



What We Know About College Success:

Using ACT Data to Inform Educational Issues

The pending reauthorization of the federal Higher Education Act has reinvigorated the debate over the value of U.S. higher education.¹ Secretary of Education Margaret Spellings has proposed mandated testing of college students or graduates as one means of measuring the amount of knowledge and skill they gain from college. State governors and legislators continue to express alarm at persistent higher education cost increases at rates substantially greater than standard inflation rates. Other evidence of a growing interest in holding higher education institutions accountable is more tangible, through recent changes in accreditation standards that focus less on inputs and more on outcomes.

The National Governors Association and the Commission on the Future of Higher Education both advocate increased communication and curricular alignment between postsecondary institutions and secondary schools. With increased alignment, students are more likely to be ready for credit-bearing entry-level college courses. If students are ready for college, dropout rates and the costs of remediation are reduced and more students persist in and graduate from college. ACT research related to college readiness and college success is rich and extensive and offers insights about the impact of readiness on college success. Below we highlight findings of these studies.

College Recruitment

- The three most important determiners of where a student will enroll in college are the rank order of a student's college choice (first choice, second choice, etc.), the distance they live from the college, and their ACT Composite score.
- The closer the fit between a high school student's planned college major and the programs offered by a given postsecondary institution (also taking into account the perceived reputation of those programs), the more important the student's planned major is in determining whether the student will enroll at that institution.
- A student whose list of college choices follows a particular pattern typical of students who eventually enroll in an out-of-state or private institution is more likely to enroll in one of these institutions than a student whose list of college choices does not follow this pattern.

¹ The U.S. Congress most recently amended and reauthorized the U.S. Higher Education Act in 1998. Its original legal authority expired September 30, 2004. But, absent agreement on a newly amended and reauthorized Act, the legal authority of the 1998 Act has been extended by continuing resolutions and remains in effect today.

College Enrollment

- Students who are ready for college (i.e., who meet the ACT College Readiness Benchmarks) are substantially more likely to enroll in college than those who are not ready. This is true of all students regardless of gender, racial/ethnic group, or family income.
- The college enrollment gap between white and racial/ethnic minority students is reduced for students who are ready for college in mathematics or science.
- Students who engage in earlier college readiness planning, such as through taking both PLAN® (10th grade) and the ACT® test (11th and 12th grade), are more likely to enroll in college than students who take only the ACT (by 7 percentage points). Similar results are found across gender, racial/ethnic, or family income groups.
- Students who take higher-level mathematics, social studies, and/or science courses in high school are generally more likely to enroll in college than students who do not take these courses (by 7 to 25 percentage points). This is true for most gender, racial/ethnic, or family income groups.

College Remediation

- Students who are ready for college are less likely to need remediation in English or mathematics than students who are not ready (typically by 36 to 47 percentage points), regardless of gender, race/ethnicity, or family income.
- Students who engage in earlier college readiness planning, such as through PLAN and the ACT, are less likely to need remediation in English or mathematics than those who participate only in the ACT (by 3 to 12 percentage points).
- Students who take or plan to take a core curriculum in high school are less likely to need remediation in English or mathematics than those who do not take or plan to take a core curriculum (typically by about 8 percentage points), regardless of gender, race/ethnicity, and family income.
- Students who take higher-level English courses and a foreign language in high school are less likely to need remediation in English than those who do not take these courses (by up to 31 percentage points), regardless of gender, race/ethnicity, or family income.
- Students who take higher-level mathematics courses in high school are less likely to need remediation in mathematics than those who do not take these courses (by up to 34 percentage points), regardless of gender, race/ethnicity, or family income.

Performance in First-Year College Courses

- Students who are ready for college are more likely to achieve a grade of B or higher in specific college courses (typically by 20 to 25 percentage points) than those who are not ready. This finding is consistent across gender, racial/ethnic, and family income groups.
- Students who take a core curriculum in high school are more likely to succeed in specific first-year college courses (typically by 8 percentage points) than students who do not take a core curriculum. This is particularly true for social science and science courses.
- Taking additional English courses in high school, or taking one or more foreign languages with these courses, does not substantially affect success in first-year college English composition courses.
- Taking additional social studies courses in high school is associated with a slight increase in students' chances of success in first-year social science courses (by 4 to 8 percentage points).
- Taking higher-level mathematics courses in high school is associated with increases in students' chances of success in first-year mathematics courses (by 3 to 28 percentage points).
- Taking higher-level science courses in high school is associated with increases in students' chances of success in first-year science courses (by 11 to 25 percentage points).

