

RESEARCH SUMMARY

Academic Performance of IB Students Entering the University of California System from 2000-2002

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Abstract

This report documents the college performance of 1,547 U.S. high school students who participated in the International Baccalaureate (IB) programme and subsequently enrolled in the University of California (UC) system between 2000 and 2002. Performance of IB students is compared to the UC population at large, as well as a comparison group of 5,253 non-IB students matched on year of enrollment, race/ethnicity, family income (within a range of +/- \$10,000), and high school academic performance (formula using high school GPA and highest SAT or ACT score).

Descriptive analyses indicate that students participating in the IB earned higher grade point averages and graduated at higher rates than comparison group students as well as students in the University of California system overall. This trend was observed across all income groups.

In addition, regression analyses controlling for socio-economic status, high school GPA, and SAT/ACT scores, demonstrated a positive relationship between indicators of high school IB participation and performance and college performance. Performance in the Diploma Programme was the best predictor of college performance, accounting for around 25% of the variance (depending on the specific model). Among subject group exams, scores on the experimental sciences IB exams were the best predictors of college GPA, explaining around 17% of the variance. The data show that IB students in the UC system tend to perform better than a matched comparison group and students overall, and that performance in the IB programme in high school significantly predicts achievement in college.

The International Baccalaureate (IB) offers a continuum of international education for children ages 3-19. It has been growing rapidly in recent years, with current projections predicting 10,000 authorized schools and 2 million IB students by the year 2020. The IB Diploma Programme (DP), a college preparatory program offered during the last two years of high school, equips students with a unique set of skills necessary to succeed at college and university and prepare them for life in the 21st century. As of July 2010, the IB Diploma Programme was present in more than 2,100 schools in 139 countries worldwide. In the US, 719 schools currently offer the Diploma Programme. Students receiving an IB Diploma take exams in 6 subject areas (both Higher Level and Standard Level), write an extended essay of 4,000 words, complete a requirement of 150 hours of creativity, action and service, and take a Theory of Knowledge course. In a 2006 article in *Education Week*, Barmak Nassirian of American Association of Collegiate Registrars and Admissions Officers called the Diploma Programme "the best-kept secret in high school reform" and "the gold standard of high school curriculum in admissions circles."

Despite the IB's growth in recent years, there is relatively little data on the benefits of IB as preparation for college and the trends among IB students in college attendance. A handful of studies, however, have shown positive outcomes (Taylor & Porath, 2006; Poelzer & Feldhausen, 1996; Eckhardt, 1998; Panich, 2001). The results of these small scale studies are promising. However, there have not been any large-scale studies looking at overall performance of IB students and their performance in post-secondary education.

STUDY OVERVIEW

In the current study, we examine trends among IB students entering the University of California system. The University of California system is one of the premier publicly funded university systems in the United States. This study examines the undergraduate performance of IB students who enrolled in the eight UC campuses that were open to undergraduates between 2000 and 2002. Where possible, the analyses aim to compare the performance of IB students to the UC population overall and to a matched comparison group. The study investigates the following questions:

- 1) What are the enrollment patterns of IB students in the UC system – are they more likely to attend highly selective UC schools (i.e., UC campuses with comparatively low acceptance rates)?
- 2) How do IB students fare academically in college relative to a matched comparison group and to students overall in the UC system, as measured by GPA and graduation rates?
- 3) How do IB students, across income ranges and high school API rank, fare academically in college relative to a matched comparison group and to students in the UC system overall, as measured by GPA and graduation rates?
- 4) Do IB students from under-represented minority groups perform better in college than their non-IB peers?
- 5) What is the relationship between IB assessments taken in high school and college performance?
- 6) What fields of study do IB students pursue in college, and how does IB performance in high school relate to college performance in particular fields of study?

METHOD

Participants

The analyses focused on 1,547 IB students who enrolled at a university in the UC system between 2000 and 2002, and a matched comparison group of 5,253 non-IB students in the UC system. For the comparison group, exact matches for year of enrollment and race/ethnicity were made. In addition, cases were matched based on family income (within a range of +/- \$10,000) and high school academic performance (formula using GPA and highest SAT or ACT score).

Table 1. Number of IB students, comparison group students, and UC students overall

	2000	2001	2002
IB students	402	649	496
Comparison	1,429	2,154	1,670
UC students	29,574	31,519	32,365

A review of the demographic data shows that IB students appear to have gender and racial/ethnic distribution that is representative of the larger UC population. IB students come from slightly higher socio-economic backgrounds, based on high school API rank and average parental income.

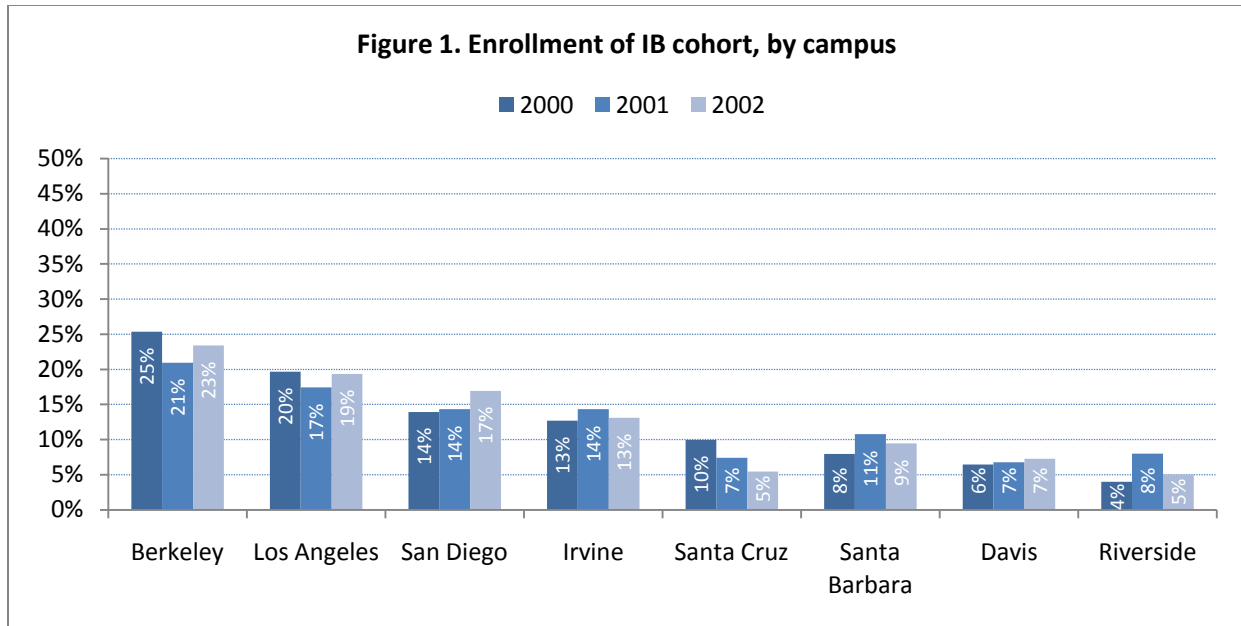
Procedure

Descriptive analyses, including frequencies, means and crosstabs were conducted to understand how IB students perform in the UC system. When possible, t-tests and chi-square tests were used to assess statistically significant differences between IB students and the comparison group. To assess how IB participation and performance in the high school related to college performance, hierarchical regression analyses were conducted, controlling for socio-economic variables (family income and API rank) and high school performance (high school GPA, SAT/ACT scores).

