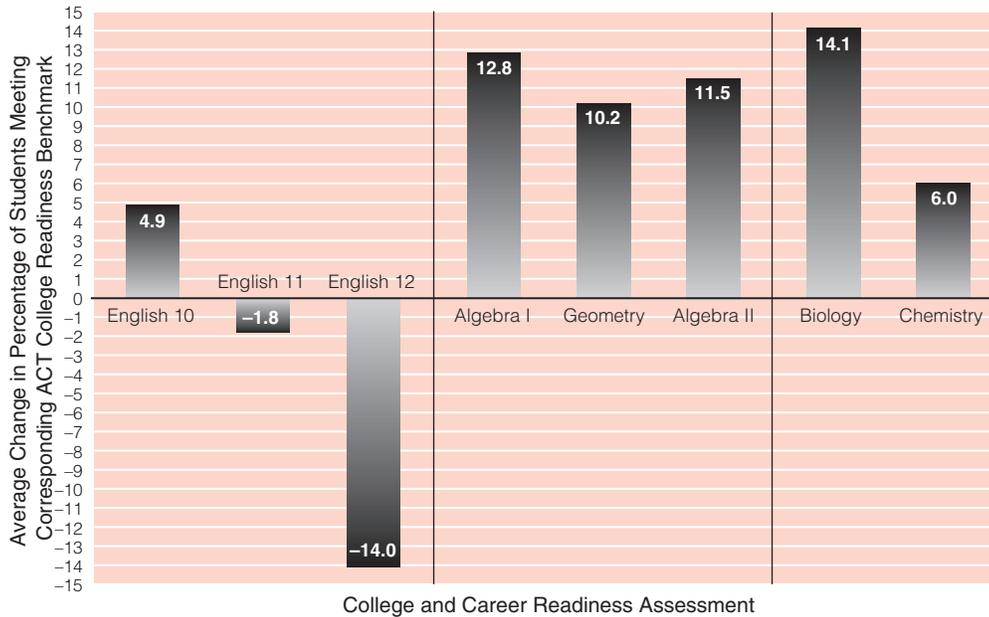


Figure 13 compares the average changes from pretest to posttest in the percentages of students who were ready (or on target to be ready) for college and career in each course.

Figure 13: Average Changes in College Readiness Benchmark Attainment for College and Career Readiness Assessments (Pretest to Posttest)



The figure shows that, at a typical high school, the percentage of students who were ready (or on target to be ready) for entry-level college coursework in mathematics by high school graduation increased by 10.2 to 12.8 percentage points across the mathematics courses, and the average percentage of students who were ready (or on target to be ready) for entry-level college coursework in science by high school graduation increased by 6 to 14.1 percentage points across the science courses. The average percentage of students who were on target to be ready for entry-level college coursework in English by high school graduation increased by 4.9 percentage points after taking English 10, but the percentage of students who were ready for such coursework decreased by 1.8 percentage points after taking English 11, and by 14 percentage points after taking English 12. These results indicate once again that high schools need to devote significant attention and resources to raising the college and career readiness of their students in English.

Note that the percentage changes shown here do not always parallel the average score changes for the college and career readiness assessments given in Figure 8. This is because not all changes from pretest to posttest in individual student scores affect the number of students who met or exceeded a particular score, such as one of the College Readiness Benchmarks. To take the clearest example, although enough students' scores on the ACT English Test increased sufficiently to raise the average score 0.2 point in English 11, among the same group of students enough scores also decreased to below 18 in English 11 to lower the percentage of students meeting the ACT College Readiness Benchmark for English by 1.8 percentage points.

In each subject area, the greatest change from pretest to posttest in the percentage of students who were ready (or on target to be ready) for college and career occurred in the first course in the sequence. In English and science, the percentage change declined steeply in subsequent courses; in mathematics, the percentage change declined slightly in the second course then increased again slightly in the third course.

