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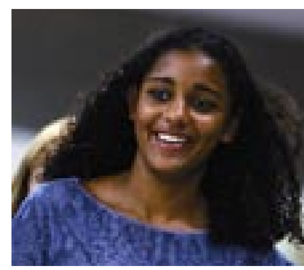

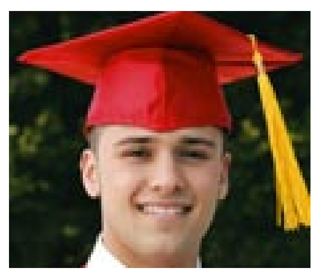

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January 2008

Prepared by

Neal D. Finkelstein
WestEd

Anthony B. Fong
WestEd

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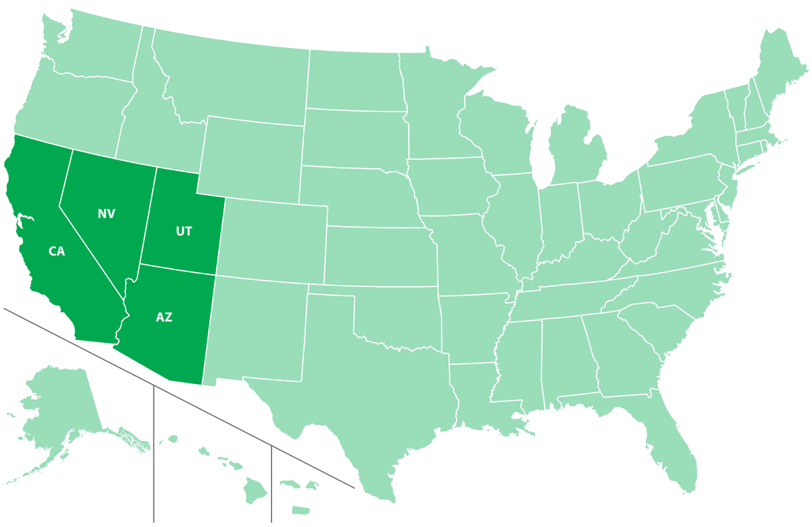

Issues & Answers is an ongoing series of reports from short-term Fast Response Projects conducted by the regional educational laboratories on current education issues of importance at local, state, and regional levels. Fast Response Project topics change to reflect new issues, as identified through lab outreach and requests for assistance from policymakers and educators at state and local levels and from communities, businesses, parents, families, and youth. All Issues & Answers reports meet Institute of Education Sciences standards for scientifically valid research.

January 2008

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This report is available on the regional educational laboratory web site at http://ies.ed.gov/ncee/edlabs.

Summary

Course-taking patterns and preparation for postsecondary education in California's public university systems among minority youth

This report finds that the high school program for college preparation begins in 9th grade and that making up missed preparatory courses and academic content is likely to be difficult for students who put off college-preparatory work until later in their high school career.

Throughout the states served by the West Regional Educational Laboratory education leaders and policymakers have raised concerns about high school achievement patterns and preparedness for college, especially for student groups that have traditionally been underrepresented in higher education (Kirst & Venezia, 2004; Gandara, Horn, and Orfield, 2005). Although the issue has resonated throughout the region, it was brought into sharp focus in California by passage of Proposition 209 in 1996, which eliminated affirmative action in public employment, contracting, and education. In a state whose high school population has growing proportions of ethnic and socioeconomic groups that have little college-going history, the post-Proposition 209 period has been crucial for developing policy to reverse the decline in admission rates for African American, Hispanic, and American Indian students. Both of California's public university systems—California State University (CSU) and the University of California (UC)—continue to focus on how to ensure that more students from these groups are prepared for and enter the state's public universities.

With affirmative action in admissions off the table the systems shifted to maintaining university access for students who are broadly thought of as "educationally disadvantaged" (Strategic Review Panel on UC Educational Outreach, 2003). Within this category are students who come from low-income families, who attend schools with a limited college-preparatory curriculum, and who would be in the first generation of their family to attend college. One of the University of California's key admissions policy changes is the Eligibility in the Local Context (ELC) program, which "seeks to identify and enroll the top 4 percent of students in all of California's high schools, including rural and urban schools that have not traditionally sent significant numbers of students to the University" (Robinson, 2003, p. 2). To be eligible, students must have satisfactorily completed a specific pattern of 11 approved courses (called the "a–g" requirements) and have a minimum cumulative grade point average (GPA) of 2.0 by the end of their junior year.

ELC program staff who review student transcripts noticed a disconcerting trend among students from low-performing schools that serve high percentages of educationally disadvantaged students. Many students appeared to be missing required college-preparatory courses, rendering them ineligible for the program even if they otherwise ranked in the top of their high school class.

Efforts to increase high school success and college readiness for all students can take many forms, from improving dropout prevention to making sure that there is a highly qualified teacher in every classroom. But all students also need access to a standard college-preparatory curriculum. In California that curriculum includes the a–g requirements, which account for approximately three-fifths of a student's total high school

program and, depending on the student's grades in these courses, are seen as evidence of core academic preparation. A student who has a high GPA but who has not met all a–g requirements will not be eligible for admission to either university system.

This report examines the extent to which California high school students fail to meet the high school course requirements for admission to California's four-year public universities. It investigates students' course-taking patterns and whether the courses they take meet the universities' entrance requirements. Because students from a variety of minority groups have been and continue to be underrepresented in California's colleges and universities, this study includes a subgroup analysis by ethnicity.

The study documents patterns of high school course-taking associated with preparation for college and entry into two-year California community colleges and four-year CSU and UC institutions. The findings demonstrate a consistent pattern: students who complete college-preparatory courses in 9th grade begin a clear trajectory that continues throughout high school. Compared with students who do not take key college preparatory courses in 9th grade, students who do take these courses have a higher probability of meeting the complete set of CSU and UC course requirements. Students who fall off the college-preparatory track early in high school tend to move ever further from a complete college-preparatory program as they progress through high school. These patterns are examined by ethnicity and the overall performance of the school that a student attends.

Specific findings include:

- Completing one year of college-preparatory English and mathematics in 9th grade is an enormous challenge for many students. As early as the end of 9th grade more than a third of the students in the sample did not meet the CSU and UC requirement in English, and more than 40 percent of the students had not completed two semesters of college-preparatory mathematics. More than a fifth of students (23 percent) missed both requirements.

- By the end of high school less than a quarter of the students in the sample had fulfilled both the subject and GPA requirements for CSU and UC admission. Students are much more likely to not fulfill the subject requirements, an outcome tied directly to high school course enrollment. Many students are simply not enrolling in enough a–g courses to meet CSU and UC requirements, a pattern that begins as soon as students enter high school. For example, only 40 percent of African American students in 9th grade are enrolled in the courses that would meet CSU and UC requirements.

- Disaggregating by student ethnicity yields large differences in education attainment. For example, about half of Asian and White students have completed at least four units of English by the end of 12th grade, compared with about a third of Hispanic and African American students. This ethnicity gap in completion appears in mathematics and laboratory science as well.

- For students with similar GPAs after the first semester of high school, future college readiness depends on the school they attend. With equivalent grades after the fall semester of 9th grade, students in better performing schools are more likely to meet CSU and UC requirements upon finishing high school than are students in poorer performing schools.

- An early and complete sequence of courses raises a student's chance of attending a four-year California public college over a two-year California community college after high school. Students who take algebra I or higher, English, and a language other than English in 9th grade are more likely to attend a CSU or UC institution than a two-year community college.

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This report finds that the high school program for college preparation begins in 9th grade, and that making up missed preparatory courses and academic content is likely to be difficult for students who put off college-preparatory work until later in their high school career.

WHY THIS STUDY

Throughout the states served by the West Regional Educational Laboratory education leaders and policymakers have raised concerns about high school achievement patterns and preparation for college, especially for student groups that have traditionally been underrepresented in higher education (Kirst & Venezia, 2004; Gandara, Horn, and Orfield, 2005). Although the issue has resonated throughout the region, it was brought into sharp focus in California by passage of Proposition 209 in 1996, which eliminated affirmative action in public employment, contracting, and education.

For California's public university systems—California State University (CSU) and University of California (UC)—the change took effect in time to influence the 9th grade class of 1998, with both systems experiencing admission rate declines for African American, Hispanic, and American Indian students.[1] In some instances the decline was dramatic: at the University of California's Berkeley and Los Angeles campuses, for example, the percentage of underrepresented students shrank by more than 50 percent (Robinson, 2003). In a state whose high school population has growing proportions of ethnic and socioeconomic groups that have little college-going history, the post-Proposition 209 period has been a crucial time for finding ways to reverse this trend. Both systems continue to focus on ensuring that more students from these groups are prepared for and matriculate to the state's public universities.

For some 20 years before Proposition 209 both California State University and the University of California pursued a variety of outreach strategies to ensure that minority students were prepared for, interested in, and accepted into the state's university and community college systems. In 1997, with affirmative action in college admissions off the table, the systems shifted their focus to maintaining university access for students who are broadly thought of as "educationally disadvantaged" (Strategic Review Panel on UC Educational Outreach, 2003). Within this category are students who come from low-income families, who attend schools with a limited college-preparatory curriculum, and who would be in the first generation of their family to attend college.

University strategies have included expansion of partnerships with K–12 schools, direct outreach to educationally disadvantaged students and their families, and changes in admissions policies. One of the University of California's key programs in changing admissions policies has been the Eligibility in the Local Context (ELC) program, which "seeks to identify and enroll the top 4 percent of students in all of California's high schools, including rural and urban schools that have not traditionally sent significant numbers of students to the University" (Robinson, 2003, p. 2). To be eligible, students must have satisfactorily completed a specific pattern of 11 approved courses (called the "a–g" requirements) and have a minimum cumulative grade point average (GPA) of 2.0 by the end of their junior year.

To confirm students' eligibility and school ranking, the ELC program analyzes their transcripts using an integrated computer-based system with human verification, called the Transcript Evaluation Service. As program staff began looking at transcript data, they saw a disconcerting trend in the transcripts from low-performing schools that serve high percentages of educationally disadvantaged students: many students were missing required college-preparatory courses, a gap that rendered them ineligible for the program even if they otherwise ranked in the top of their high school class. This issue was also noted in a 2001 program evaluation.

One of the most basic requirements for increasing high school success and college readiness is ensuring that all students have access to a standard college-preparatory curriculum

Efforts to increase high school success and college readiness for all students can take many forms, from improving dropout prevention to making sure there is a highly qualified teacher in every classroom. But one of the most basic requirements is ensuring that all students have access to a standard college-preparatory curriculum. In California that curriculum is the a–g requirements (see appendix A), first established by the University of California and subsequently embraced by California State University, which accounts for approximately three-fifths of a student's total high school program and, depending on the student's grades in the courses, are seen as evidence of core academic preparation. A student who has a high GPA but who has not taken all the a–g requirements will not be eligible for admission to either university system. An alternative post-secondary option for students who have not completed the required courses is to enroll in the state's community college system; students can work toward an associate's degree or, after meeting transfer requirements, apply to the four-year public institutions at a later time.

Many California high school students are poorly informed about eligibility requirements for the state universities. Students who come from families that have little or no experience with higher education must rely on their high school counselors for information. But many counselors lack a solid understanding of university eligibility requirements or have too little knowledge about individual students' course-taking history to counsel them appropriately. Even students who understand the need to meet a–g requirements may be thrown off track if their school does not offer a required course or offers it at a time when the student has a conflict with another required course. The unfortunate result is that some students may never even get in range of college eligibility, while others may miss it by an inch.

This report examines the extent to which California high school students fail to meet the high school course requirements for admission to California's four-year public universities by investigating students' course-taking patterns and whether the courses they take meet state university entrance requirements (see box 1 and appendix B for background on the data in this study). Because students from a variety of minority groups continue to be underrepresented in California's colleges and universities, this study includes a subgroup analysis by ethnicity. The analysis is framed by five study questions:

1. When do high school students take specific college-preparatory courses? Are there certain patterns of courses that students take

BOX 1

About the data

Data were collected with the Transcript Evaluation Service (TES), an integrated computer-based system, followed by human verification. A comprehensive dataset with complete transcript information exists for more than 100,000 high school students in California. The first panel of TES data—for the spring 2004/05 school year—included transcripts from 31 schools,[1] yielding 70,543 transcripts. After deleting observations with multiple or missing responses for student ethnicity (3.4 percent of the sample), the sample size was 67,536 students and comprised transcripts for students in 9th, 10th, 11th, and 12th grades as well as for students who had been in 12th grade during the previous school year (2003/04). Transcripts of 12th graders from the 2003/04 school year were originally extracted by TES to allow for an analysis of a cohort of students with complete high school course grades, since the transcripts of the 12th graders for the spring 2004/05 school year included courses taken in the spring semester but did not include grades (students had not completed the school year when the transcripts were extracted).