RESULTS

1. What are the enrollment patterns of IB students in the UC system – are IB students more likely to attend highly selective UC schools?

Universities within the UC system have minimum requirements for eligibility that set the academic bar high for incoming students. Based on admission rates and average SAT scores, the Los Angeles, Berkeley, and San Diego campuses can be considered among the more competitive schools within the UC system. The enrollment rates of IB students at UC campuses show that IB students tend to enroll at the most competitive schools within the system and are likely to be experiencing more challenging coursework.

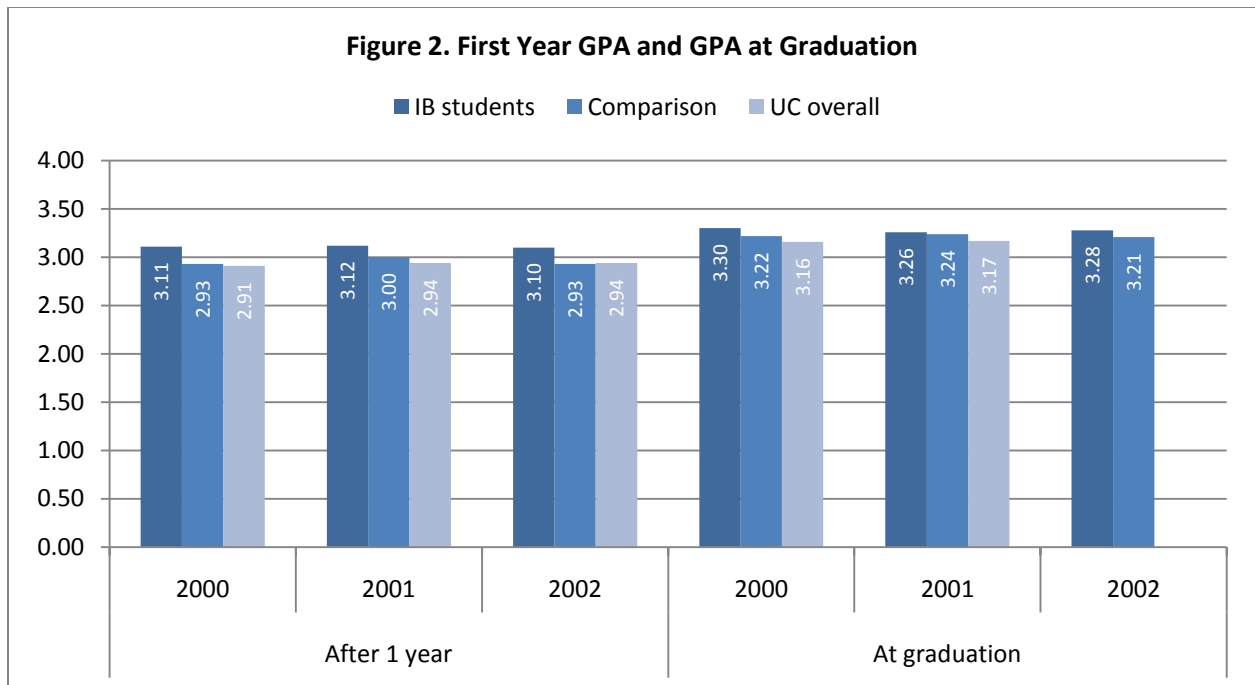


Though students in the comparison group possessed similar academic credentials to IB students, they tended to enroll at the more competitive schools in the UC system at slightly lower rates than IB students.

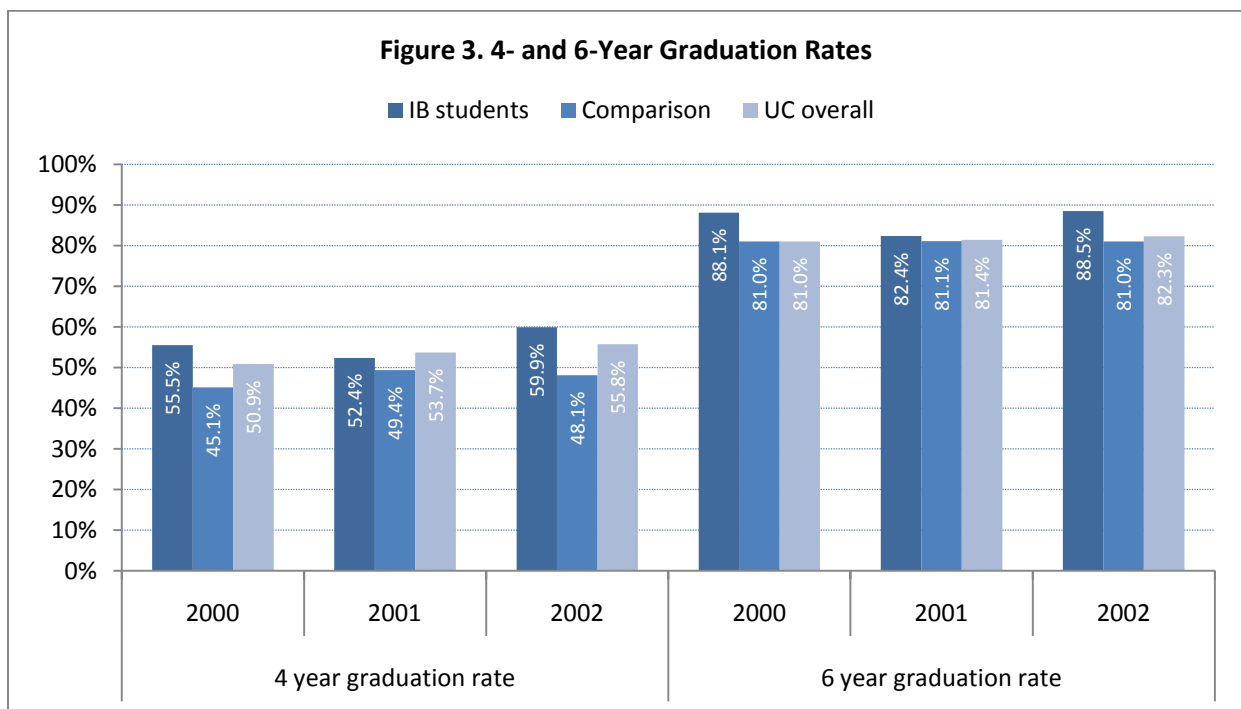
2. How do IB students fare academically in college relative to comparison group students and students in the UC system overall, as measured by GPA and graduation rates?