Summary

On both the end-of-course examinations and the college and career readiness assessments, the typical high school demonstrated positive but generally modest score gains in all subjects except English 12. On the college and career readiness assessments in mathematics and science, student growth was greatest in the earliest course in the sequence and increased steadily in the subsequent course or courses. This is encouraging because it should generally be the case that more advanced courses in a sequence add more to students' content knowledge or to their college and career readiness. By contrast, on the end-of-course examinations in mathematics and on both the end-of-course examinations and the college and career readiness assessments in English, student growth was greatest in the earliest course and declined in the subsequent courses—sometimes sharply.⁵ These are therefore areas of particular concern for schools attempting to increase the content knowledge and the college and career readiness of their students.

⁵ In mathematics, it is unclear why the value added to content knowledge appears to decrease in each subsequent course while the value added to college and career readiness appears to increase.

The typical score decreases seen in English 12 for both the end-of-course examinations and the college and career readiness assessments may suggest that students in English 12 are less motivated to perform well than students in the other courses. Compared to the performance of twelfth-grade students in other courses where achievement is increasing, however, it may also mean that the students in English 12 are failing to learn the necessary knowledge and skills. These results may be due to any number of factors, and clearly more research will need to be conducted to determine which of these factors plays the most significant role in influencing the score decreases seen in English 12.

Too many schools are making insufficient progress in the core courses. The end-of-course examination results suggest that 44 percent of schools are showing no progress at all at conveying the rigorous material necessary for success in college-level English coursework. Results for the college and career readiness assessments are even worse, with about 47 percent of schools showing no progress in English, 11 percent showing no progress in science, and 7 percent showing no progress in mathematics.

With regard to the impact of schools on the percentages of their students who are ready (or on target to be ready) for credit-bearing first-year college coursework or workforce training programs, the typical school shows an increase of about 11.5 percentage points across the mathematics courses, an increase of about 10 percentage points across the science courses, and a decrease of about 3.6 percentage points across the English courses.

Conclusion and Recommendations

The findings of the study discussed in this report reveal the following trends:

- ▼ In seven of the eight high school core courses, a majority of the schools are demonstrating modest gains in course achievement. In English 12, students may possibly be less motivated to perform well than students in the other courses, or they may in fact not be learning the necessary knowledge and skills.
- ▼ A substantial percentage of high schools are performing below average at improving the college and career readiness of their students. Worse, nearly half of schools are showing no progress at all toward improving their students' college and career readiness in English, while only 10 percent or less are showing no progress in mathematics or science.
- ▼ The typical school shows an increase in the percentage of its students who are on target for college and career readiness of about 11 percentage points across the mathematics courses and science courses, but a decrease of about 3.6 percentage points across the English courses.
- ▼ In mathematics and science, student growth in college and career readiness was greatest in the earliest course in the sequence and increased steadily in the subsequent course or courses. In English, however, the reverse was true.

By describing the current state of the core courses in a nationally representative sample of high schools, this report sets a baseline against which the success of the necessary improvements that schools must make in order to better serve our nation's high school graduates may be compared. This baseline, consisting of the average school-level score changes observed in the end-of-course examinations and the college and career readiness assessments for each course as well as the average changes observed in College Readiness Benchmark attainment observed in each course, is presented in Table 5 on p. 32.

Table 5: Changes in Average Scores for End-of-Course Examinations and College and Career Readiness Assessments, and Changes in College Readiness Benchmark Attainment for College and Career Readiness Assessments (Pretest to Posttest)

Course	Average Score Change, End-of-Course Examination, in Score Points	Average Score Change, College and Career Readiness Assessment, in Score Points	Average Change in College Readiness Benchmark Attainment, in Percentage Points
English 10	+1.1	+0.6	+4.9
English 11	+0.3	+0.2	-1.8
English 12	-1.1	-1.5	-14.0
Algebra I	+3.1	+1.1	+12.8
Geometry	+2.1	+1.3	+10.2
Algebra II	+2.1	+1.5	+11.5
Biology	+3.0	+1.2	+14.1
Chemistry	+4.5	+2.2	+6.0

The report also shows that much work needs to be done: nearly half of the schools in the study need to do a better job of improving the value they add to their students' knowledge and skills, and of accelerating student progress so that more students graduate high school prepared for college and career. How do we help ensure that more schools are able to prepare more students for college and career? Based on the results of this study, we offer the following recommendations:

- 1. Core course content must be aligned with the requirements of postsecondary educational institutions and workforce training programs.** The core courses must, as a priority, focus on the essential knowledge and skills for college and career readiness.
- 2. Teachers must reinforce the rigor of core course content.** A rigorous course syllabus is only a blueprint: it is the important task of teachers to serve as the bridge between curriculum content and student learning, through assignments that reflect the priority of college and career readiness skills.
- 3. The core courses must be progressively sequenced.** In too many cases, course syllabi in a given subject area rely too heavily on re-teaching from year to year and do not capitalize on what students have already learned.

