

UK Institutional Research Brief:

The Utility of High School Grades and ACT Scores in Predicting Academic Success during the First Year at UK

Summer 2007

In recent years, many colleges and universities have started to take a closer look at the criteria used to admit students to their campuses. Standardized tests, such as the ACT and SAT, have increasingly come under attack for their relatively weak ability to predict academic success during the first year in college. Critics of standardized testing further contend that these assessments do not measure important personal qualities necessary for learning, including: persistence, intellectual curiosity, and imagination.¹ Others have argued that the tests are biased against minorities, economically disadvantaged students and women. The brunt of the criticism leveled at standardized tests has been targeted at the SAT, which has historically been required for admission to the nation's elite institutions. However, many of the same arguments might be made against using the ACT Assessment for admission purposes.

A number of highly selective institutions, primarily small liberal arts colleges, have recently established SAT-optional admission policies.²³ Submission of test scores is voluntary, and admission decisions are made primarily on the basis of high school grades, extra-curricular activities and essays. Many of the institutions adopting test-optional policies have implemented them in an effort to attract a more diverse pool of applicants. Preliminary institutional research at these institutions suggests that the quality of first-year students enrolling in the fall has not been diminished by SAT-optional policies.

The UK Office of Institutional Research has studied the relationship between High School Grade Point Averages (HSGPA), ACT scores and grades earned at UK during the fall and spring semesters. IR staff compiled information from first-year cohorts that entered during fall 2000 through fall 2005. Table 1 shows descriptive statistics for freshmen who began their college careers during this six-year period.⁴ This analysis shows that the typical UK freshman...

- Presented an average HSGPA of 3.53;
- Earned an average ACT Composite score of 24;
- Earned a fall semester GPA of 2.73, reflecting a decline of nearly eight-tenths of a grade-point from his or her HSGPA; and
- Earned a spring semester GPA of 2.78, amounting to a gain of .05 of a grade-point from the fall semester.⁵

¹ See the review of standardized tests in Alon, S., and Tienda, M. (2007). Diversity, Opportunity, and Shifting Meritocracy in Higher Education. *American Sociological Review*. 72: 487-511.

² Jaschik, S. (2007). Advance for the SAT-Optional Movement. *Inside Higher Ed*.
<http://www.insidehighered.com/news/2007/05/09/wpi>

³ Weisbuch, R.A. (2006). Worshipping False Gods. *Chronicle of Higher Education*.
<http://chronicle.com/jobs/new/2006/05/200652401c/careers.html>

⁴ In an effort to include as many first-year students as possible, the Office of Institutional Research converted SAT scores to ACT scores using a well-established concordance table.

⁵ First spring GPAs use only the grades of students who were enrolled during that semester; students who dropped out either during or just after their first fall semester were not included.

Table 1
Descriptive Statistics on Selected Variables

Label	N	Mean	Std Dev	Median	Minimum	Maximum
HSGPA	17589	3.53	0.41	3.62	1.58	4.00
ACT Composite	20994	24.36	3.64	24.00	13.00	36.00
First-Fall UKGPA	20960	2.73	0.94	2.92	0	4.00
First-Spring UKGPA	19138	2.78	0.89	3.00	0	4.00

The correlation matrix in Table 2 shows the strength of association between high school grades, ACT scores and grades earned during the first year at UK. The matrix presents Spearman correlations, which do not assume that the relationship between any two variables is linear. Table 2 reveals that there is a moderate correlation between high school grades and ACT scores ($r_s=+.41$).

Table 2
Spearman Correlation Matrix⁶ on Admission Criteria and Grades Earned at UK

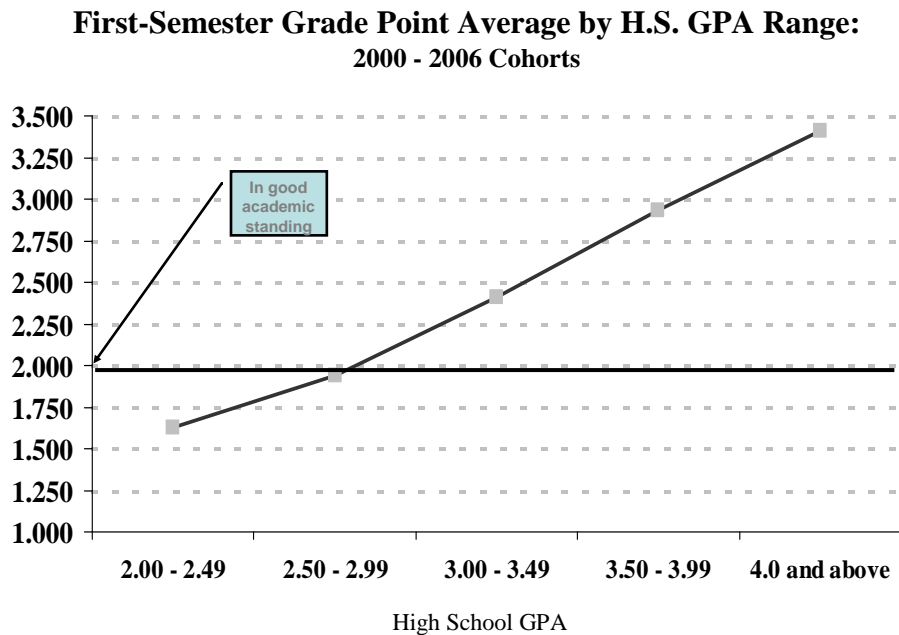
Label	HSGPA	ACT Composite	First-Fall UKGPA	First-Spring UKGPA
HSGPA	1.00	0.41	0.54	0.47
ACT Composite	0.41	1.00	0.41	0.37
First-Fall UKGPA	0.54	0.41	1.00	0.70
First-Spring UKGPA	0.47	0.37	0.70	1.00

The correlation matrix also clearly shows that HSGPA is a better predictor of college grades than the ACT. High school grades have two advantages over standardized test scores in predicting students' academic success. First, high school grades capture a motivational component, such as persistence in completing homework and studying for tests, that is lacking in ACT and SAT scores. Second, students' high school GPAs are generally based on four years of work rather than the effort expended in several hours of test-taking. It should be noted, however, that the ACT Composite is still a significant predictor of fall and spring grades earned by students during their first year at UK.