After their first year of college and at graduation, students from IB programmes earned higher grade point averages than did students in the comparison group and students in the UC population overall.¹ This pattern held across all three cohorts. T-tests showed that the differences in the mean GPAs of IB students and the comparison group were statistically significant for all three cohorts in the first year, and for the 2000 and 2002 cohorts at graduation.

¹ At the time of this writing, the University of California had not released grade point averages at graduation for the 2002 cohort.



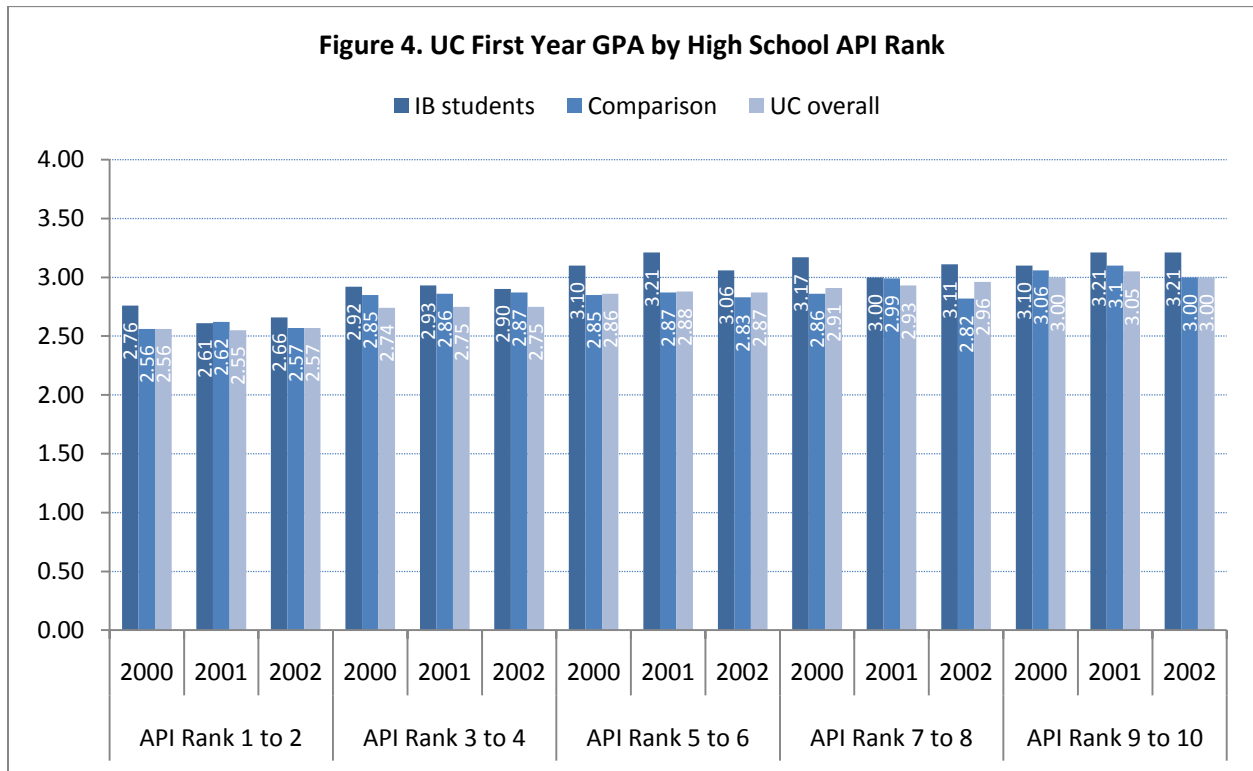
Four- and six-year graduation rates in the 2000 and 2002 cohorts were 4 to 7 percentage points higher for IB students than students in the UC system at large. In the 2001 cohort, graduation rates were virtually identical for IB students and UC students overall. IB students in the UC system had consistently higher graduation rates than comparison group students; graduation rates among IB students ranged from 1 to 11 percentage points higher than the comparison group. Results of the chi-square showed statistically significant differences for the 2000 and 2002 cohort of IB students.



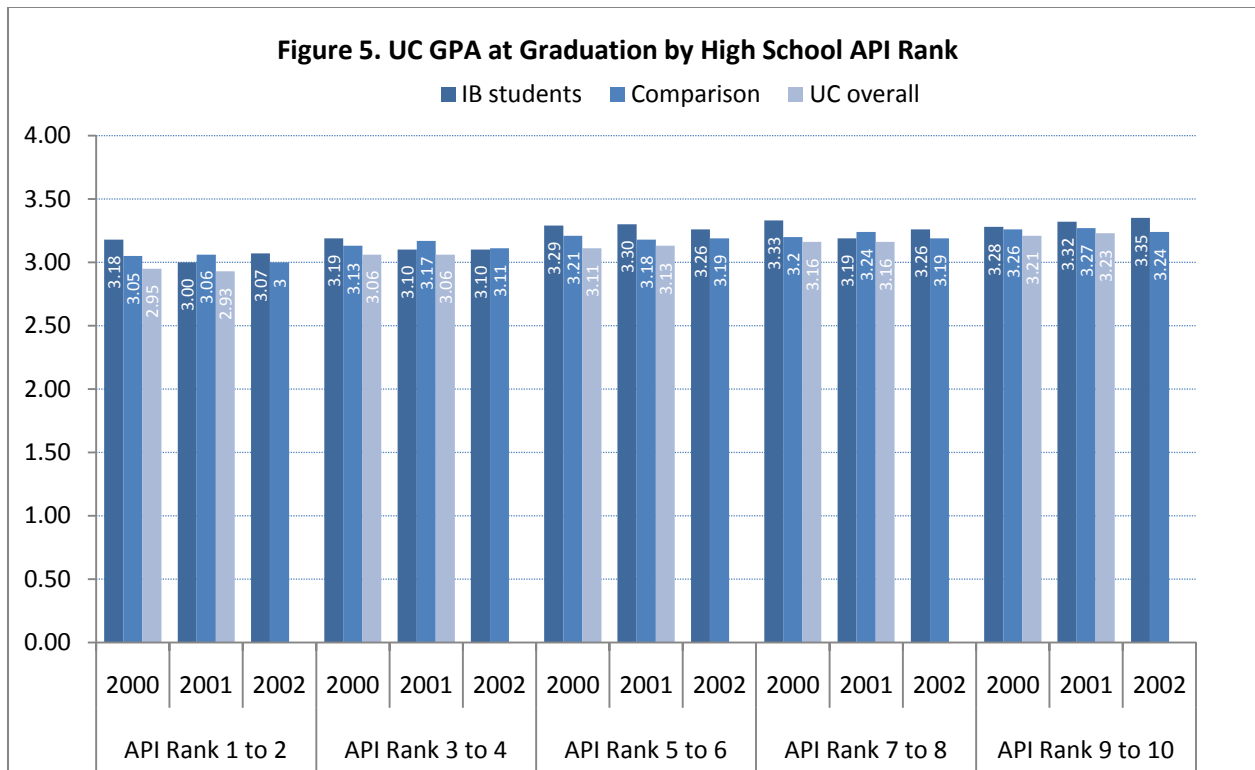
3. How do IB students, across income ranges and high school API rank², fare academically in college relative to the comparison group and to students in the UC system overall, as measured by GPA and graduation rates?