- 4. Schools must offer teachers professional development opportunities tied to the rigorous curriculum.** Such development is a crucial means of providing teachers with the resources that enable them to best teach to college- and career-ready standards.
- 5. Schools must monitor student progress toward becoming ready for college and career by high school graduation.** Such monitoring should take place, at a minimum, at the start and end of each school year.
- 6. School districts must intervene with students who are not on target to become college and career ready.** ACT research (ACT, 2008) shows that without early identification of such students, whether through course examinations or other diagnostic tools, it may be very difficult if not impossible for all students to reach college and career readiness by high school graduation.
- 7. Educators must adopt best practices used at other schools to further student growth.** By observing and learning from the practices of schools and classrooms that are currently achieving high levels of growth and applying these practices at all high schools in the country, we can help ensure that more students graduate ready for college and career.

There is rigor in the core courses at some schools now. Let's work to ensure that *all* core courses are of sufficient rigor so that more graduates are prepared to take advantage of educational and career-training opportunities after high school. Failing to provide high school graduates with the help they need is to fail at the very mission of education: preparing our children for a successful life.

The time to begin is now.

Appendix: Sampling Process and Study Methodology

A stratified random sampling design was used in which schools were stratified by size, type (public/private), and geographical location. School size and type were explicit strata. Extremely small schools (fewer than 100 students per grade) were excluded because the low number of students in a course would not provide stable results. Within the explicit strata, the list of schools was ordered by ZIP code and a systematic sample was drawn. This implicit stratification was to obtain a geographic representation of schools.

Based on the precision necessary to attain a reasonable spectrum of school performance, the minimum number of schools per course was set at 50 to 60. To meet this minimum, approximately 90 schools per course were invited to participate. Some schools tested in more than one subject area. During recruitment, the number of schools in each stratum was carefully monitored in order to maintain the representativeness of the sample. Table 6 lists the characteristics of the target population and the 62 participating schools. As can be seen, the Midwest and Southwest were somewhat overrepresented, and the East and West were somewhat underrepresented.

Table 6: Percentage of Population and Sample by Stratum

Stratum		Target Population	Sample
Type	Public	92	88
	Private	8	12
Size	400–799	39	43
	800-plus	61	57
Region	East	46	38
	Midwest	24	41
	Southwest	10	14
	West	19	7

The matching process yielded a total of 35,228 individual student records at the 62 schools. Table 7 on p. 36 gives the gender and racial/ethnic characteristics of the matched sample.

Table 7: Matched Sample Description (n = 35,228)

Variable		Percentage
Gender	Female	53
	Male	47
Race/ethnicity	African American	7.0
	American Indian	0.4
	Asian American/Pacific Islander	2.0
	Hispanic	8.0
	Multiracial	5.4
	White	67.4
	No Response	9.7

As part of the study, students in each course were required to take the QualityCore test for that subject area, and either the PLAN or the ACT subject test. The choice of PLAN or the ACT was guided by the level of the course, and whether it was more appropriate to give PLAN or the ACT to the majority of students at that level. The test pairings are shown below.

- QualityCore English 10 Test PLAN English Test
- QualityCore English 11 Test ACT English Test
- QualityCore English 12 Test ACT English Test
- QualityCore Algebra I Test PLAN Mathematics Test
- QualityCore Geometry Test ACT Mathematics Test
- QualityCore Algebra II Test ACT Mathematics Test
- QualityCore Biology Test PLAN Science Test
- QualityCore Chemistry Test ACT Science Test

Table 8 gives, by grade level, the percentages of students who took each course in the study.