TES data were supplemented with school-level data reported by the California Department of Education, which publishes annual School Accountability Report Cards that provide demographic, academic, and staffing information for all schools in California (http://www.cde.ca.gov/ta/ac/sa/). The report cards include school-level data on the percentage of students who qualify for free or reduced-price lunches, the percentage of students who are English language learners, the academic performance index[2] decile of the school, and the percentage of credentialed teachers.

To have a sample of observations with full high school coursework information, the sample was restricted to 12th graders for both the 2003/04 and 2004/05 school years. The transcripts for these 12th graders in the final dataset include information on 9th- 10th-, 11th-, and 12th-grade courses, course grades, and the year and semester in which students took the courses. The transcripts also include the ethnicity and gender of each student.

The dataset includes all students who were enrolled at a particular school when the transcripts were extracted. The dataset contains only students who remained at the same school for grades 9–12. It does not include students who dropped out or transferred. To the extent that students who drop out of school or transfer have lower GPAs than those who remain in the same school (see Rumberger and Larson 1998), the sample is overrepresentative of students who are academically above average. However, the findings of the analysis would likely be further strengthened if students who dropped out or transferred were included in the dataset.

Caution must be exercised in the conclusions that can be drawn from the analyses. In particular, no randomization was performed with respect to the courses taken. The analysis seeks to examine the overall patterns with which students take courses, the differences across ethnicities in meeting CSU and UC requirements throughout high school, and the relationship between taking these courses and meeting the requirements upon finishing high school. Particularly with respect to the third analysis, no statements of causation can be made about how taking particular courses causes a student to meet CSU and UC requirements at the end of high school. In other words, enrolling in a particular course in 9th grade will not necessarily cause a student to meet the requirements at the end of high school, since meeting them also depends on student ability and preparation. More generally, causal statements cannot be made from correlational analyses performed on nonexperimental data.

Notes

1. These schools were not selected at random to participate in the TES; they self-selected into the sample because they had the technology to have their transcripts extracted.
2. The academic performance index is a weighted average of a school's academic performance on a number of California standardized tests, including the California Standards Test and the California Achievement Test. A school's score on the index is indicative of overall student achievement at the school.

simultaneously (mathematics, laboratory science, and English, for example) that predict college readiness?

2. Does a–g course eligibility vary by sociodemographic characteristics?

3. How is student performance in specific courses related to subsequent course-taking within a college-preparatory curriculum?

4. Does course completion vary by the overall performance of the school in which students are enrolled?

5. What patterns of high school courses differentiate students who matriculate to two- and four-year colleges?

Specific findings from the study include:

- Completing one year of college-preparatory English and mathematics in 9th grade is an enormous challenge for many students. As early as the end of 9th grade more than a third of the students in the sample did not meet the CSU and UC requirement in English, and more than 40 percent of the students had not completed two semesters of college-preparatory mathematics. More than a fifth of students (23 percent) missed both requirements.

- By the end of high school less than a quarter of the students in the sample had fulfilled both subject and GPA requirements for CSU and UC admission. Students are much more likely to not fulfill the subject requirements, an outcome tied directly to high school course enrollment. Many students are simply not enrolling in enough a–g courses to meet CSU and UC requirements, a pattern that begins as soon as students enter high school. For example, only 40 percent of African American students in 9th grade are enrolled in the courses that would meet CSU and UC requirements.

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- Disaggregating by student ethnicity yields large differences in education attainment. For example, about half of Asian and White students have completed at least four units of English by the end of 12th grade, compared with about a third of Hispanic and African American students. This ethnicity gap in completion appears in mathematics and laboratory science as well.

- For students with similar GPAs after the first semester of high school, future college readiness depends on the school they attend. With equivalent grades after the fall semester of 9th grade, students in better performing schools are more likely to meet CSU and UC requirements upon finishing high school than are students in poorer performing schools.

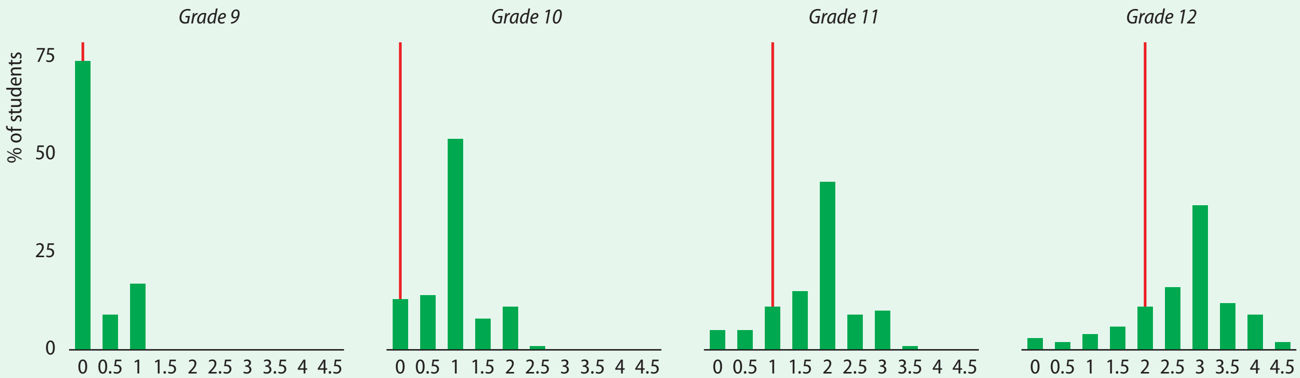
- An early and complete sequence of courses raises a student's chance of attending a four-year California public college over a two-year California community college after high school. Students who take algebra I or higher, English, and a language other than English in 9th grade are more likely to attend a CSU or UC institution than a two-year community college.

STUDY QUESTION 1: WHEN DO HIGH SCHOOL STUDENTS TAKE SPECIFIC COLLEGE-PREPARATORY COURSES?

The first part of this analysis examines when students take certain courses and how the accumulation of a–f courses (g is a category of required coursework in an elective area) compares with the number of courses needed in each area of the curriculum.[2] Histograms are used to plot the progression of fulfilled coursework for students in each of the a–f subject areas, where each semester completed represents half a unit (figures 1–6).[3] These figures illustrate how students are progressing through their coursework to meet CSU and UC

FIGURE 1

Share of students receiving history and social science (a) units, by grade level (cumulative)

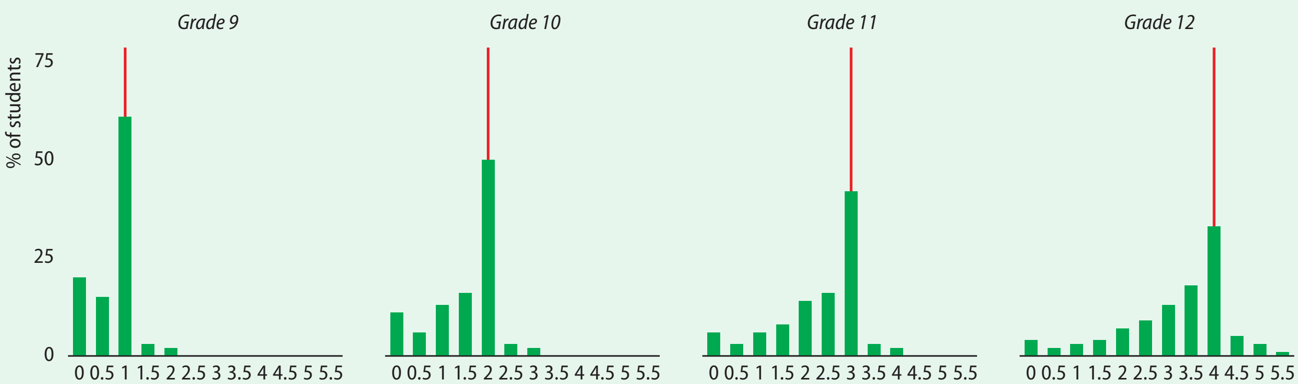


Note: The vertical red line shows the number of units required to meet the CSU and UC course requirement. Percentages may not total 100 due to rounding.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

FIGURE 2

Share of students receiving English (b) units, by grade level (cumulative)

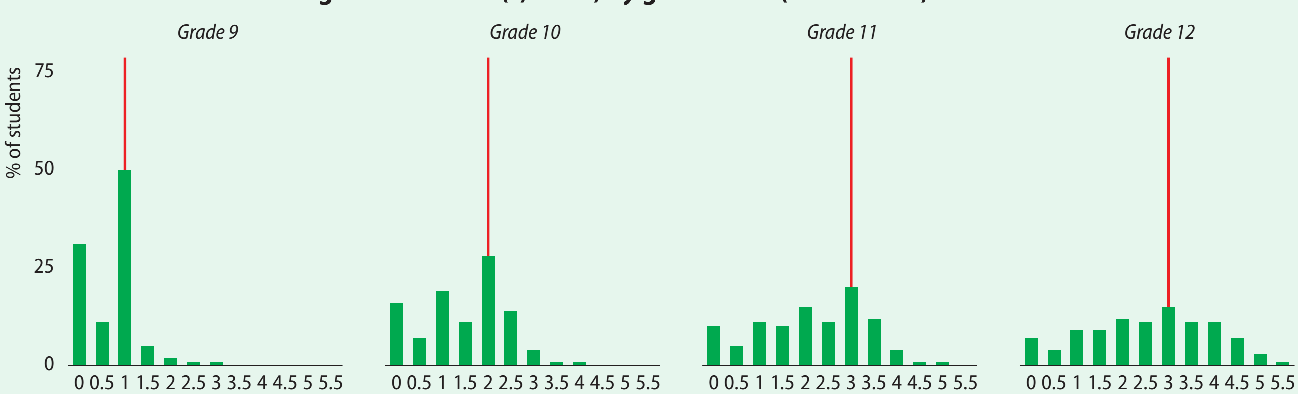


Note: The vertical red line shows the number of units required to meet the CSU and UC course requirement. Percentages may not total 100 due to rounding.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

FIGURE 3

Share of students receiving mathematics (c) units, by grade level (cumulative)

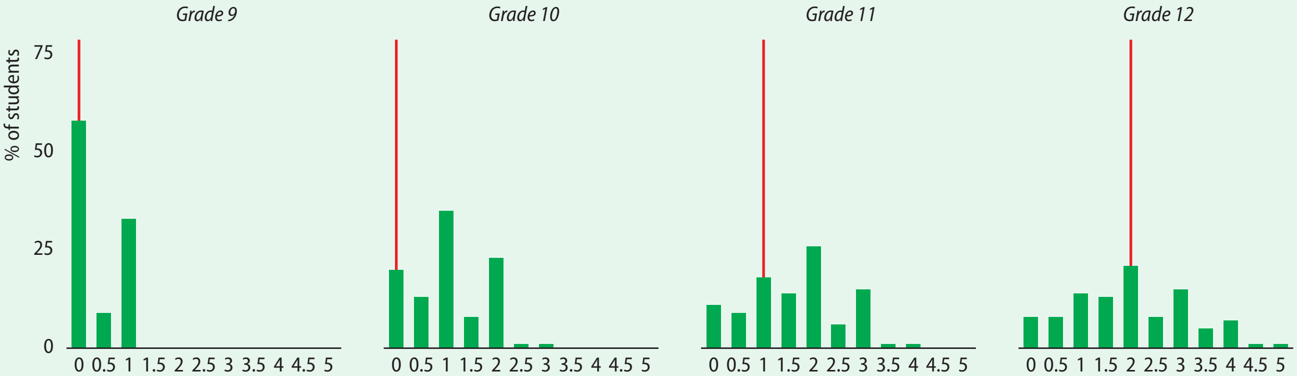


Note: The vertical red line shows the number of units required to meet the CSU and UC course requirement. Percentages may not total 100 due to rounding.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

