

Assessment of Advanced Placement Participation and University Academic Success in the First Semester:

Controlling for
Selected High School
Academic Abilities

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Abstract

The College Board Advanced Placement Program allows high school students to take college-level courses and if an appropriate score on an exam is received, college credit is earned. While the program has had its detractors (access in rural and inner-city schools, lack of diversity, pre-selection of talented students, poor articulation with actual college course work, etc.), it has had tremendous growth throughout the country. In this study, pre-college criteria, high school rank and SAT score were used to categorize students. Therefore, students with similar abilities could be compared, with the only difference being earned advanced placement credit. Regardless of ethnicity, gender, class rank or SAT score, students with advanced placement earned higher first semester college GPAs than their counterparts with similar high school academic characteristics, but who lacked advanced placement credit.

History

The Advanced Placement (AP) Program, administered by the College Board, is a collaborative educational effort between secondary schools, colleges and universities. John Kemper, of the Andover Academy (MA), created the first AP courses in 1954 after realizing able high school students were capable of college-level work and that high schools desired to provide such courses (Santoli 2002). The program offers highly motivated students the opportunity to take college-level courses in high school and receive college credit, advanced placement or both, based on performance on AP examinations. Thirty-seven AP courses in 22 subject areas are offered in the program. More than 3,600 colleges and universities around the world give credit based on performance on AP exams, this includes 90 percent of four-year institutions in the United States (College Board 2008). In 2006, more than one million students took over two million AP exams worldwide (AP Program Summary 2006).

Advanced academic coursework through AP programs provides many benefits to students, high schools, teachers, and higher education. Students who participate in these programs are found to be better prepared for coursework and success in college (CEEB 2002a). In a study conducted by Morgan and Ramist (1998), AP students who received AP credit were compared to non-AP students who took the prerequisite courses. The AP students were found to perform as well or better in subsequent courses than the non-AP students. Compared to non-AP students, AP student examinees were more likely to pursue additional college coursework in that subject and field of study with many completing degrees in the subject area (Morgan & Maneckshana 2000). Willingham and Morris (1986) concluded that AP students were found to have more success than non-AP students on all measures of academic abilities and achievements prior to attending college and through four years of college. Finally, Geiser and Santelices (2004) found AP scores to be higher than any other measured factor, except high school grades, to predict college sophomore GPA.

While more students are attending institutions of higher education, entering college freshmen are increasingly academically unprepared

for college (Bailey et al. 2002). McCauley (2007) felt that through AP programs, college expectations are more clearly delineated. However, there are problems associated with the current AP Program. Peer reviewed refereed articles are relatively few, as most articles on AP are products of the College Board or persons who conduct AP programs (McCauley 2007). Other researchers suggest that touting performance of AP students is biased, since students attracted to these programs are already high achieving and highly motivated (Bailey et al. 2002; Klopfenstein and Thomas 2005). Perhaps the biggest concern with AP has to do with access to the programs. Enrollment of African-American and Hispanic students does not match representation of these populations in the nation's schools (Geiser and Santelices 2004; Klopfenstein 2004). Students within a low socioeconomic demographic, especially African Americans and Hispanics, experience lack of adequate academic preparation for college preparation courses like AP (Kirst and Venezia 2002; Klopfenstien 2003 & 2004; Allen 1999). Additionally, such students may lack the resources to pay for the exams (McCauley 2007). Finally, Klopfenstein (2003) revealed that when low socioeconomic African Americans and Hispanics enroll in AP courses, they avoid courses in mathematics and science.

While the research must be refined and the access issue must be resolved, McCauley (2007) concluded that the advantages of AP participation outweigh the critical problems associated with the program. McCauley (2007) found AP coursework to be a significant predictor of who is more likely to graduate from a four-year institution. Legislators, policy makers and supporters of education reform see AP programs as an opportunity to promote high academic standards for all high school students. Federal and state funding provides support for teacher professional development, student access into advanced programs and examination fees for low-income students (CEEB 2001; TEA 2002). Higher education benefits by the seamless transfer of better prepared students into their programs. Therefore, it is necessary to fill any void of information regarding evaluation and analysis of the effectiveness of AP programs as determined by subsequent performance in higher education.

Materials and Methods

The sample in this study consisted of 9,075 participants for two fall semesters. The group of students who received Advanced Placement credit was comprised of 3,360 students, while 5,715 students did not receive AP credit. Only students with complete information in terms of fall grade point averages and full-time course loads of 12 or more class credits at the end of the fall semester were analyzed in this report.

The researchers sought to answer the following questions:

1. Do students with AP credit and similar ACT or SAT scores earn higher grades in their first semester than those without AP credit?
2. Do students with AP credit and similar high school class rank earn higher grades in their first semester than those without AP credit?
3. What are the most common AP credits earned and how does the score on the respective AP exams impact the first semester GPA?