Table 8: Percentages of Students in Each Course, by Grade Level

Course	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12	Missing	TOTAL*
English 10	0	5	91	2	0	2	100
English 11	0	0	5	92	2	2	101
English 12	0	0	0	10	88	2	100
Algebra I	10	72	12	2	1	2	99
Geometry	0	22	58	16	3	1	100
Algebra II	0	3	36	51	8	1	99
Biology	0	32	54	10	2	3	101
Chemistry	0	3	42	48	6	1	100

* Percentages do not always sum to 100 due to rounding.

Each of the QualityCore tests has two parts lasting 45 minutes each. The PLAN and ACT components last between 25 and 60 minutes, depending on the test. Thus, testing time for both the pre- and posttests ranged from about 2 to 2.5 hours. For the pretest, all students took the same form of QualityCore and either PLAN or the ACT. On the posttest, two forms of QualityCore were spiraled within a classroom. One of these forms was the same as the pretest form. For the PLAN and ACT posttests, one form was used, and this form was distinct from the form given on the pretest.

Each student in a sampled school was tested at the beginning of the school year and at the end of the school year. The pretest and posttest records of study participants were matched together in order to compute score changes over time. Some data had to be discarded because it was not possible to discern which test was the pretest and which was the posttest. The matching fields used were the QualityCore exam, high school code, and student first and last name. After the initial electronic match, the records went through two cycles of hand matching.

Any record with fewer than 10 responses, or with posttest scores lower than what would be expected if each response was a random guess, was deleted from the analysis. Any answer sheet with a cyclic pattern of responses (such as ABCDABCD...) or with identical responses throughout (such as all Cs) was also deleted.

Because the QualityCore tests are split into two 45-minute sessions, many schools chose to test over two days. Therefore, there is a small number of students who took only half the test. The two test halves are parallel, so rather than losing the record completely, the raw score on the half-test was doubled, and the scaled score was calculated based on this value. This did not introduce any bias into the data, but these scores are less reliable. Because of the small number of such records, this is not viewed as an important factor.

To assure that the academic achievement level of the sample was representative of the achievement level of schools across the nation, weights were created using the schools' average ACT Composite scores and those of all U.S. high schools with more than 50 ACT-tested students. This weighting ensured that the schools in the sample are similar to schools nationwide with respect to overall academic level. These weights were then applied to the scores to create norms.

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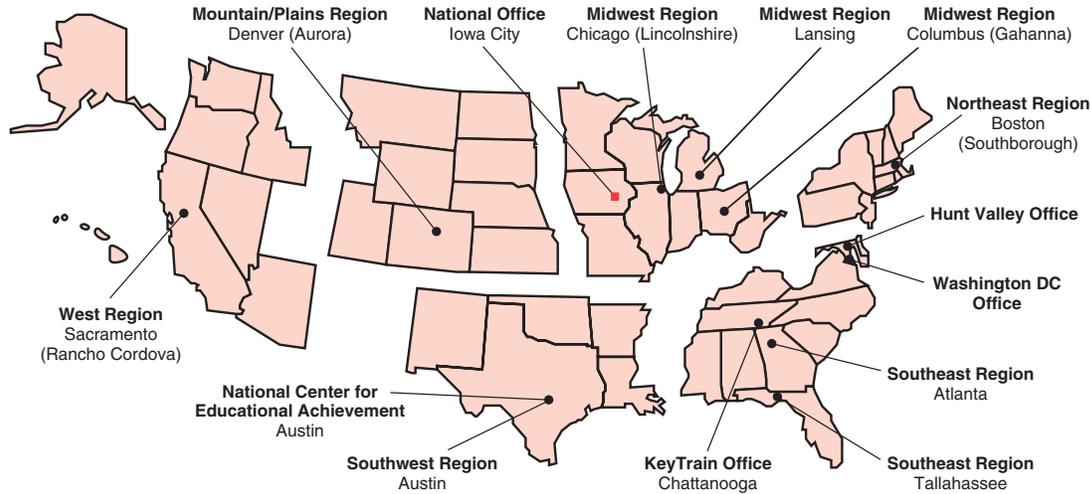
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