FIGURE 4

Share of students receiving laboratory science (d) units, by grade level (cumulative)

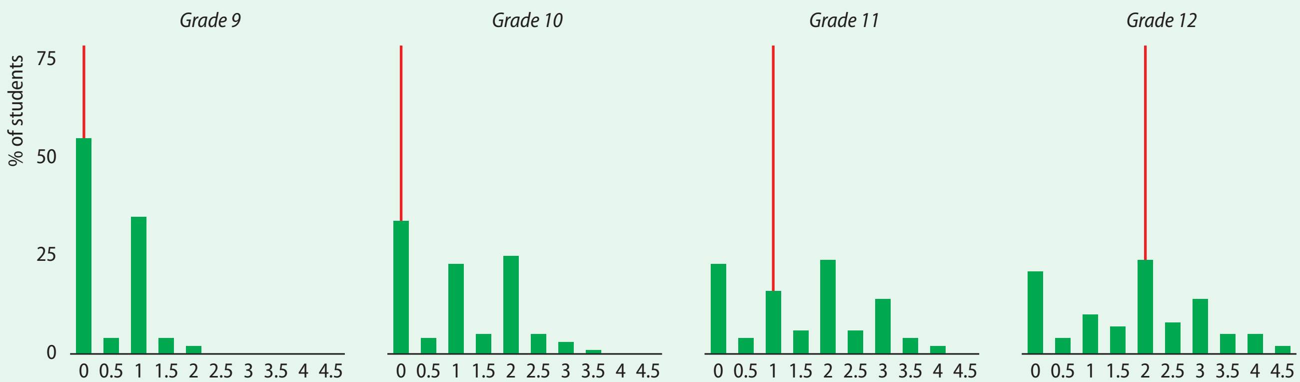


Note: The vertical red line shows the number of units required to meet the CSU and UC course requirement. Percentages may not total 100 due to rounding.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

FIGURE 5

Share of students receiving languages other than English (e) units, by grade level (cumulative)

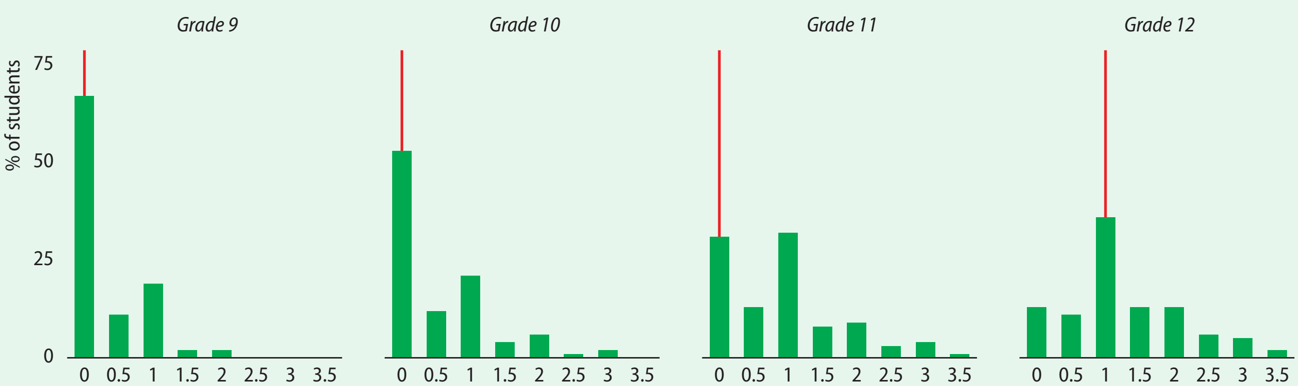


Note: The vertical red line shows the number of units required to meet the CSU and UC course requirement. Percentages may not total 100 due to rounding.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

FIGURE 6

Share of students receiving visual and performing arts (f) units, by grade level (cumulative)



Note: The vertical red line shows the number of units required to meet the CSU and UC course requirement. Percentages may not total 100 due to rounding.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

subject requirements at each grade level (the course requirements are the same for both the CSU and UC systems). The histograms plot the percentage of students who have completed a certain number of units with a grade of "C" or better by the end of each grade level. By the end of 12th grade 87 percent of students have completed the minimum two units of history and social science (see figure 1). Moreover, 60 percent of students have completed at least three units of history and social science by the end of 12th grade, even though the CSU and UC requirement is only two units.[4]

These histograms also show the percentage of students who are only half a unit short of meeting the CSU and UC subject requirement. For history and social science 6 percent of students are half a unit short of the required two units by the end of 12th grade and thus ineligible to attend a CSU or UC institution after high school. Students who are half a unit short of the "a" requirement are considered to be on the borderline. From a policy perspective these students are most likely to benefit from any program to improve eligibility at CSU and UC institutions.

Some 35 percent of students do not meet the requirement in English as early as the end of 9th grade, meaning that they have not completed a full year of English (see figure 2). Students are required to take four years of English in high school, so to get back on track for CSU and UC eligibility, they would need to take two years of English concurrently in either 10th, 11th, or 12th grade or attend summer school. The percentage of students not meeting the English requirement increases to 46 percent in 10th grade, 53 percent in 11th grade, and 60 percent by the end of 12th grade. In other words, 60 percent of 12th graders cannot matriculate to a CSU or UC institution based solely on their failure to fulfill the English course requirement. And 18 percent of the students are only half a unit from the required four units of English by the end of 12th grade.[5]

A similar pattern occurs for mathematics, with a large percentage (42 percent) of students already off track by the end of 9th grade because they have not completed two semesters of at least algebra I with a grade of "C" or better (see figure 3).[6] The percentage of students off track rises to 53 percent in 10th grade and 62 percent in 11th grade. But it decreases to 52 percent by the end of 12th grade. One reason for the decrease is the fact that only three units of mathematics are required; this in essence gives students an extra year (12th grade) to make up the third unit. Interestingly, the percentage of students who are only half a unit short of the requirement remains the same (11 percent) through all four years of high school.

The results for laboratory science, languages other than English, and visual and performing arts are similar to those for history and social science, English, and mathematics (see figures 4–6). But English and mathematics remain the most common requirements that students do not fulfill by the end of high school,[7] while English and laboratory science have the highest percentages of students who are only half a unit short of the requirement.

STUDY QUESTION 2: DOES A–G COURSE ELIGIBILITY VARY BY SOCIODEMOGRAPHIC CHARACTERISTICS?

While the first study question examined the course completion rate among all students in the sample, the second study question disaggregates these rates by ethnic group. Table 1 reports the percentage of students who fulfilled the a–g course

TABLE 1

Share of students fulfilling the course requirements in various subjects by the end of 12th grade, by ethnicity (percent)

Ethnicity	English (4 units)	Mathematics (3 units)	Laboratory science (2 units)
Asian	51.8	64.5	72.6
Hispanic	36.6	41.7	51.5
African American	34.0	34.9	47.7
White	50.7	58.7	64.7

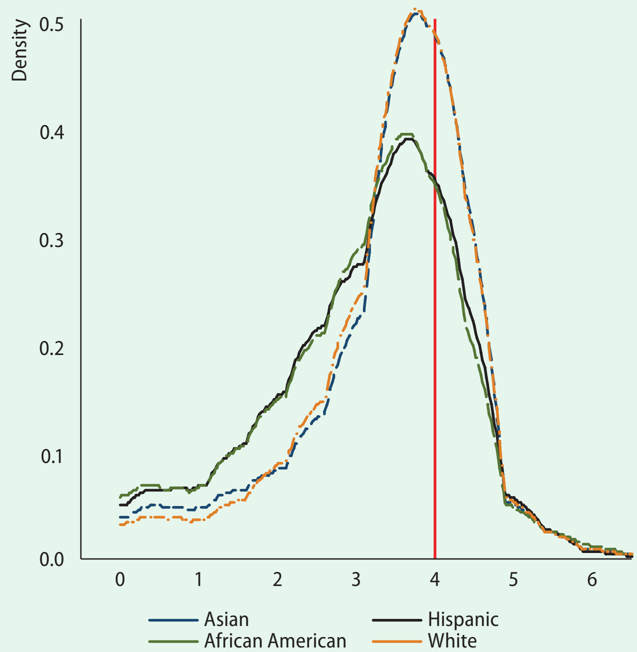
requirements in English, mathematics, and laboratory science at the end of 12th grade by ethnic group.

While table 1 shows the percentage of students by ethnic group who have met these three a–g course subject requirements, figures 7–9 show the distribution of units that each ethnic group has accumulated by the end of 12th grade. These figures display information similar to that in figures 1–6, but they are more flexible in that the curves of four different ethnicity groups can be superimposed onto a single graph, allowing the distributions by ethnicity for various subjects to be easily compared.[8]

Curves that are centered more to the right imply that students have on average completed more coursework by the end of 12th grade. A higher percentage of White students have completed the required four units of English compared with Hispanic and African American students (shown by the larger area under the curve for White students to the right of the vertical red line than under the curves for Hispanic and African American students; figure 7).[9] More specifically, 50.7 percent of White students have completed at least four units of English by the end of 12th grade, compared with 36.6 percent of Hispanic students and 34.0 percent of African American students (see table 1). A chi-square test of independence accounting for clustering of students at the school level (that is, accounting for the fact that students within the same school are more likely to share similar characteristics than are students drawn from a random sample of all students throughout the state) shows that the difference between White and Hispanic students and the difference between White and African American students are statistically significant at the 5 percent level, meaning that the results are unlikely to be due to chance.

For mathematics the curve for White students is to the right of the curves for Hispanic and African American students, suggesting that on average White students complete more mathematics courses by the end of 12th grade (see figure 8).

FIGURE 7
English (b) units received by 12th graders, by ethnicity (cumulative)



Note: Figure uses an Epanechnikov kernel with bandwidth 0.4. The vertical red line shows the number of units required to meet the CSU and UC course requirement.

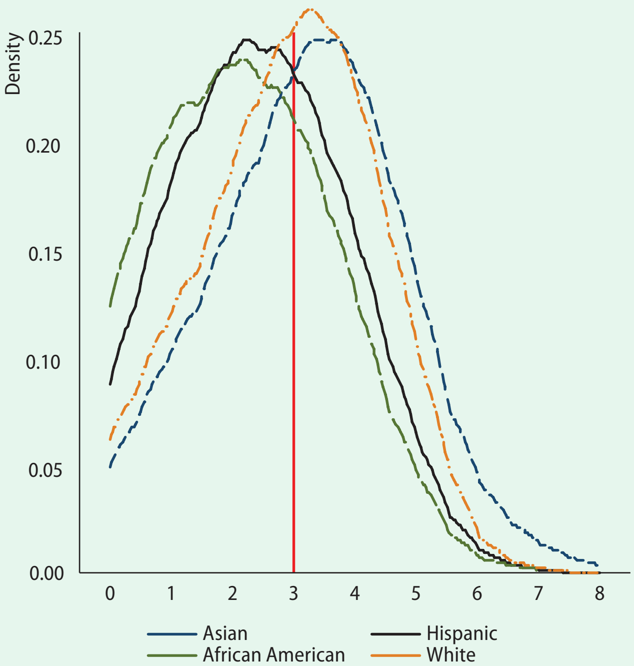
Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

The percentage of students who have completed at least three mathematics courses by the end of 12th grade is 58.7 percent for White students, 41.7 percent for Hispanic students, and 34.9 percent for African American students. A chi-square test of independence accounting for clustering of students at the school level shows that the difference between White and Hispanic students and the difference between White and African American students are statistically significant at the 5 percent level.