Results

For the combined data set, 37 percent of the students entering the university had some form of AP credit (Table 1). Male SAT scores were significantly higher than female scores, however, females outperformed males in terms of average first semester GPA (Table 2). African-American, Hispanic and Native-American students were underrepresented in this study and their AP scores, high school rank, ACT/SAT and GPA were generally lower than students in the two other major ethnic categories (Asian/Pacific Islander and Caucasian—Table 3). Based on the overall analyses conducted in this project, students who received AP credit academically outperformed non-AP students (Table 4). When AP and non-AP students were classified in terms of SAT ability, the AP students still outperformed the non-AP students (Figure 1). Additionally, when AP and non-AP students were classified in terms of quartile of high school graduation, the AP students consistently earned higher first semester GPAs and SAT scores than the non-AP students (Figures 2 and 3). In both comparisons, a difference was present regardless of gender and ethnicity.

Table 1. Frequencies and Percentages for AP and Non-AP Groups

Group	Year 2		Year 1		Combined	
AP Group	n=1,704	37.0%	n=1,656	37.1%	n=3,360	37%
Non-AP Group	n=2,905	63%	n=2,810	62.9%	n=5,715	63.0%
Total	n=4,609		n=4,466		n=9,075	

Table 2. Mean Fall Semester GPA and SAT Based on Gender

Year	GPA		SAT	
Year 2	F=3.00	M=2.90	F=1,071.39	M=1,142.16
Year 1	F=2.96	M=2.96	F=1,070.66	M=1,129.1
Combined	F=2.98	M=2.93	F=1,071.04	M=1,135.62

Table 3. Frequencies and Percentages of Ethnicities, Fall Semester GPAs and SAT Scores for Combined Data Set

Ethnicity	Frequency	Percentage	GPA	SAT
African American	n=224	2.5%	2.571	959.331
Hispanic	n=794	8.8%	2.722	1,073.112
Native American	n=40	0.4%	2.932,3	1,050.501,2
Asian/Pacific Islander	n=317	3.5%	3.063	1,182.113
White	n=7,653	84.4%	2.993	1,102.062,3
Other	n=40	0.4%	3.183	1,177.502,3

Table 4. Summary ANOVA for AP and Non-AP Groups for Year 1, Year 2 and Combined

Data Set	Dependent Variable	F	Significant	ES	Post Hoc	Results
Year 1	GPA	405.21	Yes	.083	Yes	AP->Non AP
Year 2	GPA	431.48	Yes	.086	Yes	AP->Non AP
Combined	GPA	836.69	Yes	.084	Yes	AP->Non AP

Figure 1. Means for Fall GPA for each Year, and Years Combined for Group SAT Categories