First-Year College Grade Point Average (GPA)

- Students with higher ACT scores are more likely to achieve a first-year college GPA of 2.0 or higher or 3.0 or higher than students with lower ACT scores, regardless of gender, race/ethnicity, or family income.
- Students who are ready for college are more likely to achieve a first-year college GPA of 2.0 or higher or 3.0 or higher than those who are not ready (by 11 to 23 percentage points across subject areas).
- Students who take a core curriculum in high school are more likely to achieve a first-year college GPA of 2.0 or higher or 3.0 or higher than students who do not take a core curriculum (by 7 to 9 percentage points), regardless of gender, race/ethnicity, or family income.
- Students who take higher-level courses in high school are more likely to achieve a first-year college GPA of 2.0 or higher or 3.0 or higher than students who do not take these courses (by as much as 27 percentage points), regardless of gender, race/ethnicity, or family income.
- Students who are highly motivated (as measured by the ACT Student Readiness Inventory) have higher first-year college GPAs.

Persistence to a Second Year of College at the Same Institution

- Students who are ready for college in all four subject areas are more likely to re-enroll at the same postsecondary institution their second year than those who are not ready (by about 13 percentage points). This finding is generally consistent across gender, racial/ethnic, and family income groups.
- Differences in retention rates across racial/ethnic groups are reduced among students who are ready for college in mathematics or science, compared to those who are not ready.
- Differences in college retention rates across racial/ethnic groups are reduced among students who take either higher-level mathematics or higher-level science courses in high school, compared to students who do not take these courses.
- Students who take higher-level mathematics, social studies, and/or science courses in high school are generally more likely to return to the same institution for their second year of college than students who do not take these courses (by 5 to 16 percentage points). This is true for most gender, racial/ethnic, and family income groups.
- Students who are academically self-disciplined, socially engaged, and committed to college are substantially more likely to return to the same institution for their second year of college than students who are not.

Academic Proficiency by the Second Year of College

- Students who are ready for college demonstrate greater academic proficiency by their sophomore year in college (as measured by the ACT Collegiate Assessment of Academic Proficiency, or CAAP) than those who are not ready, regardless of subject area.
- Students who earn higher ACT scores demonstrate greater academic proficiency by their sophomore year in college (as measured by CAAP) than those who earn lower ACT scores, regardless of subject area.
- Students with higher ACT scores demonstrate greater academic proficiency than those who earn lower ACT scores by their sophomore year in college (as measured by CAAP), regardless of subject area.

Performance, Progress, and Success beyond the Second Year of College

- Students who are ready for college are more likely to achieve a cumulative college GPA of 2.5 or higher (by 18 to 22 percentage points), persist beyond the first year of college at the same institution (by 7 to 13 percentage points), progress towards a college degree (by 15 to 20 percentage points), and complete a college degree (by 5 to 17 percentage points) than those who are not ready. These results are consistent across gender, racial/ethnic, and family income groups.
- When students are ready for college in more than one subject area, they are more likely to achieve a cumulative college GPA of 2.5 or higher.
- Differences in college GPA success rates across racial/ethnic and income groups are reduced when students are ready for college.

- Students who take a core curriculum in high school are more likely to achieve a cumulative college GPA of 2.5 or higher (by 11 percentage points), persist beyond the first year of college at the same institution (by 8 percentage points), progress towards a college degree (by 13 percentage points), and complete a college degree (by 8 percentage points) than those who do not take a core curriculum. These results are consistent across gender, racial/ethnic, and family income groups.
- Students who take higher-level mathematics or science courses in high school are more likely to achieve a cumulative college GPA of 2.5 or higher (by 13 and 17 percentage points), persist beyond first year of college at the same institution (by 9 and 13 percentage points), progress towards a college degree (by 15 and 20 percentage points), and complete a college degree (by 10 percentage points) than those who do not take these courses. These results are consistent across gender, racial/ethnic, and family income groups.
- Students who are academically self disciplined, socially engaged, and committed to college are more likely to persist to college graduation than those who are not.
- The closer the fit between students' interests and their college major (as measured by the ACT Interest Inventory) the less likely those students are to change their major by the third year of college.