Student performance by API rank

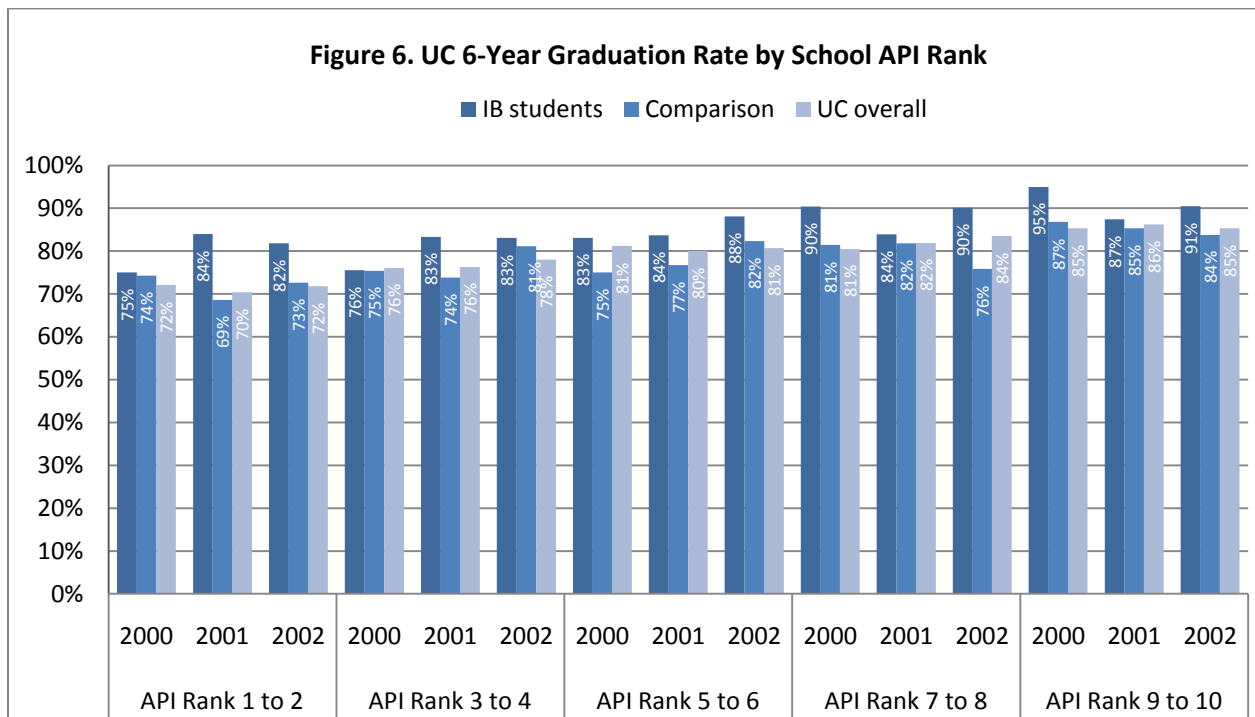
An analysis of students who attended California public schools showed that the grade point averages of IB students were consistently higher in both the first year of college and at graduation than the UC population overall, across all high school API ranks. Relative to the comparison group, the first-year grade point averages of IB students were higher across years and across all high school API ranks. A similar pattern held for GPA at graduation, although the comparison group in the 2001 cohort outperformed IB students in three of the five API groupings. The number of IB students who attended high schools with an API rank of 1 or 2 is small, and thus results should be interpreted cautiously and viewed as preliminary.



² To assess a school’s academic standing, the state of California computes the Academic Performance Index (API) for each public school, based on a formula that integrates the results of various standardized tests. A complete description of API and API rank can be found online in the State of California’s API Reports Information Guide: <http://www.cde.ca.gov/ta/ac/ap/documents/infoguide08.pdf>.



Trends for four-year graduation rates for IB students, broken down by high school API rank, were variable. In contrast, the six-year graduation rate for IB students was consistently the same as, or higher, across all API ranks, compared to the comparison group and overall UC cohort. Again, data for API rank 1 to 2 should be interpreted cautiously due to the small sample size.



Student performance by family income

IB students were represented across all income levels, with the largest proportion of students falling into the middle-income category of \$40,000 to \$79,999 (Table 2). Across all income levels, with a few modest exceptions, IB students consistently earned higher GPAs in the first year of college and at graduation than students in the comparison group and students in the UC population at large.

The first year GPA data in particular, and to a lesser extent, graduation GPA data, suggest that the IB curriculum may be especially effective in preparing students from low to moderate income families for the demands of college, whereas students in upper income categories are likely to have access to a high-quality, college preparatory education whether they participate in an IB programme or not.

Table 2. Number of IB students in the UC system by family income

Family Income	2000	2001	2002
Less than \$40,000	87	125	87
\$40,000 to \$79,999	105	152	116
\$80,000 to \$119,999	67	122	92
\$120,000 and above	63	130	102