A similar pattern occurs for laboratory science, with Hispanic and African American students completing fewer laboratory science courses on average than White students (see figure 9). The percentage of students who have completed at least two laboratory science courses by the end of 12th grade is 64.7 percent for White students, 51.5 percent for Hispanic students, and 47.7 percent

FIGURE 8

Mathematics (c) units received by 12th graders, by ethnicity (cumulative)

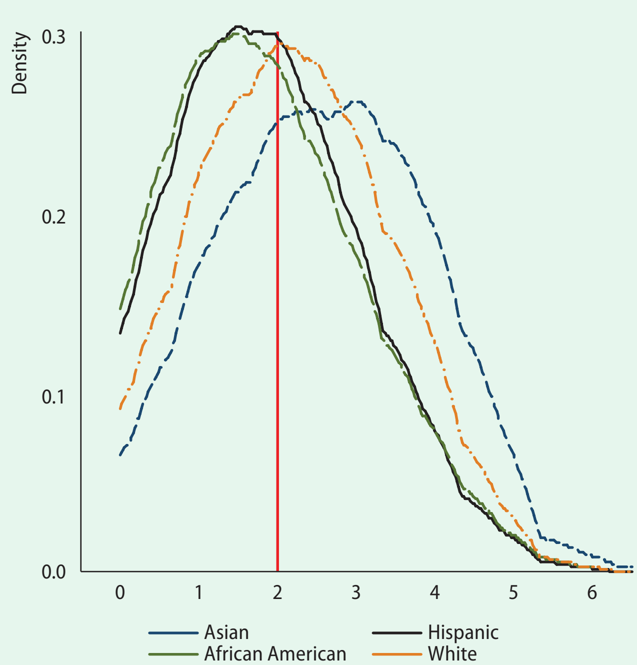


Note: Figure uses an Epanechnikov kernel with bandwidth 0.7. The vertical red line shows the CSU and UC requirement.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

FIGURE 9

Laboratory science (d) units received by 12th graders, by ethnicity (cumulative)



Note: Figure uses an Epanechnikov kernel with bandwidth 0.6. The vertical red line shows the CSU and UC requirement.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

for African American students (see table 1). A chi-square test of independence accounting for clustering of students at the school level shows that the difference between White and Hispanic students and the difference between White and African American students are statistically significant at the 5 percent level.

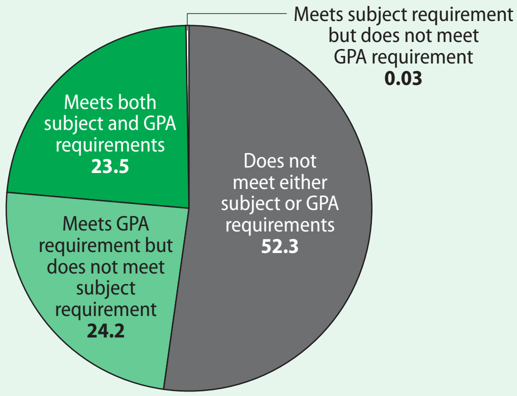
Untangling courses and grades: two sets of requirements

Building on the previous section that looks at students' coursework progression through high school, this section examines students' eligibility status in both subject requirements and GPA requirements. To be eligible for CSU or UC admission upon finishing high school, students must meet both subject and GPA requirements. Subject requirements pertain to students completing the required number of a–g courses with a grade of "C" or better, and GPA requirements pertain to students maintaining a certain GPA in the a–g courses throughout high school. The subject requirements are the same for both CSU and UC institutions (see appendix A), but the GPA requirements differ. The UC system requires a 3.0 GPA for all a–g courses taken in 10th and 11th grade, and a 2.8 GPA for all a–g courses in 12th grade. The CSU system requires a 2.0 GPA for all a–g courses in 10th–12th grades. This report uses the CSU GPA requirement in its analysis because it is the minimum requirement for California four-year public institutions.

Less than a quarter of students (23.5 percent) fulfilled both the CSU GPA and subject requirements by the end of high school, and more than half (52.3 percent) failed to meet both requirements, which suggests a problem in the preparation of high school students for college (figure 10). Only 0.03 percent of students met the subject requirements but not the

FIGURE 10

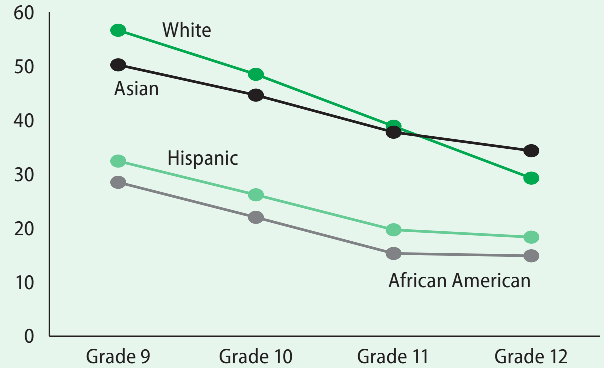
Share of students who meet CSU requirements by the end of 12th grade (percent)



Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

FIGURE 11

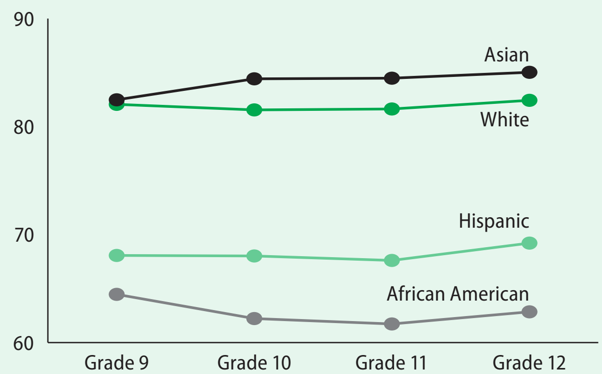
Share of students meeting CSU requirements, by grade level and ethnicity (percent)



Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

FIGURE 12

Share of students meeting the CSU GPA requirement, by ethnicity (percent)



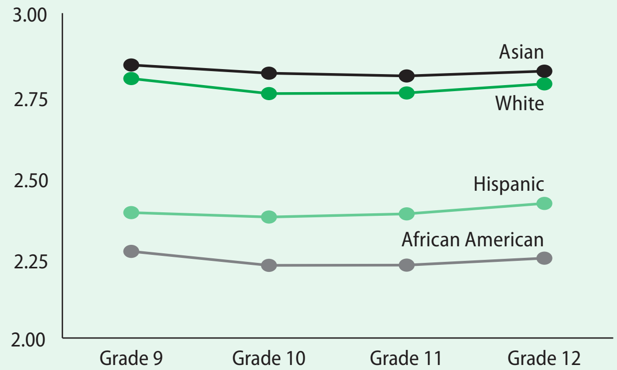
Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

GPA requirement. By comparison, 24.2 percent met the GPA requirement but not the subject requirement. A chi-square test of homogeneity of proportions accounting for clustering of students at the school level shows that a student who is going to miss one requirement is much more likely to miss the subject requirement than the GPA requirement (results were significant at the 5 percent level).

There is a wide variation in CSU requirement status among ethnicity groups, even as early as 9th grade (figure 11). White students on average have the highest rate of meeting the CSU course requirement in 9th grade (at 57 percent), whereas African American students (29 percent) and Hispanic students (32 percent) have particularly low rates. This means that 71 percent of African American students have already fallen off track by the end of 9th grade; this percentage grows to 85 percent by the end of high school.[10] A chi-square test of independence accounting for clustering of students at the school level shows that the difference between White and Hispanic students and the difference between White and African American students are statistically significant at each grade level.

The minimum GPA for CSU eligibility is 2.0 in the a–g courses at the end of 12th grade. The percentage of students meeting the requirement remains stable across each year of high school (figure 12).[11] In other words, the percentage of students who do not maintain at least a 2.0 GPA by the end of 9th grade does not appreciably change through high school. A chi-square test of independence accounting for clustering of students at the school level shows no statistical difference between the percentage of students meeting the minimum in 9th grade and those meeting it in 12th grade for each ethnicity. But there are differences between White and Hispanic students and between White and African American students that are statistically significant at each grade level.

FIGURE 13
Average cumulative GPA, by ethnicity (points)



Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

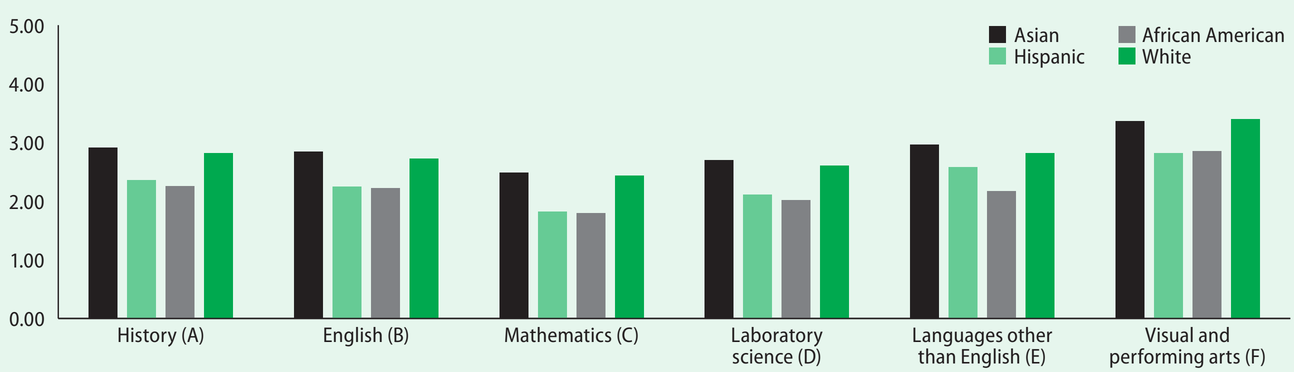
As implied in figure 12, average cumulative GPA in the a–g courses does not change appreciably through high school. More specifically, for each ethnicity 9th grade GPAs were not statistically different from 12th grade GPAs (figure 13). There are also gaps in GPA between White and Hispanic students and between White and African American students. The gap between White and Hispanic students is approximately 0.4 points through high school and the difference between White and African American students is approximately 0.5 points. A two-sample t-test shows that these differences are statistically significant at each grade level.[12]

Regardless of ethnicity students had on average the lowest grades in mathematics and laboratory science and the highest grades in visual and performing arts (figure 14).[13] And while African American and Hispanic students tended to perform similarly across most subjects, Hispanic students achieve almost 0.5 points higher in languages other than English (tests of differences indicated that the difference in average GPA between Hispanic students and African American students are not statistically significant except for languages other than English). Closer inspection of the transcripts indicates that this difference is likely due to the fact that Hispanic students enroll primarily in Spanish for their language other than English course (more than 90 percent of their language other than English courses are Spanish). A two-sample t-test shows that the difference in GPA between White and Hispanic students and between White and African American students is statistically significant for all subjects.

The figures in this section highlight the large percentage of students who are not meeting CSU requirements at the end of high school. But are these students not meeting the requirements because they are not enrolling in the required courses or because they are not earning high enough grades when they do enroll? Examining the percentage of students who enroll in a–g courses regardless of the grade received in the course can shed light on this question.

A large percentage of students are not enrolling in enough a–g courses to meet the CSU requirements,

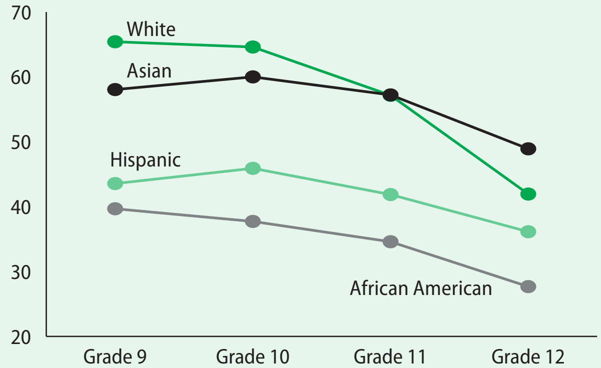
FIGURE 14
Average GPA, by subject and ethnicity (points)



Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

FIGURE 15

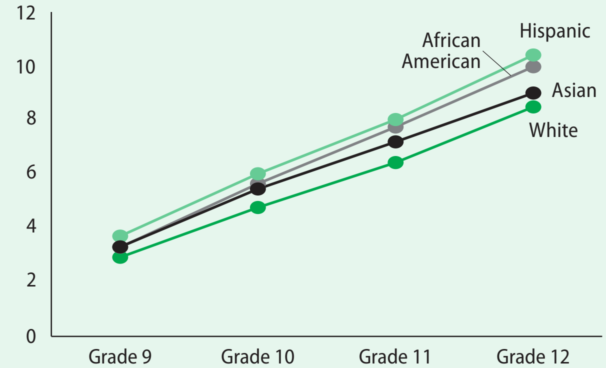
Share of students enrolled in sufficient courses to meet CSU course requirements (percent)



Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

FIGURE 16

Number of non-a–g courses taken, by grade level and ethnicity (cumulative)



Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

beginning in 9th grade (figure 15). For instance, only 40 percent of African American 9th graders are enrolled in the required a–g courses. Comparing this result with that in figure 11, which shows that approximately 30 percent of African American 9th graders meet CSU requirements, implies that approximately 10 percent of African American students are enrolled in the required a–g courses but do not receive at least a "C" grade in the a–g courses (calculated as the difference between the values in figure 11 and figure 15 for 9th grade African American students). However, it is apparent from figure 15 that the majority of African American students (approximately 60 percent) are not enrolled in the required courses in 9th grade, suggesting that the primary problem is student enrollment in the required courses rather than student achievement in them.[14]

It is more difficult to disentangle the situation later in high school because students may fail to enroll in a–g courses if they received poor grades in a–g courses earlier in their high school career (that is, because of feedback effects). However, the results illustrate the important point that students are not enrolling in a–g courses even early in their high school careers. The results also reveal a difference in enrollment patterns across ethnicities. The difference between White and Hispanic students is statistically significant at every grade level except grade 12. And the difference between White students and African American students is statistically significant at every grade level.