Success after College

- Students' earnings increase as their ACT scores increase: for every 10-percent increase in ACT score, earnings increase by as much as 2 percent.
- The closer the fit between students' career interests and their choice of career (as measured by ACT's UNIACT), the higher their earnings are likely to be: for every 10-percent increase in career-choice fit, earnings increase by as much as 1.3 percent.

Recommendations

College readiness is highly related to college success. Our research suggests the following recommendations to maximize students' chances of succeeding in college:

- Students should take ACT's recommended core curriculum in high school (4 years of English and 3 years each of mathematics, science, and social studies).
- Students should take higher-level mathematics and science courses in high school (i.e., mathematics beyond Algebra II and science beyond Chemistry).
- Students should work hard to increase their academic self-discipline, degree of social engagement, and commitment to benefiting from postsecondary education.
- Students should choose a college major that fits as closely as possible with their personal interests.



The Economic Benefits of Academic and Career Preparation

Introduction

In an increasingly complex and specialized global economy, education and training beyond high school are crucial to the ability of high school graduates to earn a self-sufficient living and to support a family. Without such education and training, high school graduates are more likely than ever before to see the options for their future narrow as the number of good jobs available to people with only a high school diploma dwindles.

In order to succeed in college, students must graduate from high school ready for the demands of postsecondary education. ACT research (ACT, 2006, 2007) highlights the importance to all high school students of taking a rigorous core preparatory curriculum regardless of whether their intent is to enter a workforce training program or a four-year college or university after graduation. In addition, ACT believes that students should start career planning as early as middle school, by learning about their interests and their academic strengths and weaknesses as they begin to consider postsecondary and career options (ACT, 2005).

How can we tell whether all of this planning and preparation ultimately matters? Long-term change in salary is a strong indicator of career success and economic well-being. A recent study (Neumann, Olitsky, & Robbins, 2007) examined whether the long-term earnings of first-year college students can be predicted by 1) their academic preparation in high school, as measured by ACT Composite score; and 2) the degree to which their career interests fit their planned choice of career.

Economists have previously studied predictors of salary attainment (e.g., Mincer, 1974), focusing on constructs including educational level, ability, and occupational choice (Blackburn & Neumark, 1992; Ehrenberg, 2004). Research such as the National Education Longitudinal Study has also shown an association between salary attainment and measures of general intelligence regardless of education level. And Tracey and Robbins (2006) demonstrated a relationship between career interest and measures of college outcomes, such as cumulative grade point average, retention, and graduation status. But to our knowledge, researchers have not until now examined academic preparation and career-interest fit as predictors of salary attainment.

The Study

We surveyed alumni from more than 300 colleges and universities who had taken the ACT® test in high school and earned college degrees. We asked the survey participants about their college experience, their current work, and their current salary. The data obtained from the surveys was then linked to data on participants' ACT Composite scores, demographic characteristics, high school accomplishments, career interests, and educational and career aspirations. (This information had been collected in high school at the time the participants took the ACT.)

Findings

1. As ACT Composite score increased, average salary also increased.
2. As the amount of agreement between participants' stated career interests and their stated career aspirations increased, average salary also increased.
3. These relationships held for both male and female participants, regardless of college major or ultimate educational attainment.

Conclusion

The positive relationship between ACT Composite score and earnings, and that between career-interest fit and earnings, speak to the importance of academic achievement and early career planning in the future economic well-being of our workforce. Not only do college readiness and early career planning directly affect success in postsecondary education but, just as important, they predict long-term salary attainment, regardless of gender, college major, or ultimate educational attainment.

The results of this study reinforce the *economic* imperative for all high school students to become ready for college and a career. We already know that students who are ready for college are more likely to enroll in college, less likely to need remedial coursework during their first year of college, more likely to succeed in their college courses, and more likely to earn a college degree (ACT, in press). Now, we also know that students who are ready for college are also more likely to earn higher long-term salaries after college graduation.