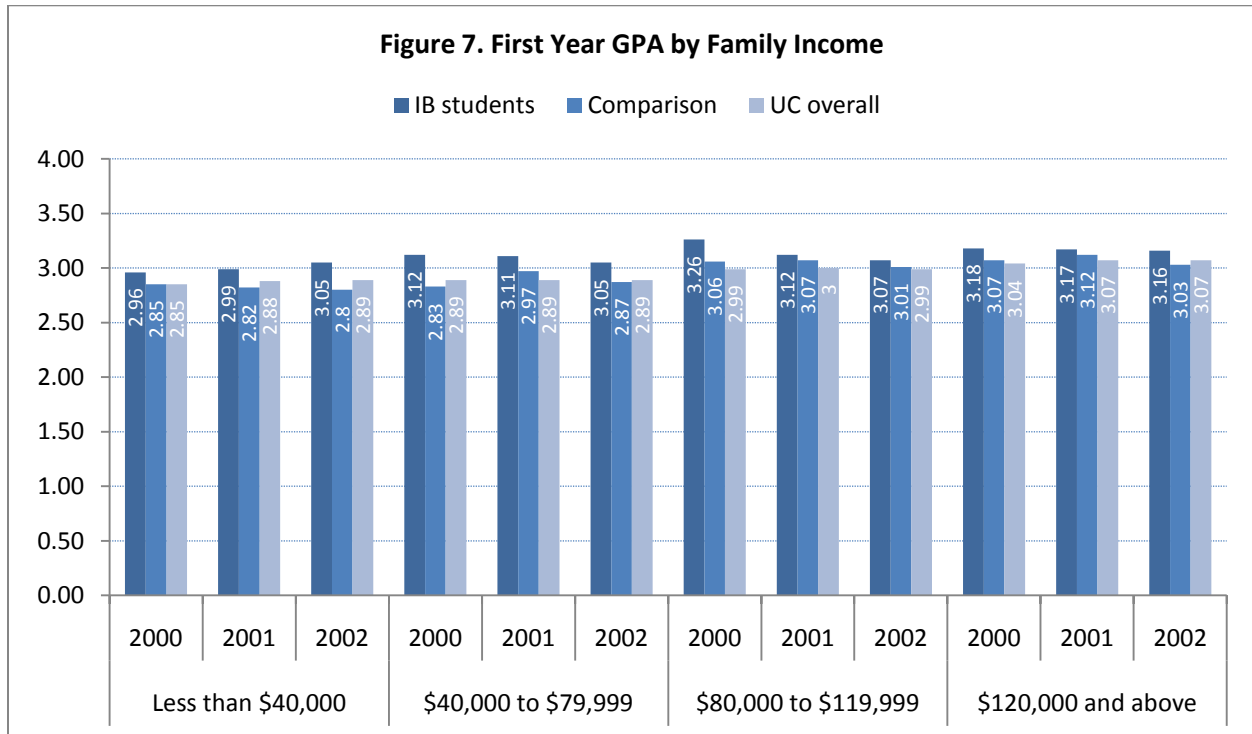
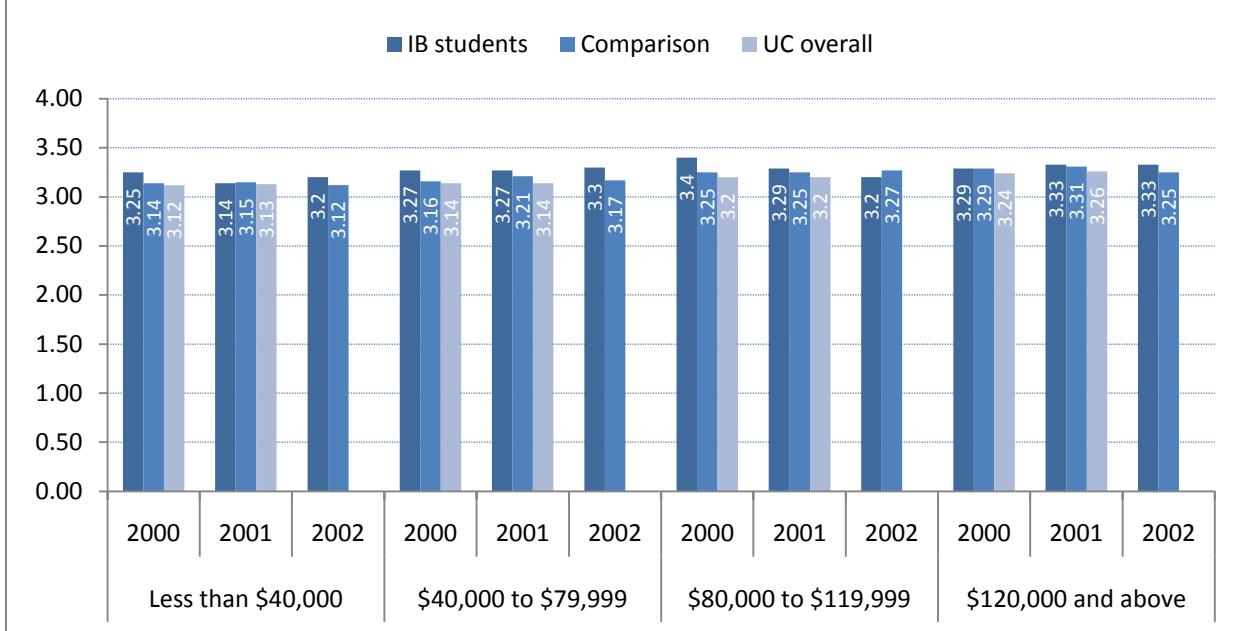
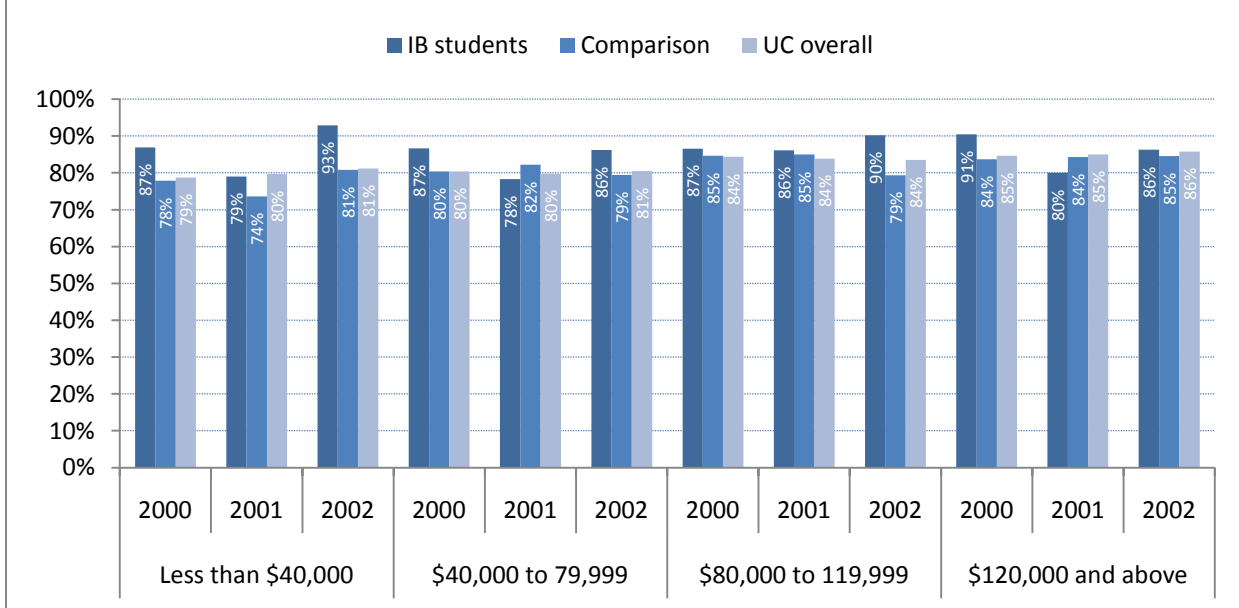


Figure 8. GPA at graduation by Family Income



With few exceptions, IB students also exhibited higher four- and six-year graduation rates than students in the comparison group and UC students overall. Differences between IB students and the comparison group were especially pronounced among families earning less than \$40,000, with graduation rates among IB students being 10 to 20 percentage points higher than the comparison group. Chi-square tests showed a significant relationship between IB participation and whether or not a student graduated, particularly in the lowest income bracket.