Course-taking patterns for courses that do not meet the a–g requirements

White students tend to take the fewest non-a–g courses and Hispanic students the most (figure 16).[15] A two-sample t-test shows that this difference is statistically significant at each grade level, as is the difference between White and African American students. The next step for this type of analysis would be to disentangle the course content of these non-a–g courses; for instance, are they career or technical courses, and do students with particular course sequences enroll and complete them with particular patterns? (A preliminary look suggests that a majority of the courses are in physical education.) These questions will be addressed in future research.

STUDY QUESTION 3: HOW IS STUDENT PERFORMANCE IN SPECIFIC COURSES RELATED TO SUBSEQUENT COURSE-TAKING WITHIN A COLLEGE-PREPARATORY CURRICULUM?

To further untangle the patterns of course sequences, it is informative to examine when students progress from one course to the next—algebra I to geometry, for example. The distribution of grades received for the five most common courses in 9th grade is skewed to the right, meaning that more students earn "A's" and "B's" than "D's" and "F's" (table 2). This pattern is most pronounced for geometry and language other than English I, where "A" was the most common grade, followed by "B," and so on down to "F."[16] For geometry this may be a result of more academically inclined students taking geometry in 9th grade, a hypothesis supported by the fact that there were only 7,727 semesters of geometry taken by 9th graders compared with 23,609 semesters of algebra I.[17]

TABLE 2

Letter grades received by 9th graders, by course

Letter grade	Number of semesters	Share of total (percent)
Algebra I (n = 23,609)		
A	4,387	18.6
B	5,816	24.6
C	6,618	28.0
D	3,869	16.4
F	2,919	12.4
Geometry (n = 7,727)		
A	2,468	31.9
B	2,405	31.1
C	1,757	22.7
D	714	9.2
F	383	5.0
English (n = 37,888)		
A	9,461	25.0
B	11,206	29.6
C	9,689	25.6
D	4,909	13.0
F	2,623	6.9
Languages other than English I (n = 17,559)		
A	5,674	32.3
B	5,102	29.1
C	3,884	22.1
D	1,911	10.9
F	988	5.6
Biology (n = 10,273)		
A	2,371	23.1
B	3,062	29.8
C	2,756	26.8
D	1,325	12.9
F	759	7.4

Note: The skewness of the distributions for these five courses is 0.21 for algebra I, 0.69 for geometry, 0.46 for English, 0.64 for languages other than English I, and 0.44 for biology.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

Table 3 cross-tabulates the mathematics courses that students took in 10th grade based on their GPA in algebra I in 9th grade (typically, these students took two semesters of algebra I in 9th grade, so their GPA is measured in half unit intervals). Some 336 students averaged a GPA of 0.0 in 9th grade algebra I, and 18 of them did not take a mathematics course in 10th grade, 273 of them took algebra I again in 10th grade, 27 students took geometry in 10th grade, 8 took algebra II in 10th grade, and 10 took some other mathematics course. Notice that about 6 percent of the students whose algebra I GPA is 1.0 or lower did not enroll in any mathematics course in 10th grade. This is a cause for concern since these students are not enrolling in mathematics courses after doing poorly in algebra I as 9th graders.

As expected, the percentage of students enrolling in geometry as 10th graders increases as students' algebra I GPA increases. For instance, only 27 students whose algebra I GPA was 0.0 in 9th grade went on to take geometry in 10th grade (these students most likely passed algebra I during the summer before 10th grade). By comparison, 916 students whose algebra I GPA was 4.0 in 9th grade enrolled in geometry in 10th grade. Conversely, the percentage of students who enroll in algebra I again as 10th graders decreases as 9th grade algebra I GPAs increase. Some students with high algebra I GPAs (3.0–4.0) in 9th grade took algebra I again in 10th grade because they were enrolled in a two-year algebra I course sequence.

Table 4 provides the cross-tabulations between 9th grade English GPA and enrollment in

TABLE 3

Mathematics course-taking progression based on 9th grade algebra I GPA

10th grade math course	9th grade algebra I GPA																	
	0.0 (n = 336)		0.5 (n = 576)		1.0 (n = 893)		1.5 (n = 1,193)		2.0 (n = 1,653)		2.5 (n = 1,465)		3.0 (n = 1,562)		3.5 (n = 1,044)		4.0 (n = 1,315)	
	Number of students	Share of total (percent)	Number of students	Share of total (percent)	Number of students	Share of total (percent)	Number of students	Share of total (percent)	Number of students	Share of total (percent)	Number of students	Share of total (percent)	Number of students	Share of total (percent)	Number of students	Share of total (percent)	Number of students	Share of total (percent)
None	18	5.4	35	6.1	54	6.0	47	3.9	28	1.7	20	1.4	18	1.2	4	0.4	7	0.5
Algebra I	273	81.3	396	68.8	443	49.6	411	34.5	418	25.3	312	21.3	265	17.0	181	17.3	170	12.9
Geometry	27	8.0	124	21.5	351	39.3	671	56.2	1,063	64.3	1,002	68.4	1,082	69.3	731	70.0	916	69.7
Algebra II	8	2.4	12	2.1	34	3.8	53	4.4	138	8.3	128	8.7	190	12.2	126	12.1	205	15.6
Other	10	3.0	9	1.6	11	1.2	11	0.9	6	0.4	3	0.2	7	0.4	2	0.2	17	1.3

Note: The sample comprises only students who enrolled in algebra I in 9th grade for at least two semesters. Students who took geometry in 9th grade, for instance, are not included. Students were counted as having taken a particular course in 10th grade if they enrolled for two semesters in that course, regardless of the letter grade they earned.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

TABLE 4

English course-taking progression based on 9th grade English GPA

Took English in 10th grade?	9th grade English GPA																	
	0.0 (n = 338)		0.5 (n = 618)		1.0 (n = 1,296)		1.5 (n = 1,810)		2.0 (n = 2,730)		2.5 (n = 2,744)		3.0 (n = 3,235)		3.5 (n = 2,421)		4.0 (n = 3,127)	
	Number of students	Share of total (percent)	Number of students	Share of total (percent)	Number of students	Share of total (percent)	Number of students	Share of total (percent)	Number of students	Share of total (percent)	Number of students	Share of total (percent)	Number of students	Share of total (percent)	Number of students	Share of total (percent)	Number of students	Share of total (percent)
No	25	7.4	61	9.9	97	7.5	146	8.1	147	5.4	98	3.6	76	2.3	54	2.2	56	1.8
Yes	313	92.6	557	90.1	1,199	92.5	1,664	91.9	2,583	94.6	2,646	96.4	3,159	97.7	2,367	97.8	3,071	98.2

Note: The sample comprises only students who enrolled in English in 9th grade for at least two semesters. Students were considered to have taken English in 10th grade if they enrolled for two semesters in English, regardless of the letter grade earned.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

English as a 10th grader. So, for example, 338 students averaged a GPA of 0.0 in English as 9th graders, and 313 of them took English as 10th graders. Approximately 8 percent of the students who earn less than a 2.0 in 9th grade English do not enroll in English as 10th graders. This is especially alarming because the CSU and UC requirement is four years of English in high school; by not enrolling in English as 10th graders, these students put themselves at a great disadvantage for meeting the CSU and UC course requirements at the end of high school because they would need to take concurrent English courses in either 11th or 12th grade or take English over the summer to have completed four years of English.

What about differences in course-taking patterns by student ethnicity? Cross-tabulations of whether students took certain courses in 9th grade and whether they met CSU requirements as 12th graders show, for example, that 644 Asian students who took algebra I or higher in 9th grade did not go on to meet the requirements in 12th grade, while 725 did (table 5). And 943 Asian students who did not take algebra I or higher in 9th grade did not go on to meet requirements in 12th grade, while 152 did.

The table also shows that a more than a fifth of Hispanic students (22.1 percent) did not take (or did not receive at least a "C" in) English in the 9th grade. This is calculated as the number of

TABLE 5

Number of students meeting CSU requirements by 12th grade, by ethnicity and courses taken in 9th grade

Ethnicity	Took algebra I or higher in 9th grade		Took English in 9th grade		Took biology in 9th grade		Took a language other than English in 9th grade		Did not take algebra I or higher in 9th grade		Did not take English in 9th grade		Did not take biology in 9th grade		Did not take a language other than English in 9th grade	
	Not met	Met	Not met	Met	Not met	Met	Not met	Met	Not met	Met	Not met	Met	Not met	Met	Not met	Met
Asian	644	725	1,185	863	335	350	503	533	943	152	402	14	1,252	527	1,084	344
Hispanic	3,291	1,582	6,369	1,829	1,113	715	3,105	1,254	5,350	303	2,272	56	7,528	1,170	5,536	631
African American	455	262	1,102	311	338	138	488	231	1,102	52	455	3	1,219	176	1,069	83
White	2,080	1,683	3,127	1,784	749	648	1,596	1,453	1,706	103	659	2	3,037	1,138	2,190	333

Note: Courses were selected because they are commonly taken in 9th grade.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

TABLE 6

Share of students meeting CSU requirements by 12th grade, by ethnicity and courses taken in 9th grade (percent)

Ethnicity	Took algebra I or higher in 9th grade?			Took English in 9th grade?			Took biology in 9th grade?			Took a language other than English in 9th grade?		
	No	Yes	Difference (percentage points)	No	Yes	Difference (percentage points)	No	Yes	Difference (percentage points)	No	Yes	Difference (percentage points)
Asian	13.9	53.0	39.1*	3.4	42.1	38.7*	29.6	51.1	21.5*	24.1	51.4	27.3*
Hispanic	5.4	32.5	27.1*	2.4	22.3	19.9*	13.5	39.1	25.6*	10.2	28.8	18.6*
African American	4.5	36.5	32.0*	0.7	22.0	21.3*	12.6	29.0	16.4*	7.2	32.1	24.9*
White	5.7	44.7	39.0*	0.3	36.3	36.0*	27.3	46.4	19.1*	13.2	47.7	34.5*

* Statistically significant at the 5 percent level based on a two-sample test of proportions that accounts for clustering.

Note: Courses were selected because they are commonly taken in 9th grade.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

Hispanic students that did not take English in 9th grade (2,328) divided by the total number of Hispanic students (10,526).[18] This could be due to language difficulties specific to Hispanic students that cause them to earn lower grades in English. However, further inspection of the data shows that the percentage of "D's" and "F's" received by Hispanic students in English or English language development courses is similar to that of African American students (15 percent of Hispanics and 16 percent of African Americans earned "D's" and 9 percent of both groups earned "F's"; a chi-square test of homogeneity of proportions, which tests whether the difference between two proportions is statistically different from zero, shows that these differences between Hispanic and African American students are not statistically significant at the 5 percent level).

Table 6 shows the percentages of the tabulations from table 5 and provides the results of a two-sample test of proportions (accounting for clustering in the data) that tests whether the differences are statistically significant. To continue with the previous example, 13.9 percent of Asian students who did not take algebra I in 9th grade went on to meet CSU requirements at the end of high school compared with 53.0 percent of Asian students who did take algebra I in 9th grade. The difference of 39.1 percentage points between the two groups is statistically significant, meaning that Asian students who took algebra I as 9th graders are more likely to meet CSU requirements as 12th graders than those who did not. All the differences between students taking and not taking the specified courses are statistically significant at the 5 percent level, meaning that students who took the courses as 9th graders are more likely to meet CSU requirements as 12th graders than students who did not take the courses.