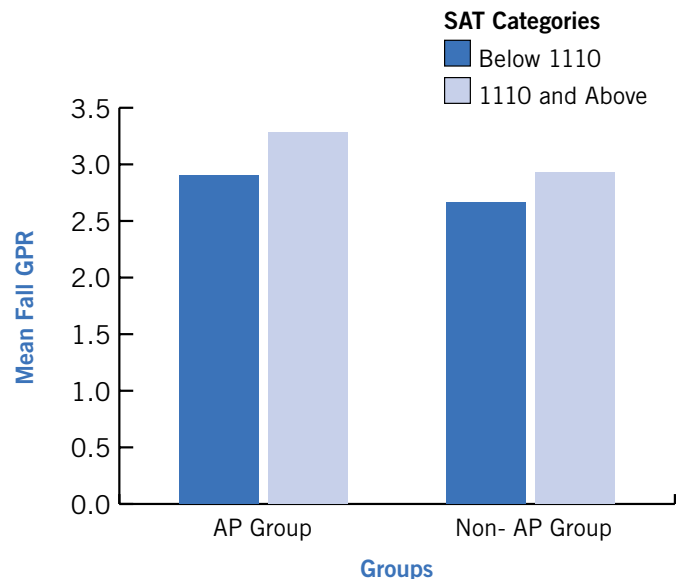


Figure 2. Average SAT Performance for Groups by Class Rank

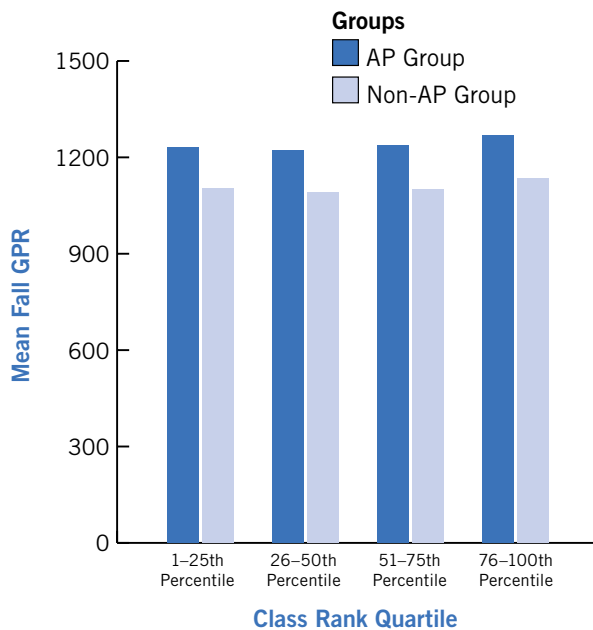
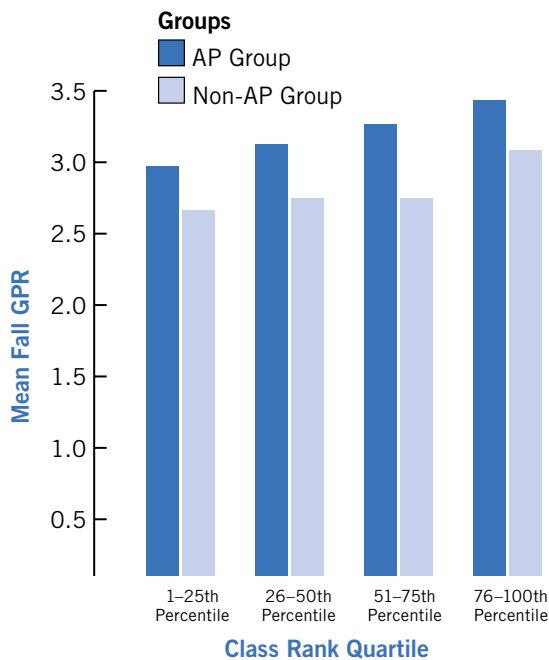


Figure 3. Fall Semester GPAs for Groups by Class Rank



The most frequent form of AP credit was for mathematics (Table 5). English language was the second most frequent form of AP credit and history was third. Within AP Mathematics, AP Political Science and AP Biology, the order of AP scores matched the order of the GPAs. Students who achieved AP scores of 5-1 were all significantly different from each other in terms of average GPA (Table 6). Within AP English Language and AP Literature, students who earned an AP score of 5 tended to exhibit academic performance that was significantly different from all other

Table 5. Frequencies of AP Scores by Subject Matter

Subject Matter	Year 2	Year 1	Combined
Mathematics	1,291	1,163	2,454
English Language	1,144	1,137	2,281
History	1,003	867	1,870
Political Science	710	622	1,332
English Literature	673	580	1,253
Biology	421	395	816
Chemistry	276	285	561
Physics	273	221	494
Spanish Language	259	234	493
Spanish Literature	33	37	70

Table 6. Summary ANOVA for Years Combined for Fall GPA

Subject Matter	F	Sig.	ES	PostHoc	Results
Mathematics	113.59	Yes	.156	Yes	5 4 3 2 1
English Language	73.23	Yes	.114	Yes	5 4 3 2 1
History	62.25	Yes	.118	Yes	5 4 3 2 1
Political Science	65.06	Yes	.164	Yes	5 4 3 2 1
English Literature	46.76	Yes	.130	Yes	5 4 3 2 1
Biology	45.27	Yes	.183	Yes	5 4 3 2 1
Chemistry	22.70	Yes	.140	Yes	5 4 3 2 1
Physics	18.57	Yes	.132	Yes	5 4 3 2 1
Spanish Language	4.73	Yes	.037	Yes	4 3 2 5 1
Spanish Literature	.87	No	.051	No	5 4 3 2 1

Underlined AP scores did not have significantly different Fall GPA's.

scoring groups. The AP scoring groups of 1 and 2 did not exhibit different GPAs. The other scoring groups exhibited means that were significantly different from each other. Within AP History, students who obtained an AP score of 5 tended to exhibit the same academic performance as students who scored a 4 and the performance means for these two groups were superior to the other groups. Students who scored a 3, 2 or 1 were significantly different from each other. Within AP Spanish Language, only students who scored a 1 were different from other scoring groups. Within AP Spanish Literature, students who obtained different AP scores did not differ in terms of academic performance. Based on the AP scoring results, AP scores obtained for math, political science and biology could be used to differentiate first semester success. Except for scores obtained for Spanish literature, students who obtain higher AP scores in the other subject areas tend to obtain higher first semester GPAs.

One additional serendipitous finding was that students earning credit for course work through advanced placement outperformed students who earned credit through university administered departmental exams.