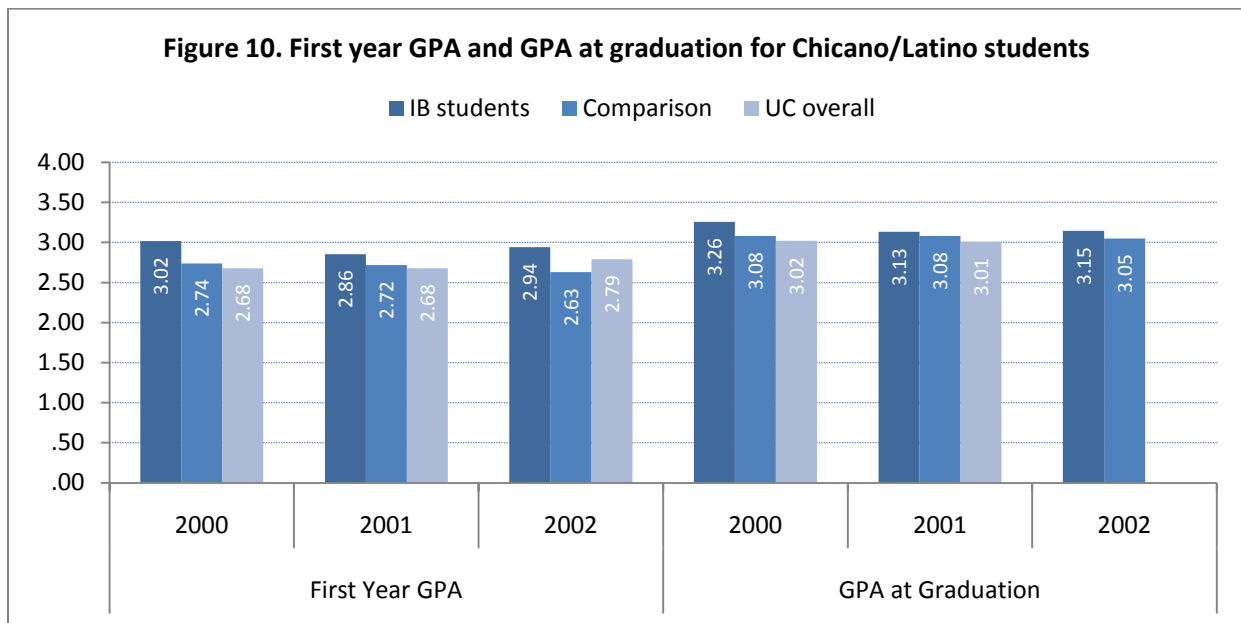
Figure 9. 6-Year Graduation Rates by Family Income



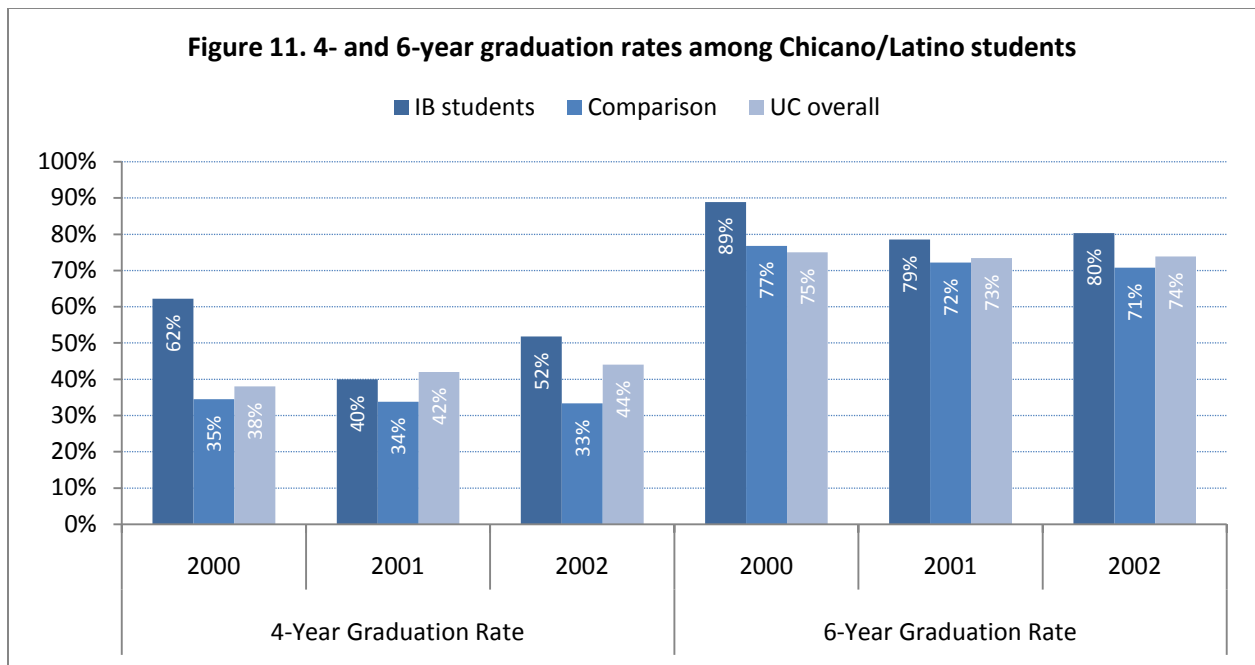
4. How do IB students from under-represented minority groups fare academically in college compared to students overall in the UC system, as measured by GPA and graduation rates?

Many universities across the country continue to experience a persistent “achievement gap,” in which under-represented minority groups, specifically African-Americans and Chicanos/Latinos, earn lower grade point averages and graduate at lower rates than White students. This pattern holds true in the UC system as well.

We sought to examine how under-represented minority IB students performed in the UC system. However, the number of African-American IB students per cohort was 10 or fewer, precluding any meaningful analyses. The total number of Chicano/Latino students who participated in IB ranged from 45 to 70 in the three cohorts. Given the small sample, results should be interpreted cautiously. An analysis of first-year GPA and GPA at graduation showed that Chicano/Latino students who had participated in the IB programme in high school consistently outperformed Latino students in the UC system and comparison group students who had not participated in IB. GPAs for IB students in the 2000 cohort, both in the first year and at graduation, were significantly higher than the comparison group. Differences for the other two cohorts were non-significant.