Table 6 also shows that even among students who take these courses in 9th grade, in many instances more than half these students do not meet the CSU requirements by the end of 12th grade. This is because taking English, for instance, in the 9th grade does not ensure that a student will be on track in the 9th grade (he or she also must earn a "C" or better in an a–g math course and one other a–g course) and because the percentage of students on track to meet CSU requirements decreases as students progress through high school (see figure 11). Instead, these results show only that students taking these courses in 9th grade are more likely than student who do not take these courses to meet the CSU requirements.

STUDY QUESTION 4: DOES COURSE COMPLETION VARY BY THE OVERALL PERFORMANCE OF THE SCHOOL IN WHICH STUDENTS ARE ENROLLED?

The fourth component of this analysis examines the relationship between overall school-level academic achievement, individual student-level achievement in 9th grade, and the frequency with which students meet CSU requirements. Table 7 reports the percentage of students who met both CSU requirements for GPA and a–g courses, based on their 9th grade fall semester GPA and the academic performance index quintile of the school they attended. Presenting these three characteristics simultaneously allows the relationship of two of the characteristics to be examined while the third is held constant. For instance, of students who earned a 3.0 GPA during the fall semester of 9th grade, 20.0 percent in the lowest academic performance index quintile of schools went on to meet the CSU requirement as 12th graders, as did 22.2 percent in the second quintile, 23.8 percent in the third quintile, 31.0 percent in the fourth quintile, and 28.6 percent in the highest quintile.

The percentage of students who meet CSU requirements at the end of high school increases as the 9th grade fall semester GPA increases

As expected, the percentage of students who meet CSU requirements at the end of high school increases as the 9th grade fall semester GPA increases (this can be seen in the weighted averages in the bottom row of table 7). This implies a positive relationship between having a high 9th grade fall semester GPA and meeting CSU requirements in 12th grade.[19] A more interesting relationship exists between the school academic performance index quintile and 12th grade CSU requirement status for a given 9th grade fall semester GPA. As academic performance index quintiles increase from lowest to highest, there is generally a corresponding rise in the percentage of students with a 4.0 GPA who fulfilled CSU requirements.

This pattern means that conditional on the 9th grade fall semester GPA, students enrolled in schools with higher academic performance indexes are more likely to meet CSU requirements by the end of 12th grade.[20] More specifically, students with similar GPAs in the first semester of 9th grade have very different outcomes depending on the school they attend. The difference between the share of students with a 4.0 GPA who meet CSU requirements from the lowest academic performance index quintile schools and the share from the highest quintile schools is more than 20 percentage points. While there are many possible reasons for this finding (most notably, school and student characteristics not included in the dataset), disentangling the cause of this finding is beyond the scope of this research. The authors plan to examine this issue further in future studies.

TABLE 7

Share of students meeting CSU requirements by 12th grade, by academic performance index quintile of schools and student GPA in 9th grade (percent)

School academic performance index quintile	9th grade fall semester GPA									
	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	Average
Lowest	0.0	0.0	0.0	1.3	2.0	8.1	20.0	39.5	55.8	17.2
Second	0.0	0.0	1.4	0.8	3.5	9.7	22.2	44.8	63.4	21.2
Third	0.0	2.0	0.0	0.6	2.1	8.5	23.8	50.1	68.3	27.0
Fourth	0.0	0.0	0.0	1.7	6.3	13.0	31.0	55.9	67.5	39.7
Highest	..	0.0	0.0	1.6	4.8	11.2	28.6	52.6	76.4	32.6
Average	0.0	0.6	0.6	0.9	3.0	9.2	23.1	46.7	65.6	23.8

.. indicates no observations.

Note: GPA is rounded to the nearest half point. Averages are weighted by number of students.

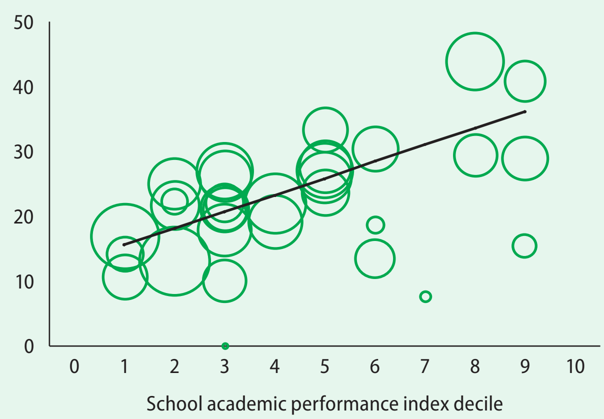
Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

Figure 17 illustrates the relationships between the size of the school, the school's academic performance index decile, and the percentage of students who met CSU requirements as 12th graders. The area of the circles is proportional to school enrollment, which allows three variables to be examined rather than the two in a standard scatterplot. The academic performance index decile is the decile that the school is in with respect to the entire state of California. None of the schools in this dataset scored in the top decile in California, although three scored in the ninth decile. The figure also plots a fitted line indicating the relationship between the school academic performance index decile and fulfilling the CSU requirements (the fitted line is weighted by school size, which is another reason for weighting the circles in the figure).

The fitted line slopes upward, indicating a positive relationship. This finding is somewhat expected, given that standardized test scores (on which the academic performance index is based) are positively correlated with students meeting the CSU requirements. The figure also suggests no relationship between school size and either academic measure.[21] The figure shows that large schools are distributed at both ends of the academic performance and CSU requirement spectrums.

FIGURE 17

School academic performance decile and size and share of students meeting CSU requirements in 12th grade (percent)



Note: Area of circle is proportional to school enrollment.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

STUDY QUESTION 5: WHAT PATTERNS OF HIGH SCHOOL COURSES DIFFERENTIATE STUDENTS WHO MATRICULATE TO TWO- AND FOUR-YEAR COLLEGES?

This study has linked a large proportion of the 2003/04 cohorts of 12th graders with the post-secondary institutions they attended if they matriculated to a CSU, UC, or California community college in 2004. If a high school student in

The four-year college–going rate generally rises as the 9th grade fall semester GPA increases

the Transcript Evaluation Service sample matriculated to a private university or an out-of-state institution, the postsecondary outcome of that student was unable to be observed. As such, it could not be determined whether students who were not matched with postsecondary outcomes attended a private university, attended an out-of-state institution, or did not attend college altogether. Students who followed one of these paths were excluded from this part of the analysis, allowing comparison only of students who attended California community colleges, CSU institutions, and UC institutions.[22]

Although this data limitation precludes a comparison between students attending college and not attending college, the comparison between California public four-year students and two-year students is still important due to the differences between these two populations. Namely, the a–g requirements discussed throughout this report pertain only to four-year public college-going students in California, whereas the requirements for admission to a two-year college are much less stringent. This difference in entrance requirements between two-year and four-year colleges provides a basis for examining the relationship between successful course completion early in high school and the chances of attending a four-year versus a two-year institution. Tables 8 and 9 provide cross-tabulations of the four-year California college–going rates of students who attended either a two- or four year California public institution based on ethnicity, course-taking patterns, and GPA. In particular, this analysis compares students who matriculated to a four-year university (CSU or UC) with those who matriculated to a two-year institution (a California community college)

The left side of table 8 shows the number of students who took certain courses in 9th grade and matriculated to two-year California community colleges and four-year CSU or UC colleges, and the right side shows the number of students who did not take certain courses in 9th grade and matriculated to the same types of schools. For instance, 379 of the Hispanic students who took algebra I in 9th grade matriculated to a California community college and 503 matriculated to a four-year CSU or UC institution. And 251 of the Hispanic students who did not take algebra I in 9th grade matriculated to a California community college and 123 to a four-year CSU or UC institution. Table 9 shows the percentages of students who attended a four-year CSU or UC institution as a share of students who attended either a two- or four year California public institution based on whether the student took the specified coursework. The differences in the four-year college-going rate between students who did and did not take certain classes are also provided, as well as an indicator of whether the difference is statistically significant. (Tests of significance account for clustering in the data and are based on a two-sample test of proportions.)

The difference in percentages is statistically significant at the 5 percent level for all comparisons except biology among Asian, African American, and White students. More specifically, students who take algebra I or higher, English, and a language other than English in 9th grade are more likely to attend a CSU or UC school than a California community college compared with students who do not take these courses in 9th grade. The lack of statistically significant differences for biology is likely because the course is not required in 9th grade and is not as taken as often as the other courses. Table 2 shows that there were 10,273 semesters of biology taken in 9th grade compared with more than 20,000 semesters of algebra I or higher, 37,888 semesters of English, and 17,559 semesters of languages other than English.[23]

Finally, table 10 provides the cross-tabulations of the percentages of students who matriculated to a four-year institution as a share of students who attended either a two- or four year California public institution based on their ethnicity and 9th grade fall semester GPA. As expected, the four-year college–going rate generally rises as the 9th grade fall semester GPA increases.[24] For example,

TABLE 8

Number of students matriculating to a two-year California community college or four-year CSU or UC institution, by ethnicity and courses taken in 9th grade

Ethnicity	Took algebra I or higher in 9th grade		Took English in 9th grade		Took biology in 9th grade		Took a language other than English in 9th grade		Did not take algebra I or higher in 9th grade		Did not take English in 9th grade		Did not take biology in 9th grade		Did not take a language other than English in 9th grade	
	Two-year college	Four-year college	Two-year college	Four-year college	Two-year college	Four-year college	Two-year college	Four-year college	Two-year college	Four-year college	Two-year college	Four-year college	Two-year college	Four-year college	Two-year college	Four-year college
Asian	143	230	201	263	96	110	121	167	80	38	22	5	127	158	102	101
Hispanic	379	503	519	596	122	215	308	429	251	123	111	30	508	411	322	197
African American	51	64	119	72	46	32	55	50	92	9	24	1	97	41	88	23
White	483	451	600	485	184	154	391	397	156	39	39	5	455	336	248	93

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

TABLE 9

Students matriculating to a four-year CSU or UC institution as a share of students who matriculated to a two- or four-year California public institution, by ethnicity and courses taken in 9th grade (percent)

Ethnicity	Took algebra I or higher in 9th grade			Took English in 9th grade			Took biology in 9th grade			Took a language other than English in 9th grade		
	No	Yes	Difference (percentage points)	No	Yes	Difference (percentage points)	No	Yes	Difference (percentage points)	No	Yes	Difference (percentage points)
Asian	32.2	61.7	29.5*	18.5	56.7	38.2*	55.4	53.4	–2.0	49.8	58.0	8.2*
Hispanic	32.9	57.0	24.1*	21.3	53.5	32.2*	44.7	63.8	19.1*	38.0	58.2	20.2*
African American	8.9	55.7	46.8*	4.0	37.7	33.7*	29.7	41.0	11.3	20.7	47.6	26.9*
White	20.0	48.3	28.3*	11.4	44.7	33.3*	42.5	45.6	3.1	27.3	50.4	23.1*

* Statistically significant at the 5 percent level based on a two-sample test of proportions and accounting for clustering.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

no African American students who earned a 0.5, 1.0, or 1.5 GPA went on to a four-year institution. About 9.7 percent who earned a 2.0 went on to a four-year institution, and the percentage generally increases as GPA increases, with 60.0 percent of students who received a 4.0 GPA attending a four-year institution rather than a two-year institution.

The percentage of Hispanic students who matriculate to a four-year college is higher than that of White students for all GPAs, although the caveat that this percentage refers only to students who attend a two-year or four-year college in California rather than the entire sample of high school students must be recalled. However, a chi-square test of homogeneity of proportions shows that the difference between Hispanic and White students is not statistically significant at the 5 percent level; the difference between White and African American students is also not statistically significant.[25]

CONCLUSION

This study documented patterns of high school course-taking associated with preparation for college and matriculation into two-year California community colleges and four-year CSU and UC

TABLE 10

Students matriculating to a four-year California college as a share of students who attended either a two- or four-year California public institution, by ethnicity and GPA in 9th grade (percent)

	9th grade fall semester GPA									
Ethnicity	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	Average
Asian	..	0.0	25.0	0.0	7.1	21.7	43.1	65.9	67.5	54.6
Hispanic	0.0	0.0	23.1	17.0	19.6	35.6	46.2	61.2	69.2	49.8
African American	..	0.0	0.0	0.0	9.7	18.2	43.1	63.6	60.0	33.8
White	..	0.0	11.1	0.0	16.2	14.6	32.7	54.0	60.7	43.4
Average	0.0	0.0	14.3	10.1	16.1	25.1	41.1	59.5	64.8	47.1

.. indicates no observations.