Conclusions

While it has already been reported that students with advanced placement course work are more likely to graduate from a four-year university within six years than students who do not participate in such courses (McCauley 2004), this study accounted for academic ability. The academic credentials which are utilized for admission at this institution are high school rank and SAT scores. In this study, students from like groups (either high school rank or SAT performance) were compared. For students with similar high school rank or SAT scores, those with advanced placement credit significantly outperformed their peers with no advanced placement credit. Performance of AP students was higher, regardless of gender or ethnicity.

While future studies should follow this cohort of students through their college experience, we believe the first semester transition to college is critical. While access for certain students to AP courses must continue to be addressed (Geiser and Santelices 2004; Klopfenstein 2004), GPA performance of underrepresented minorities with AP credit led their counterparts without AP credit, regardless of gender, high school rank or SAT performance. In a time when our nation needs

to increase college going and college graduating rates and diversity of these populations, more Advanced Placement programs should be considered rather than being subjected to criticisms.

Based on our findings, all high school counselors should encourage college-bound students to pursue Advanced Placement courses whenever possible. Participation in courses and high scores on the exams increase the likelihood of success in the equivalent courses in college. Success in college following AP experiences should cause schools to redouble their efforts to increase access to Advanced Placement courses to all students, especially those with historically limited access to both the AP program and higher education.

In terms of advising students, each institution and each respective major should carefully evaluate students with AP credit and subsequent success in their major field of study. For example, at the researchers' institution, Texas A&M University, an AP experience is always recommended for mathematics and science majors. However, if the credit earned is in the major or in a support area (e.g., chemistry for biology majors or mathematics for chemistry and physics majors), students are usually urged to enroll in the foundational courses on campus. Many students struggle in upper level major courses without having foundational courses on campus, so an AP experience can be especially helpful in their future success at any institution.

REFERENCES

- Allen, David. 1999. Desire to finish college: An empirical link between motivation and persistence. *Research in Higher Education*, 40(4):461-485.
- AP Program Summary Report 2006. http://apcentral.collegeboard.com/apc/public/repository/ap06_prog_summary_rpt.pdf. Retrieved August 2008.
- Bailey, T. R., Hughes, K.L., and Karp, M.M. 2002. What role can dual enrollment programs play in easing the transition between high school and postsecondary education?. This paper was prepared for the Office of Vocational and Adult Education, U.S. Department of Education pursuant to contract no. ED-99-CO-0160. <http://www.inpathways.net/dualcredit.pdf>
- College Board 2008. College Board Announces Advanced Placement Results: A Greater Percentage of the Nation's Students Succeed on AP® Exams, Predictors of Success in College Report Points to the Need for Better Preparation in Earlier Grades <http://www.collegeboard.com/press/releases/194817.html>. (accessed August 2008).
- College Entrance Examination Board. (2002a). *Facts about the Advanced Placement Program*. http://apcentral.collegeboard.com/repository/ap02_facts_program_19697.pdf (accessed February 3, 2003).
- Geiser, Paul and Veronica Santelices. 2004. The role of advanced placement and honors courses in college admissions. University of California, Berkeley: Center for Studies in Higher Education.
- Kirst, M. and Venezia, A. 2001. Bridging the great divide between secondary schools and postsecondary education. *Phi Delta Kappa*, 83(1): 92-97.
- Klopfenstein, Kristen. 2004. Advanced placement: Do minorities have equal opportunity? *Economics of Education Review*, 23:115-131.
- Klopfenstein, K. 2003. Recommendations for maintaining the quality of advanced placement programs. *American Secondary Education*, 32(1): 39-48.
- Klopfenstein, Kristen and M. Kathleen Thomas. 2005. The advanced placement performance advantage: Fact or fiction? http://www.aeaweb.org/annual_mtg_papers/2005/0108_1015_0302.pdf
- McCauley, D. 2007. The Impact of Advanced Placement and Dual Enrollment Programs on College Graduation. Applied Research Projects. Paper 206. <http://ecommons.txstate.edu/arp/206>
- Morgan, R., & Maneckshana, B. (2000). *AP students in college: An investigation of their course-taking patterns and college majors*. (ETS Statistical Report 2000-09). Princeton, NJ: Educational Testing Service.
- Morgan, R., & Ramist, L. (1998). *Advanced Placement students in college: An investigation of course grades at 21 colleges*. (Statistical Report No. 98-13). Princeton, NJ: Educational Testing Service.
- Santoli, S. 2002. Is there an advanced placement advantage? *American Secondary Education*, 30 (3) Summer: 23-35.
- Texas Education Agency. (2002). *Advanced Placement and International Baccalaureate Examination Results in Texas, 2000-01* (Document No. GE02 601 04). Austin, TX.
- Willingham, W. & Morris, M. (1986). *Four years later: A longitudinal study of Advanced placement students in college* (Report No. 86-2). Princeton, New Jersey: College Entrance Examination Board



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