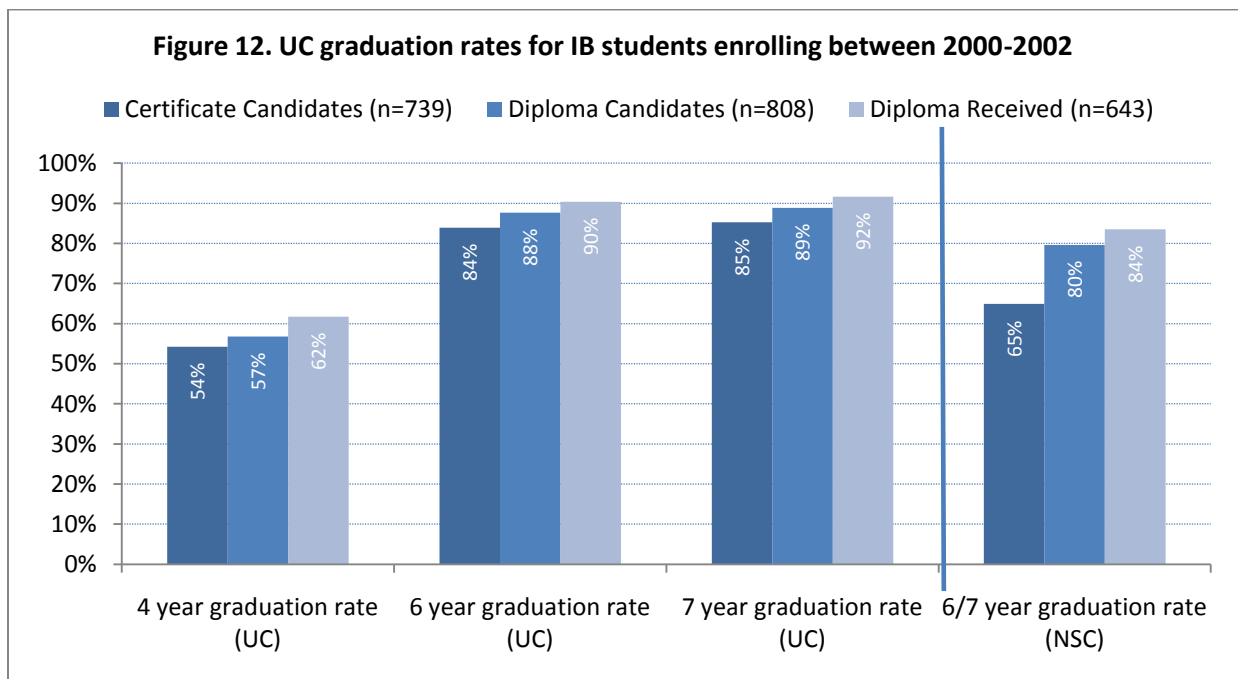


The four- and six-year graduation rates among Chicano/Latino IB students were similar to or higher than the graduation rates of Chicano/Latino students in the UC system at large. For the four-year graduation rate, chi-square tests showed there was a statistically significant relationship between IB participation and whether or not a student graduated for both the 2000 and 2002 cohort. Again, results should be interpreted cautiously due to small sample sizes.



5. What is the relationship between IB assessments taken in high school and college performance?

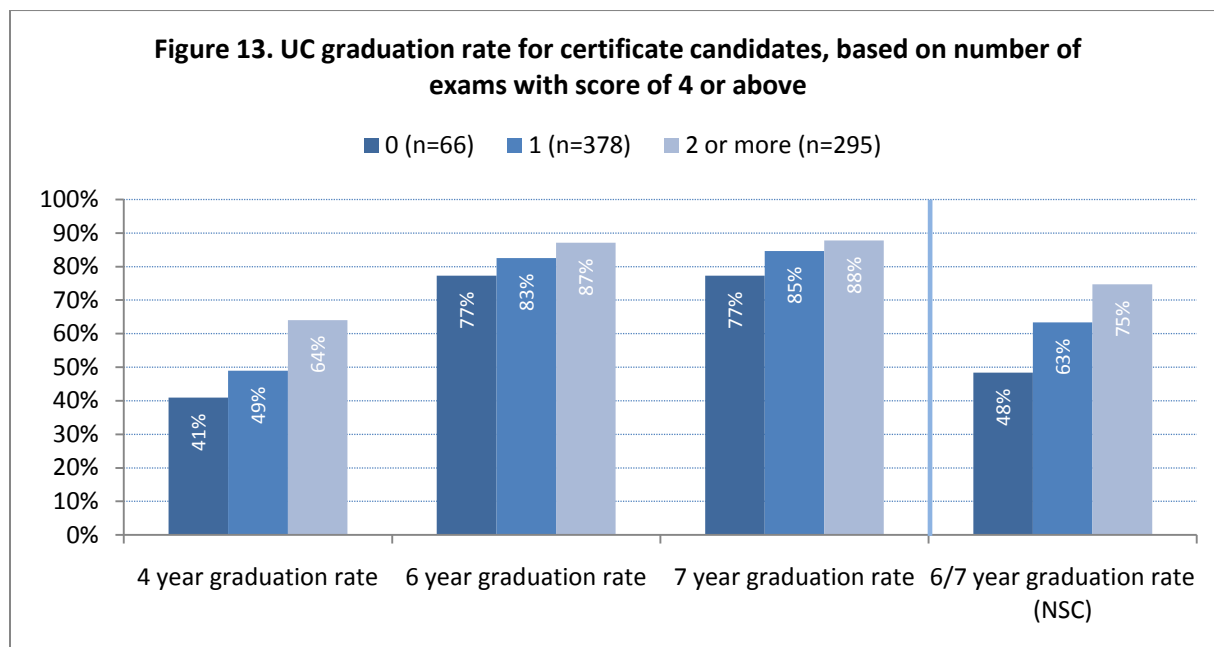
Graduation rates in the UC system were highest among IB diploma recipients, compared to diploma candidates (who may not have earned the necessary points for the diploma), and certificate candidates. To give additional context for the UC data, we compared trends in the UC system against an analysis of IB students nationally, conducted using the National Student Clearinghouse data. The data show that IB students in the UC system graduated at higher rates than did IB students nationally.



NOTE: Certificate students are defined as students who have taken one or more IB exams, but have not enrolled in the full Diploma Programme.

Certificate Candidates

Among certificate candidates, a higher numbers of exams passed with a score of 4 or above was associated with higher graduation rates. Graduation rates within the UC system were higher than in the national sample.



NOTE: Certificate students are defined as students who have taken one or more IB exams, but have not enrolled in the full Diploma Programme.

Diploma and Certificate Candidates

A series of regression analyses were conducted to examine how a variety of IB assessment indicators in high school (the number of IB exams taken, average scores on IB exams, diploma points earned, etc.) predicted first-year college GPA and GPA at graduation.

- *To what extent do the number of subject exams taken and the average grade earned on subject exams predict college GPA?*

The average score earned on subject exams is a statistically significant predictor of college GPA, and is a stronger predictor of college GPA than the number of IB exams taken. High school performance, as measured by high school GPA and SAT/ACT scores are also statistically significant predictors of college GPA, while family income and high school API are not strongly associated with college GPA. The models explain from 20.8% to 22.90% of the variance observed in college grade point averages.

- *To what extent do the number of higher level exams and the number of standard level exams, respectively, predict college GPA?*

The number of higher level and the number of standard level exams taken do not account for much variance. Overall, these models explain from 15.1% to 18.1% of the variance, with the bulk of that variance coming from high school performance.