Note: GPA is rounded to the nearest half point.

Source: Transcript Evaluation Service and California Department of Education data, as discussed in box 1 and appendix B.

institutions. The findings demonstrate a consistent pattern: students who complete college-preparatory courses in 9th grade begin a clear trajectory that continues throughout high school. Compared with students who do not take key college preparatory courses in the 9th grade, students who do take these courses have a higher probability of meeting the complete set of course requirements set by the UC and CSU systems. Students who fall off the college-preparatory track early in high school tend to move ever further from a complete college-preparatory program as they progress through high school.

The findings in this report translate into a clear message for policymakers, students, and parents: the high school program for college preparation begins in 9th grade, and making up missed courses and academic content is likely to be difficult for students who put off college-preparatory work until later in their high school career. These findings suggest that early intervention is critical.

A 2002 evaluation of the University of California's ELC program noted that students changed their behavior when they received information from the university about their chances of attending college (Masten, 2002). Specifically, when students were alerted in the fall of 12th grade about the status of their college eligibility and were given an explanation of the steps needed to maintain or achieve eligibility, they took deliberate steps to complete required high school courses. This behavior change was significant because it demonstrated students taking active steps to move from being minimally eligible to attend a CSU or UC undergraduate institution to being more competitive and likely to be admitted to the institution of their choice. While this pattern was observed for students who were relatively close to being eligible, CSU and UC staff have wondered whether similar behavior changes could be catalyzed with students who are further off track (Masten, 2002).

This has led to a series of pilot programs—led by the University of California and the Career Academy Support Network—that use transcript data to work with students, families, and schools. For some students, simply receiving the information during a one-on-one counseling session has prompted them to more carefully consider the courses they choose (Career Academy Support Network, 2007). The analysis gives counselors reliable information for working with students who need more guidance and encouragement. For schools with many students who are not on track for university eligibility, the data have prompted consideration of strategies for preparing more students for university admissions, including changes in scheduling, sequencing, offerings, and support services (Career Academy Support Network, 2007).

Future work in this area includes gathering student-level data that can improve the look at course-taking patterns into earlier grades to determine how middle school students could be better supported with regard to college preparation. Finally, this analysis has not attempted to examine whether students were receiving academic support services and what impact, if any, such services might have had on their academic and college-preparatory program. Merging transcript data files with additional information about the types of support students sought out and received is a critical next step in this area of research.

APPENDIX A
SUMMARY OF THE A–G SUBJECT REQUIREMENTS

The a–g subject requirements are summarized here and pertain to both CSU and UC institutions. This information is based on the University of California's "2007 guide to 'a–g' requirements and instructions for updating your school's 'a–g' course list," available at http://www.ucop.edu/a-gGuide/ag/content/Guidetoa-gReqs_2007.pdf. Additional information on the variety of courses that meet a–g requirements at specific schools can be found on the UC Doorways website at https://doorways.ucop.edu/list/.

a History and social science (two years)

Two years of history and social science that include one year of world history, cultures, and historical geography and one year of U.S. history or one-half year of U.S. history and one-half year of civics or American government.

b English (four years)

Four years of college-preparatory English that include frequent and regular writing and reading of classic and modern literature. English language development courses may count for up to one year provided they have a strong emphasis on reading and writing.

c Mathematics (three years)

Three years of college-preparatory mathematics that include the topics covered in elementary and advanced algebra and two- and three-dimensional geometry. College-preparatory courses in mathematics taken in 7th and 8th grades with grades of C or higher may count toward the subject requirement.

d Laboratory science (two years)

Two years of laboratory science that provides fundamental knowledge in at least two of these three disciplines: biology, chemistry, and physics. The last two years of three-year sequences in integrated science may be used to fulfill this requirement as long as rigorous coverage of at least two of the foundational subjects is provided.

e Language other than English (two years)

Two years of the same language other than English in courses that emphasize speaking and understanding and include instruction in grammar, vocabulary, reading, and composition. College-preparatory courses in languages taken in 7th and 8th grades with grades of C or better may count toward the subject requirement if the high school accepts them as equivalent to its own courses.

f Visual and performing arts (one year)

One year of dance, drama or theater, music, or visual art.

g College-preparatory elective (one year)

One year (two semesters) of additional a–f courses beyond those used to satisfy the requirements above or of courses that have been approved solely for use as g electives. All courses selected to meet the elective requirement are expected to meet standards of quality similar to those required for the a–f requirements. Courses acceptable for the g elective area should be advanced courses designed for 11th and 12th grade and have appropriate prerequisites.

APPENDIX B
ABOUT THE DATASET

The California Basic Educational Data System (CBEDS) is a publicly available comprehensive data repository that reports, among other things, the proportion of high school graduates ready to attend the state's public universities. However, the CBEDS data on college readiness are reported at the school level, which means that some important variations at the student level are lost. Moreover, CBEDS data are reported by school-level administrators who may not accurately estimate a–g completion rates or verify whether individual courses at their schools meet a–g requirements. Researchers have been concerned for some time that CBEDS may overstate college-readiness rates.

The data used for this report are drawn from individual student transcripts that are part of a transcript archive developed by the University of California (UC) as part of the Eligibility in the Local Context program. Determining whether a student has met the program's 11-unit a–g requirement is a key program task. To count toward the requirement, a high school course must be accredited by the university, and thousands of California high school courses are not accredited. Thus, to help implement the admissions program, the University of California initially developed sophisticated software for evaluating student transcripts. Three years ago, in an attempt to learn more about all students' course patterns and the potential for using that type of information to directly support students and schools, UC Office of the President staff entered into data-sharing agreements with 70 California high schools. Transcript data from these schools have been made available to West Regional Educational Laboratory analysts for this report.

Explanation of the dataset

Data were collected with the Transcript Evaluation Service (TES), an integrated computer-based system, with human verification. A comprehensive dataset with complete transcript information exists for more than 100,000 high school students in California. The first panel of TES data—for spring of the 2004/05 school year—included 70,543 transcripts from 31 schools.[26] After deleting observations with multiple or missing responses for student ethnicity (3.4 percent of the sample) and students of American Indian or Alaska Native descent (0.8 percent of the sample),[27] the sample size was 67,536 students and comprised transcripts for students in grades 9 (17,597 students), 10 (15,043 students), 11 (13,110 students), and 12 (10,232) during the 2004/05 school year as well as for students who had been in grade 12 (11,554) during the previous school year (2003/04). Transcripts of 12th graders from the 2003/04 school year were originally extracted by TES staff to allow for an analysis of a cohort of students with complete high school course grades, since the transcripts of 12th graders in 2004/05 had not yet completed that school year when the transcripts were extracted.[28]

To have a sample of observations with full high school coursework information, the sample was restricted to 12th graders (that is, 9th, 10th, and 11th graders were dropped from the analysis because they had not yet completed all four years of high school). The transcripts for these 12th graders (for both the 2003/04 and 2004/05 school years) in the final dataset include information on 9th- 10th-, 11th-, and 12th-grade courses, course grades, and the year and semester in which students took the courses. The transcripts also include the ethnicity and gender of each student.

Several variables of interest were created using the high school transcripts of these 12th graders. Cumulative grade point averages (GPAs) were calculated at each grade level to observe how GPA changed as students progressed through high school. "Benchmark status" variables were created at each grade level to indicate whether students were on track to meet all the CSU and UC requirements by the end of 12th grade. These progression variables incorporated subject and GPA requirements at each grade level. The cumulative a–f subject units were summed at each grade level to determine how well students were progressing through each of the subjects throughout high school.[29]

The TES data were supplemented with school-level data reported by the California Department of Education, which publishes annual School Accountability Report Cards that provide demographic, academic, and staffing information for all schools in California (see http://www.cde.ca.gov/ta/ac/sa/). The report cards include school-level data on the percentage of students who qualify for free or reduced-price lunches, the percentage of students who are English language learners, the academic performance index[30] decile of the school, and the percentage of credentialed teachers.

The analysis of the dataset and all statistical tests reported in the text were carried out using Stata statistical software. All statistical tests carried out for this report account for clustering in the data through the use of Stata's *svy* command. Clustering in the data, where students are nested within schools, is important to take into account since students within the same school are more likely to share similar characteristics than are students drawn from a simple random sample of all students throughout the state. Clustering can increase the standard errors of the statistical tests. Root design effects throughout the analyses ranged from 1.2 to 7.5. Statistically significant differences are reported at the 5 percent level throughout the report.

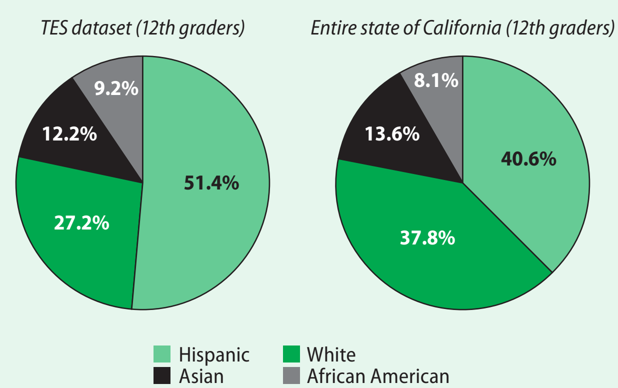
Limitations of the data

The dataset includes all students who were enrolled at a particular school when the transcripts were extracted by the TES. Because there is attrition out of the school as students progress through high school and because the sample is restricted to 12th graders, the dataset contains only students who remained in the same school for grades 9–12. It does not include students who dropped out or transferred schools. To the extent that students who drop out of school or transfer have lower GPAs than those who remain in the same school (see Rumberger and Larson 1998), the sample is overrepresentative of students who are academically above average. However, the findings and conclusions drawn from this analysis would likely be strengthened further if students who dropped out or transferred could be included in the dataset.

Caution must be exercised in the types of conclusions that can be drawn from the analyses performed. In particular, no randomization has been performed with respect to the courses taken by these high school students. The analysis here seeks to examine the overall patterns with which students take courses, the differences across ethnicities in meeting CSU and UC requirements throughout high school, and the relationship between taking these courses and meeting the requirements upon finishing high school. Particularly with respect to the third analysis, no statements of causation can be made about how taking particular courses causes a student to meet CSU and UC requirements at the end of high school. In other words, forcing students to enroll in a particular course in 9th grade will not necessarily cause that student to meet CSU requirements at the end of high school, since meeting them also depends on student ability and preparation. More generally, causal statements cannot be made

FIGURE B1

Student Demographics for the Transcript Evaluation Service dataset and the entire state of California, 2003/04)



Source: Transcript Evaluation Service and California Department of Education data; see text.

from correlational analyses performed on non-experimental data.