In addition, career planning is important for all. Career interests and tentative career plans begin to form as early as sixth grade, gradually developing and taking shape over the middle school and high school years. Age-appropriate career assessment, exploration, and planning activities encourage students to consider, and focus on, personally relevant career options. Educators, counselors, and parents can have a positive influence on the educational and career aspirations of students by following a few basic guidelines, outlined below.

In middle school:

- Begin talking to students about their academic and career interests. Help students begin to identify broad career fields consistent with their interests.
- Help students begin to understand the connections between academic coursework, college, and future career.

In high school:

- Assess career interests, spend time reviewing the assessment results, and help students make sense of the results in light of current self-knowledge.
- Show students how to use career-relevant information (e.g., interests, abilities) to engage in focused career exploration.
- Help students learn how to use sources of college and career information, e.g., the ACT DISCOVER[®] program, the ACT student Web site (www.actstudent.org), information interviews.
- Help students identify school coursework and postsecondary educational plans that will prepare them for their career goals.
- Periodically assess students' academic strengths and weaknesses and evaluate in light of developing educational plans and goals.

In college:

- Encourage undecided students to complete a career-development course early in college.
- To prepare for workforce realities in a changing economy, encourage students to become aware of the variety of occupations they can enter with a degree in their major.
- Encourage career-relevant activities (e.g., internships) that enhance the academic experience.

Greater agreement among career interests, career aspirations, and career choice is associated with higher long-term career earnings. When students' career interests are identified early, there is a greater chance that they can inform students' career aspirations and influence their ultimate choice of career.

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Crisis at the Core

Preparing All Students for College and Work

Executive Summary

Our nation is in a college readiness crisis. Too few of our students are prepared to enter the workforce or postsecondary education without additional training or remediation when they graduate from high school. And far too many have to take remedial courses as part of their postsecondary educations. As a consequence, first-year students are dropping out of school in alarming numbers: one in four freshmen at four-year institutions and one in two freshmen at two-year institutions fails to return for a sophomore year.

ACT research shows that far too few members of the graduating class of 2004 are ready for college-level work in English, math, or science—or for the workplace, where the same skills are now being expected of those who do not attend college. This deficiency is evident among both males and females and among all racial and ethnic groups. And, at present, it does not look as though students already in the pipeline are likely to fare much better.

Improving college readiness is crucial to the development of a diverse and talented labor force that is able to maintain and increase U.S. economic competitiveness throughout the world. What can be done to remedy the situation? How can we help to ensure that more of our students are ready to make the most of the college experience?

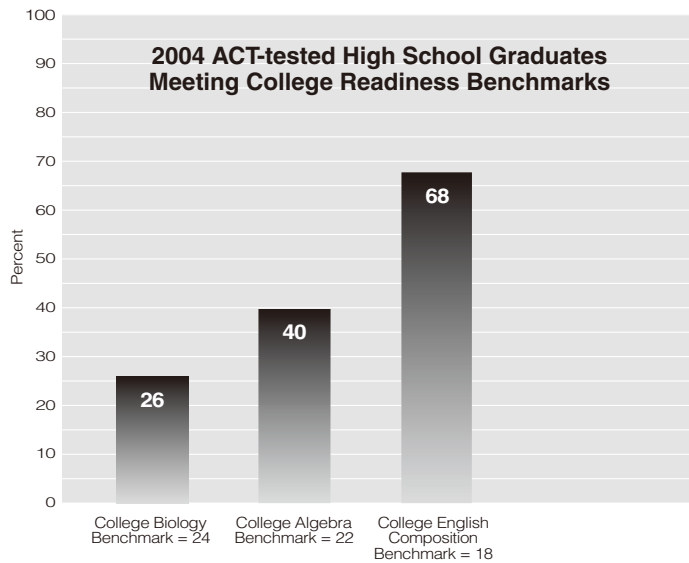
ACT research confirms the results and benefits of a rigorous core preparation curriculum for all students, whether they plan to go on to college or to work after high school. However, our research has also led us to rethink whether the core curriculum—as traditionally defined in terms of numbers of courses—adequately prepares students for success after high school.