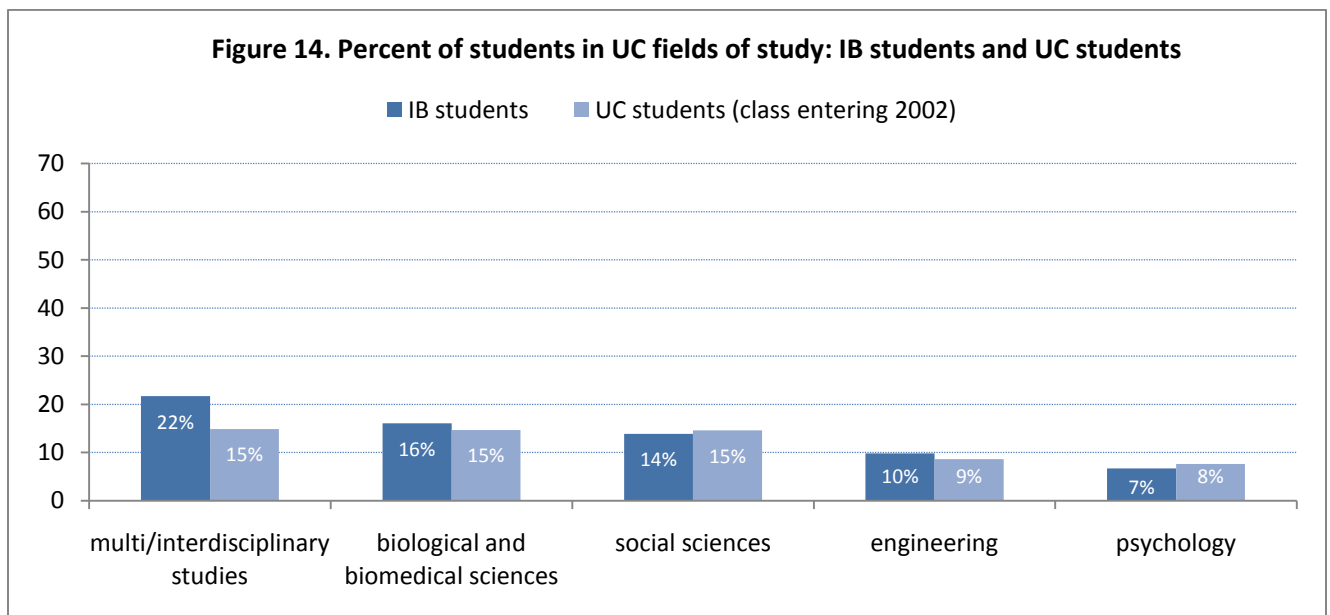
- *To what extent does the average score on higher level exams and standard level exams, respectively, predict college GPA?*

While the *number* of standard and higher level exams was not a strong predictor of college performance, the *average score* on higher level and standard level exams were statistically significant predictors of college GPA. Moreover, performance on the more challenging higher level exams, as expected, was a stronger predictor of college GPA than performance on standard level exams. Performance on higher level exams was a better predictor of college performance than other indicators of high school performance, such as SAT/ACT scores and high school GPA. Conversely, HS GPA and SAT/ACT scores were better predictors of college GPA than average scores on standard level exams. Models for higher level exams explained from 21.8 to 26.1% of the variance, while models using standard level exams explained between 19.3 and 22.3% of the variance.

6. What fields of study do IB students pursue in college, and how does IB performance in high school relate to college performance in particular fields of study?

Which fields of study do IB students pursue in the UC system?

The fields of study pursued by IB students are similar to those of UC students at large, though IB students seem to pursue multi-disciplinary areas of study at somewhat higher rates than the UC population at large. Rates of IB students in the overall sample are compared to UC students entering the university system in 2002 (an analysis of UC data between 2001 and 2002 showed no major differences, and so 2002 data are used as a representative benchmark). Chosen fields of study for IB students and the comparison group are similar.



DISCUSSION

The data indicate that IB students tend to out-perform students in a matched comparison group, as well as in the UC population, with respect to college GPA and graduation rates. In large part, this trend held across high school API rank and family income categories. There is also some preliminary evidence for a smaller “achievement gap” between White students and Latino IB students than among comparison group students and UC students overall.

The best predictor of college achievement was performance in the Diploma Programme, particularly among students who pursued the social sciences and engineering fields. Among all IB students, the average score earned on IB exams was a modest, but statistically significant predictor of college performance.

Interestingly, family income was generally not a significant predictor of college performance. This is contrary to other research studies of student performance in the UC system (i.e. Geiser & Santelices, 2004). High school API rank, an indicator of school quality for California’s public high school students, and also a proxy for socio-economic status, was often a significant predictor of performance in regression models involving all IB students, but was typically non-significant in models involving diploma students. Although other indicators of socio-economic status, such as parental education, were not available for use in our analyses, these results suggest that the curricular approach of the IB programme may be particularly well-suited in serving students of different economic backgrounds and, to some degree, “leveling the playing field.”

Future studies examining the performance of IB students should examine this hypothesis further. In addition, future studies should more closely examine the performance of low-income students and students of color to assess the degree to which the curriculum helps to diminish the “achievement gap.” The best regression models in the current study explain about a quarter of the variance, so much remains to be known about other factors that influence the performance of IB students in college. Further research is needed on these variables to understand more fully the factors contributing to college success.

REFERENCES

- Byrd, S., Ellington, L., Gross, P., Jago, C. & Stern, S. (2007). *Advanced Placement and International Baccalaureate: Do they deserve gold star status?* Washington DC: Thomas B. Fordham Institute. Retrieved June 26, 2009 from <http://edexcellence.net/foundation/publication/publication.cfm?id=378>
- Cavanagh, S. (2006). International Baccalaureate may get lift from booster Bush. *Education Week*, 25 (29), 8-9.
- Duevel, L.M. (1999). The International Baccalaureate experience: University perseverance, attainment, and perspectives on the process. Doctoral dissertation, Purdue University. Retrieved June 26, 2009, from Dissertations & Theses: The Humanities and Social Sciences Collection database. (Publication No. AAT 9951943).
- Geiser, S. & Santelices, V. (2004). The role of advanced placement and honors courses in college admissions. University of California – Berkeley: Center for Studies in Higher Education.
- Kolb, W. & Eckhardt, W.S. (1998). [Students Grade Performance at the University of Florida after completing IB Research]. Unpublished raw data.
- Panich, C. (2001). A study of the university performance of students with *International Baccalaureate* high school experience. Doctoral dissertation, Duquesne University. Retrieved June 20, 2009, from Dissertations & Theses: The Humanities and Social Sciences Collection database. (Publication No. AAT 3103065).
- Poelzer, G. H. & Feldhusen, J. F. (1996). An empirical study of the achievement of International Baccalaureate students in Biology, Chemistry, and Physics in Alberta. *Journal of Secondary Gifted Education*, 8(1), 28-40.
- Taylor, M.L. & Porath, M. (2006). Reflections on the International Baccalaureate program: Graduates' perspectives. *Journal of Secondary Gifted Education*, 17(3), 21–30.

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