Figure 1 shows the essentially linear relationship between HS GPA range and first-semester grades. Students who are admitted to UK with a HSGPA below 3.00 are, on average, likely to fall out of good academic standing after their first semester.

⁶ The Spearman correlations are, on average, about .03 - .04 higher than the Pearson correlations for the same group of variables.

Figure 1



Additional Predictors of Academic Success

The Office of Institutional Research conducted a regression analysis to identify predictors of student success as measured by the first semester GPA. The analysis focused on 4,885 students from the fall 2003 and fall 2004 cohorts.⁷ Data elements included demographics, academic credentials, and results of the Survey of First-year Students. The model accounted for 36 percent of the variance in students' grades. The table below summarizes those variables that were either positively or negatively associated with first-semester GPAs.

Outcome	Positively Associated (in order of impact)	Negatively Associated (in order of impact)
First-Fall GPA	<ul style="list-style-type: none"> ■ High school GPAs ■ ACT Composite scores ■ Being female ■ Distance from home (the farther away, the higher the GPA) ■ Number of hours students reported studying or doing homework during their HS senior year ■ Self-reported 'drive to achieve' ■ Level of identification with being a good student 	<ul style="list-style-type: none"> ■ First-generation student status ■ Number of hours students planned to be employed during their first term ■ Intentions to join a fraternity or sorority ■ Self-reported procrastination tendencies ■ Self-reported 'serious financial difficulties' during the previous year

⁷ The final regression model used a 'jack-knifing' procedure whereby 1,000 random samples composed of 90 percent of the two cohorts were analyzed to identify predictors that appeared most frequently.

As previously noted, high school grades were, by far, the best predictor of students' first fall GPA. Indeed, students' high school GPAs accounted for twice as much variance in first-fall grades as all of the other variables in the model combined! It is worth noting, however, that only a little over one-third of the variance in fall semester grades is explained by the model. Although a substantial portion of the variance in grades is not accounted for in the model, the results obtained by the UK Institutional Research staff are typical of similar analyses conducted at other institutions.

Thoughts on the Rigor of High School Coursework

Important research undertaken by the U.S. Department of Education has found that the quality and intensity of a student's high school course work is the best predictor of whether that student will eventually graduate from college.⁸⁹ In fact, the rigor of a student's course work is more highly correlated with degree completion than test scores, grades, or class rank.

These studies have revealed that the number of advanced mathematics courses taken in high school is correlated with a student's chances of graduating from college. Students who take demanding courses, like trigonometry or pre-calculus, significantly increase their odds of earning a bachelor's degree over students who simply take Algebra II as their highest level math course. Sixty-five percent of the students who took trigonometry and 76 percent of the students who took pre-calculus in high school eventually graduated from college. But only 44% of the college students who took Algebra II as their highest level of math in high school went on to earn a bachelor's degree.

Educators and policy makers should be pleased to hear that a demanding curriculum may help to narrow the race gap in college graduation rates. Many studies have consistently shown that African American and Latino students graduate at rates significantly below those of white students. However, this research has found that a curriculum composed of demanding, high quality courses appears to have an even greater effect in raising the baccalaureate completion rates of African American and Latino students than of white students.

Future Research

In 2006, the Committee for Research and Analysis on African American Student Success issued a report that recommended:

“implementing a research-based review of UK's admissions criteria with the goal of developing a model that is more accurate and inclusive in its ability to predict success at UK. The review should include a transcript analysis that will provide research-based evidence of the impact of high school curricular choices on success at UK.”

⁸ Adelman, C. (2000). *Answers in the toolbox: academic intensity, attendance patterns, and bachelor's degree attainment*. Washington, D.C., Office of Educational Research and Improvement, U.S. Department of Education.

⁹ Adelman, C. (2006). *The toolbox revisited: paths to degree completion from high school through college*. Washington, D.C., Office of Educational Research and Improvement, U.S. Department of Education.

To that end, the Office of Institutional Research developed a plan for pulling the high school transcripts of a random sample of nearly 1,000 first-year students who enrolled at UK in fall 2004, 2005 and 2006. In addition, the transcripts of approximately 600 African American first-year students who enrolled at the University during the past three years are also being pulled as part of the plan to ensure an adequate sample of high quality data on African American students. Currently, every course appearing on this collection of transcripts is being entered into a database, and plans for analyzing the correlates of academic success are under development.

We hope to answer some of the following questions:

- Does a fourth year of math offer students an advantage in their college-level math and science classes?
- Does the rigor of high school math courses, such as pre-calculus and calculus, affect the likelihood that a student will be retained or graduate?
- Does the number of AP courses taken in high school predict students' academic adjustment?
- Are weighted HS GPAs (for AP and advanced-level courses) a better predictor of later success than un-weighted HS GPAs?
- Is the academic challenge experienced by students during their senior year in high school correlated with their level of success during their freshman year?
- Can an academic intensity index be developed for use in admitting future students?

Uncovering relationships between high school course-taking patterns, retention and first-year grades holds important implications for the work of high school advisers and staff from the UK Office of Undergraduate Admissions. Moreover, this research may lead to better efforts to inform parents and instruct prospective students about their best chances for a successful academic career at UK. The results of this line of research will be explored fully in another IR Brief.