Despite the overall stasis or decline in college readiness over the last decade, a strong positive relationship exists between the amount and kind of high school coursework students take and their readiness for college. The more courses students take and the more challenging those courses, the more likely these students will be college ready and will persist to a college degree.

Furthermore, certain specific courses—such as Biology, Chemistry, Physics, and upper-level mathematics courses beyond Algebra II—have a startling effect on student performance and college readiness. ACT calls these courses the *Courses for Success*, and recommends that every high school student who is heading to college or the workplace take the *Courses for Success*. Our reasons for making this recommendation appear in brief on the following pages and in detail in the report entitled *Crisis at the Core: Preparing All Students for College and Work*.

1. Most of America's high school students are not ready for either college or work. We've made virtually no progress in the last ten years helping them to become ready. And from everything we've seen, it's not going to get better any time soon.

▼ **Too few students are ready for college-level coursework, based on ACT's national readiness indicators.** A mere 26 percent of ACT-tested high school graduates met ACT's College Readiness Benchmark demonstrating their readiness for their first credit-bearing college course in Biology, based upon the 2003–2004 results of the ACT Assessment®. Just 40 percent are ready for their first course in college Algebra, and, while better, still only 68 percent are ready for college coursework in English Composition.

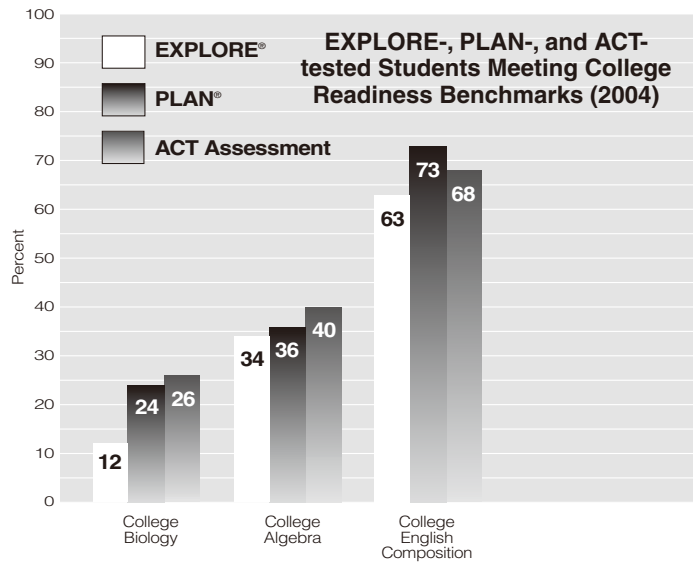


▼ **Minority students are much less likely to be college ready.** Native Americans and Hispanic Americans are only about half as likely as the total population to be ready for college Biology, and African Americans are about five times less likely to be ready. For college Algebra, the percentages of these groups meeting the benchmark were only slightly higher. And while Caucasians and Asian Americans met the ACT Benchmark for college English Composition in greater numbers than the total population, Native Americans, Hispanic Americans, and African Americans were about one and a half times less likely to meet this benchmark than the total population.

▼ **Even fewer students are ready for college and work in all three academic areas—English, mathematics, and science.** The percentage of ACT-tested high school graduates who met or exceeded all three College Readiness Benchmarks is alarming—a mere 22 percent of the 1.2 million students tested in 2004.

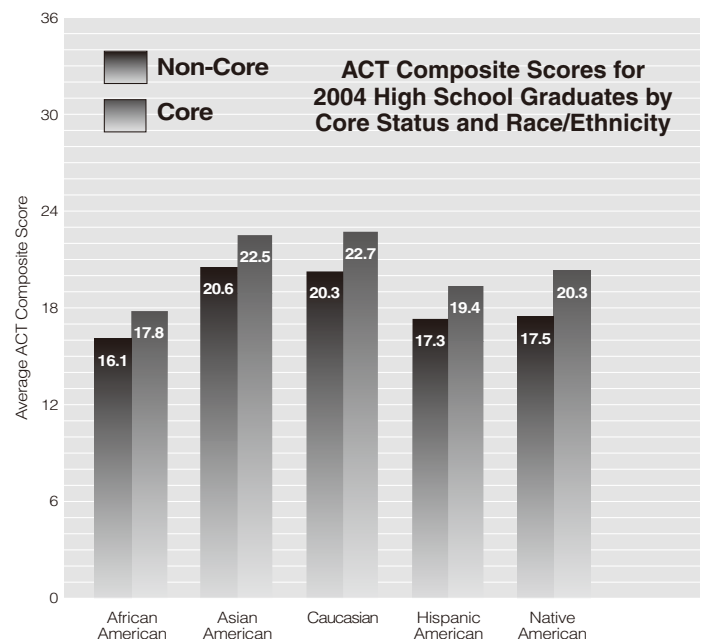
▼ **The students currently at or near the end of the college preparation pipeline will be no more ready for college than the class of 2004.** The percentages of eighth and tenth graders demonstrating