Characteristics of the sample

Figure B1 compares the demographics of 12th graders in the TES sample with those of 12th graders in the entire state of California. The TES sample has higher percentages of Hispanic and African American students and lower percentages of White and Asian students than the entire state.[31] The differences are most pronounced for Hispanic and White students: The TES dataset comprises 51.4 percent Hispanic students and 27.2 percent White students compared with 37.8 percent Hispanic students and 40.6 percent for the entire state.[32] These differences arise because the TES dataset includes students from schools that participated in the first year of the TES rather than a random sample of all students throughout California. It is thus surmised that schools with larger proportions of African American and Hispanic students participate in the TES. However, because the TES sample contains more than 21,000 students across 31 different high schools throughout the state, the authors feel that this sample is still large enough to provide valuable insight into the general

TABLE B1

School-level descriptive statistics, 2001/02

Variable	Transcript Evaluation Service schools (n = 31) mean (standard deviation)	All California high schools (n = 715) mean (standard deviation)	Difference
Share of students who are Asian (percent)	12.0 (13.3)	12.4 (14.1)	–0.4
Share of students who are Hispanic (percent)	42.7 (30.3)	37.6 (25.9)	5.1
Share of students who are African American (percent)	8.0 (8.7)	7.1 (10.1)	0.9
Share of students who are white (percent)	37.3 (30.3)	42.8 (27.9)	–5.5
Share of students who receive free or reduced-price lunch	44.4 (24.8)	33.2 (24.4)	11.2
Share of students who are English language learners (percent)	22.0 (17.2)	16.6 (14.6)	5.4
2001 academic performance index decile	4.4 (2.5)	5.3 (2.8)	–0.9
School enrollment	2,061.5 (1,118.1)	1,847.0 (926.6)	214.5
Dropout rate (percent)	2.6 (2.8)	1.9 (3.1)	0.7
Average mathematics class size	26.8 (4.9)	26.5 (4.0)	0.3
Share of teachers who are credentialed (percent)	83.4 (11.0)	86.4 (10.5)	–3.0
Student-counselor ratio	969.3 (1,275.1)	667.0 (714.3)	302.3

Note: School-level averages may vary from student-level averages for the entire state because school-level averages count each school as one observation regardless of the enrollment of the school. Tests of differences were conducted using either a one-sample test of proportions (for percentages) or a one-sample t-test (for means). No statistically significant differences at the 5 percent level were detected.

Source: Transcript Evaluation Service and California Department of Education data; see text.

course-taking patterns of high school students in California.

Table B1 provides descriptive statistics of the school-level characteristics of the 31 schools in the TES dataset, as well as the school-level averages of all high schools in California.[33] Data are for the 2001/02 school year, when the 12th graders from the TES sample were in either 9th or 10th grade.[34] Schools within the TES sample have higher percentages of students who receive free or reduced-price lunches (44.4 percent compared with 33.2 percent), English language learners (22.0 percent compared with 16.6 percent), dropouts (2.6 percent compared with 1.9 percent), and uncredentialed teachers (16.6 percent compared with 13.6 percent). Schools in the TES dataset represent a broad range of high school performance, including schools in academic performance index deciles 1–9, but tend to be slightly below average; the mean decile is 4.4 compared with 5.3 for all schools in California. However, none of the differences between the TES sample and the entire population of California schools are statistically significant at the 5 percent level.[35] Finally, these schools are spread out geographically across the state, representing school districts near rural Mt. Shasta (northern part of California) as well as within urban areas of San Diego County (southern part of California).

NOTES

1. In this report White includes all White (non-Hispanic) students; Hispanic includes Latino students and all students of Cuban, Mexican, Puerto Rican, and South or Central American origin; Asian includes all Asian students, meaning students of Asian Indian, Cambodian, Chinese, Filipino, Japanese, Korean, Laotian, Pacific Islander, and Vietnamese origin.

2. The analysis here often focuses on the a–f subjects without examining the g elective subject because it is not a specific subject. Students can use an excess a–f course to satisfy the g elective subject requirement. For instance, only two laboratory science units are required by 12th grade, so a student who completes a third unit can apply it to the g subject elective.

3. Cumulative completed units include only courses in which the student received a grade of "C" or better. This cutoff is based on CSU and UC requirements.

4. Students who completed this extra "a" unit by the end of 12th grade may apply it to the g elective subject requirement.

5. In future analyses the authors plan to examine why these students are only half a unit short of the requirement. Some students may have received a "D" grade in English during the spring semester of 12th grade, or they may have taken a one-semester English-type course that did not meet the a–g requirements.

6. Any mathematics course above algebra I, such as geometry or algebra II, also fulfills the mathematics requirement for 9th grade.

7. A chi-square test of differences was performed between mathematics and each other course. All differences were statistically significant at the 5 percent level.

8. These figures are known as kernel density estimates, which provide information on the frequency with which something occurs, much in the same way a histogram does (a histogram is in fact a type of kernel density estimate). In a histogram the data are divided into nonoverlapping intervals, and counts (or proportions) are made on the number of data points within each interval to determine the height of each bar. Kernel density estimates, by comparison, use intervals that overlap. Rather than counting the number of observations within an interval, a kernel density estimate assigns a weight between zero and one—based on the distance from the center of the interval—and sums the weighted value. The function that determines these weights is called the kernel. In essence, the kernel density estimate smoothes the histogram by calculating the height at numerous points. The y-axis is the density (or relative frequency) by which each observation on the x-axis occurs, much like the histogram. Values of the x variable with higher densities (as measured along the y-axis) mean that the value of x occurred with more frequency.

9. This report focuses on only two of the six possible comparisons: white students and Hispanic students, and White students and African American students.

10. These percentages would likely be even higher if dropouts were included in the sample.

11. While there is no formal GPA requirement in 9th grade, the number of students maintaining a 2.0 minimum GPA in 9th grade was calculated and graphed to show 9th-grade patterns and the stability from 9th through 12th grades in meeting a minimum 2.0 GPA.

12. Additional analysis available from the authors upon request disaggregates the cumulative GPA averages by gender. Regardless of ethnicity, young women tend to have higher GPAs than young men, with the differences statistically significant at each grade level.

The greatest gender difference is among Asian students—approximately 0.41 points in 9th grade, decreasing slightly to approximately 0.36 in 12th grade. The gender difference for African American and White students remains between 0.30 and 0.35 points throughout high school. The smallest gender difference in GPA is among Hispanic students, where it is about 0.20 points in 9th grade and increases to approximately 0.26 in 12th grade.

13. A test of differences accounting for clustering of students at the school and course levels shows that the difference between science and languages other than English, the difference between science and English, and the difference between mathematics and visual and performing arts are all statistically significant at the 5 percent level.

14. However, students may not be enrolling in the required courses in 9th grade because they have not been adequately prepared by prior coursework.

15. Students typically take six year-long units in each grade level, totaling 24 units over their high school career. The CSU and UC course requirement is at least 15 a–g units or 62.5 percent of the total units. Thus students could average 2.25 non-a–g courses a year and still meet CSU and UC requirements by the end of 12th grade.

16. A chi-square test of homogeneity of proportions accounting for clustering of students at the school and semester levels shows no statistically significant difference between the percentage of students receiving "A's" versus "B's" grades for both geometry and languages other than English I courses, but the differences between students receiving "B's" and "C's," "C's" and "D's," and "D's" and "F's" are statistically significant.

17. This difference is statistically significant when using a chi-square test of homogeneity of proportions.

18. English language development courses may count toward the a–g requirement in English as well.

19. A logit model accounting for the clustering in the data was estimated to test the simple relationship between the two variables. With CSU and UC requirement status the dependent variable and 9th grade fall semester GPA the only independent variable in the model, the results show that the relationship between these two variables is statistically significant at the 5 percent level. In addition, the relationship remains statistically significant when controlling for school academic performance index quintile in the logit model.

20. The results of a logit model estimated with two independent variables (9th grade fall semester GPA and school academic performance index quintile) suggests that the relationship between school quintile and CSU and UC requirement status is statistically significant and positive at the 5 percent level. The simple bivariate relationship between school quintile and requirement status is also statistically significant when school quintile is the only independent variable included in the logit model.

21. An ordered logit accounting for clustering of the data was estimated, with academic performance index decile the dependent variable and school size the independent variable. The results confirmed that the relationship between the two variables was not statistically significant at the 5 percent level. An ordered logit with the percentage of students meeting CSU and UC requirements in 12th grade the dependent variable and school size the independent variable was also estimated, but the relationship was still found to be not statistically significant.

22. Not dropping students with unknown postsecondary outcomes would have made the comparison group "students who either did not attend college or attended an unknown

institution"—too large a category from which to draw meaningful conclusions.

23. A chi-square test of homogeneity of proportions between biology courses and each of the other courses are all statistically significant at the 5 percent level.

24. A logit model accounting for clustering in the data was estimated to test this bivariate relationship. With the indicator for matriculation to a four-year college institution the dependent variable and 9th grade fall semester GPA the only independent variable in the model, the results show that the simple bivariate relationship between these two variables is positive and statistically significant at the 5 percent level.

25. The sample size of the matriculating students was only a small fraction of that for the entire TES dataset, making it less likely to detect statistically significant differences in these comparisons.

26. These schools were not selected at random to participate in TES; they self-selected into the sample because they had the technology to have their transcripts extracted.

27. American Indian and Alaska Native students were excluded from this analysis for three reasons: the size of this group of students was too small to make inferential statements, the size of the group was so much smaller than the other four groups that comparisons would not be meaningful, and this report is focused primarily on the achievement patterns of Hispanic and African American students.

28. The spring semester courses that these students were enrolled in are known, but because the transcripts were extracted during the spring semester, the grades earned in these courses are not known.

29. The analysis here often focuses on the a–f subjects without examining the g elective subject because it is not a specific subject. Students can use an excess a–f course to satisfy the g elective subject requirement. For instance, only two laboratory science units are required by 12th grade, so a student who completes a third unit can apply it to the g subject elective.

30. The academic performance index is a weighted average of a school's academic performance on a number of California standardized tests, including the California Standards Test and the California Achievement Test. A school's score on the index is indicative of overall student achievement at the school.

31. In this report White students include all White (non-Hispanic) students; Hispanic students include Latino students and all students of Cuban, Mexican, Puerto Rican, and South or Central American origin; and Asian students includes all Asian students, comprising Asian Indian, Cambodian, Chinese, Filipino, Japanese, Korean, Laotian, Pacific Islander, and Vietnamese students.

32. A chi-square goodness of fit test accounting for clustering of the data rejects the null hypothesis that the percentage of each ethnicity is the same between the TES dataset and the entire state.

33. For confidentiality purposes the names and locations of schools in the TES dataset are not provided in this report.

34. The 2001/02 school year was used because it is representative of the school characteristics when these students were in the early stages of their high school careers. This year is useful for comparing characteristics of 9th graders with their outcomes in 12th grade. Statewide school data were retrieved from the California Department of Education (http://dq.cde.ca.gov/dataquest/).

35. A one-sample test of proportions was used when the variable of interest was measured as a percentage (such as students who are English language learners) at the school level. A one-sample t-test was used for continuous variables (such as school enrollment). Tests assuming one sample were used because the TES sample is taken from the population of California schools.

REFERENCES

Adelman, C. (1999). *Answers in the tool box: Academic intensity, attendance patterns, and bachelor's degree attainment* (PLLI 1999-8021). Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.

California Postsecondary Education Commission. (2004). *University eligibility study for the class of 2003.* Sacramento, CA: Author.

Career Academy Support Network (CASN). (2007). *Enabling Small Learning Communities in High Schools to Improve College Preparation of Under-Represented Students.* Berkeley, CA: University of California, Berkeley, School of Education.

Choi, K., & Shin, E. (2004). *What are the chances of getting into a UC school? A look at the course-taking patterns of high school students for UC admissions eligibility* (CSE Report 623). Los Angeles, CA: Center for the Study of Evaluation.

EdSource. (2004). *Middle grades: The challenge of meeting high expectations*. Menlo Park, CA: Author.

Gándara, P., Horn, C., & Orfield, G. (2005). The access crisis in higher education. *Educational Policy, 19*(2), 255–261.

Kirst, M. W., & Venezia, A. (Eds.). (2004). *From high school to college: Improving opportunities for success in postsecondary education.* San Francisco, CA: Jossey-Bass.

Masten, C. (2002) *University of California Eligibility in the Local Context program Evaluation Report, Prepared for May 2002 Regents Meeting.* Oakland, CA: University of California, Office of the President.

Planty, M., Bozick, R., & Ingels, S. J. (2006). *Academic pathways, preparation, and performance: A descriptive overview of the transcripts from the high school graduating class of 2003–04* (NCES 2007-316). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

Quigley, D. D., & Leon, S. (2002). *How are high school students faring in the college prep curriculum? A look at benchmark data for UC partner high schools in the University of California's School/University Partnership Program* (CSE Technical Report No. 584). Los Angeles, CA: Center for the Study of Evaluation (CSE).

Robinson, N. (2003). *Undergraduate access to the University of California after the elimination of race-conscious policies.* Oakland, CA: University of California – Office of the President. (ERIC Document Reproduction Service No. ED476308)

Strategic Review Panel on UC Educational Outreach to the President of the University of California. (2003). *Forging California's future through educational partnerships: Redefining educational outreach.* Oakland, CA: University of California Student Academic Services.