likely readiness for college coursework in 2006 and 2008 are roughly similar to those of this year's graduates, based on results from ACT's early college readiness preparation system, EPAS®.



2. For nearly two decades, we've recommended that, to be ready for college, students take a specific minimum number of high school courses: four years of English and three years each of math, science, and social studies. But not enough students are taking this recommended core. And we now know that simply taking core is not enough. It's the nature and the quality of the courses students take, not only the number, that determine if they will be ready for college and work.

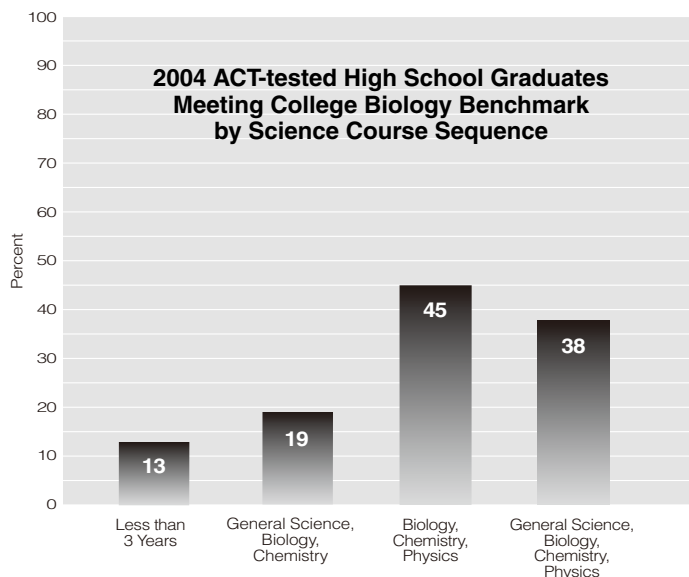
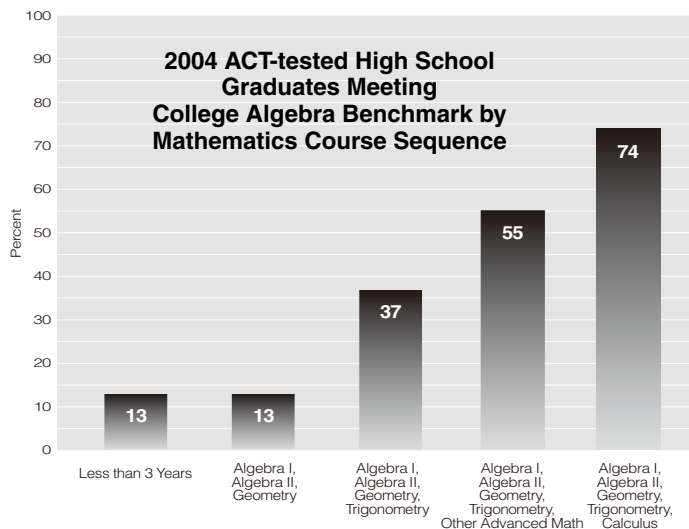
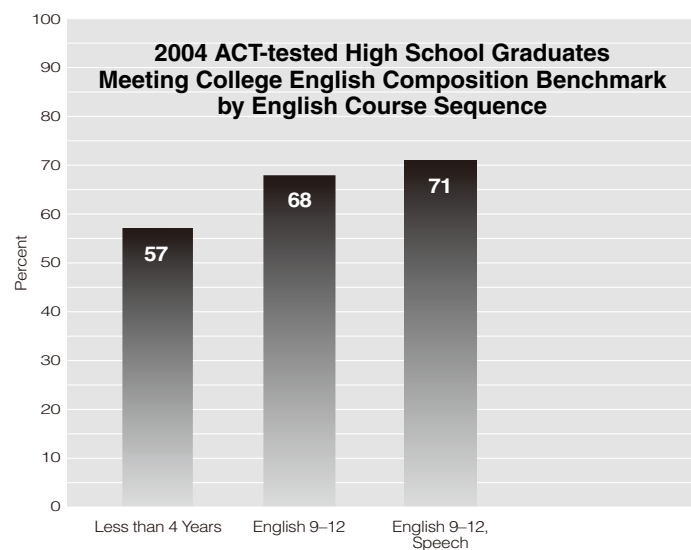
▼ **Students who reported taking the minimum core curriculum score consistently higher on the ACT Assessment than those who reported taking less than core.** ACT has long championed the benefits of the core curriculum, in particular its salutary effect on



ACT Assessment performance. The results for the class of 2004 continue to bear this out: students who take a minimum core curriculum or more attain higher average ACT Assessment composite scores than those who take less than core. The benefits of the minimum core curriculum hold true for racial and ethnic groups.

▼ **Despite the long-recommended benefits of taking a core curriculum, not enough students take a core curriculum or are required to take it.** Since 1994, the overall percentage of students taking a core curriculum has remained relatively stable, showing only a two-percent increase, from 54 to 56 percent. The percentages of males and females and of each racial-ethnic group taking a core curriculum have also remained relatively stable, with no group changing by more than 5 percentage points between 1994 and 2004.

▼ **Even if students take the minimum number of courses as defined by the core curriculum, it will not guarantee that they are college ready.** While taking a core curriculum certainly helps students raise their level of academic preparation and meet high school graduation requirements, it does not necessarily mean that a student is ready for college-level work. Obviously, the rigor of these courses is a strong determiner in preparing students for college and work. ACT Assessment results show the benefits of taking the core curriculum over taking less than the core. But they also show the even greater benefits accrued by students who take *more* than the core curriculum. As shown in the following figures, students who took one or more courses beyond core met or exceeded the College Readiness Benchmarks in significantly greater percentages than students taking only core or less.



▼ **Students gain from taking more rigorous courses regardless of their achievement level.** The value-added results of particular courses when student achievement is held constant, or controlled, are shown on the next page. Cumulatively, the potential average score increase for students on the Science Test is about 2.6 score points, and on the Mathematics Test is nearly 6 score points, *regardless of the level of student achievement.*

What does this mean? Students who take a minimum core curriculum are more likely to be ready for college-level work than are students who do not take the core. But students who take rigorous courses beyond the recommended minimum number of core courses are even more likely to be ready for college. And students whose beyond-core coursework includes courses in advanced mathematics beyond Algebra II (such as Trigonometry), as well as Biology, Chemistry, and Physics, are *likeliest of all* to be college ready. And this is true of students at all levels of achievement, not just the high achievers.

We are not saying that a concerted effort to improve the rigor of the core courses wouldn't help. It most certainly would. However, our data are based on the realities of the

Note: The percentages expressed in the figures in this summary are percentages of all students who took a particular test.

quality and content of the core courses as they currently exist. Without any improvement in the rigor of the core courses, additional higher-level courses are necessary for students to be prepared.

**Value Added by Mathematics Courses
When Achievement Is Controlled**

Math Course	Average Math Score	Value Added by Course
Calculus	25.0	→ +2.3
Trigonometry	22.7	→ +1.9
Advanced Math	20.8	→ +1.7
Algebra I, Algebra II, & Geometry (Core)	19.1	→ +1.8
Less than 3 courses (Less than Core)	17.3	

**Value Added by Science Courses
When Achievement Is Controlled**

Science Course	Average Science Score	Value Added by Course
Physics	21.2	→ +1.3
Chemistry	19.9	→ +1.3
Biology	18.6	→ +0.6
General Science	18.0	

3. To be ready for college and work, every high school student should be prepared and encouraged to take and do well in rigorous *Courses for Success* that include one or more advanced mathematics courses beyond Algebra II (e.g., Trigonometry) as well as Biology, Chemistry, and Physics.

▼ **Students who are ready for college-level work are more successful in college than those who are not.** Our research consistently shows a strong, positive relationship between performance on the ACT Assessment tests and college success. Students who obtain higher scores on the ACT Assessment are more likely to earn higher grade-point averages in college and stay in college. Moreover, our research shows that when students meet or exceed *all three* of the ACT College Readiness Benchmarks, a clear majority of these students (83 percent) returns to college after the first year—the year in which the national collegiate dropout rates are the highest. And when students take one or more *Courses for Success*, including advanced mathematics courses beyond Algebra II as well as Biology, Chemistry, and Physics, they have the best chance to be ready to enter college and work without need for remediation.

▼ **All students should be prepared and encouraged to take the *Courses for Success*.** The high school core curriculum, defined in terms of minimum numbers of courses students need to take to be ready for college and work, is not sufficient given the quality and the intensity of the core courses students are now taking in high school. Our research data show that when students take the *Courses for Success*, they all benefit, regardless of achievement level, and are much better prepared for college and work. Students don't have to take honors or advanced placement courses to be college ready.

Something can be done for each and every student.

▼ **Approximately 1 in 5 students are succeeding.** Twenty-two percent of the ACT-tested students met or exceeded all three College Readiness Benchmarks. These students likely entered high school with the requisite foundational skills, took rigorous courses, worked hard in those courses, and are now ready to enter college and work.

▼ **Nearly half of students can succeed, but aren't now preparing to succeed.** Approximately 50 percent of the ACT-tested students met one or two of the benchmarks but did not meet all three. By doing just a little bit more—taking an additional math course beyond Algebra II and taking Chemistry and Physics in addition to Biology—they will be much better prepared to succeed in college or work.

▼ **Approximately 3 in 10 students aren't yet, but could be, ready to succeed.** We estimate that there are still far too many students—at least 29 percent who took the ACT Assessment and did not meet any of the benchmarks, plus an undefined percentage who did not take the ACT Assessment—who are not ready for college or work. These students likely lack the foundational skills when they enter high school and do not take either an adequate number or kind of core courses. These students need to be identified for intervention much earlier, certainly before middle school, so that they can strengthen their foundational skills in English, mathematics, and science before they enter high school.

What, then, can be done to encourage more students to take and do well in the critical *Courses for Success*? Clearly, the actions that are necessary for change will neither happen overnight nor should they be the responsibility of educators alone. To ensure that all students have the opportunity to be ready for college and work will take the efforts of educators and policymakers, business and community leaders, and parents. All of us have crucial roles to play in helping our students prepare for college and the workplace. Action plans for selected audiences, as well as a brief description of ACT's demonstration project **Ready to Succeed**, are available in the full *Crisis at the Core* report.

Together, we can make it happen.



Ready for College and Ready for Work: Same or Different?

Executive Summary

Results of a new ACT study provide empirical evidence that, whether planning to enter college or workforce training programs after graduation, high school students need to be educated to a comparable level of readiness in reading and mathematics. Graduates need this level of readiness if they are to succeed in college-level courses without remediation and to enter workforce training programs ready to learn job-specific skills.

We reached this conclusion by:

- Identifying the level of reading and mathematics skills students need to be ready for entry-level jobs that require less than a bachelor's degree, pay a wage sufficient to support a family, and offer the potential for career advancement
- Comparing student performance on ACT tests that measure workforce readiness with those that measure college readiness
- Determining if the levels of performance needed for college and workforce readiness are the same or different

The study results convey an important message to U.S. high school educators and high school students: We should be educating all high school students according to a common academic expectation, one that prepares them for both postsecondary education and the workforce. Only then—whether they are among the two-thirds who enter college directly after graduation or those who enter workforce training programs—will they be ready for life after high school.

Although the contexts within which these expectations are taught and assessed may differ, the level of expectation for all students must be the same. Anything less will not give high school graduates the foundation of academic skills they will need to learn additional skills as their jobs change or as they change jobs throughout their careers. The results of this study provide ample evidence that we must move the agenda for high school redesign in a direction that will prepare all students for success no matter which path they choose after graduation.