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The Advanced Placement Expansion of the 1990s: How Did Traditionally Underserved Students Fare?

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Abstract

The College Board's Advanced Placement (AP) Program, which allows students to take college-level courses while in high school, enjoyed tremendous growth in the 1990s. Despite overall growth, small rural schools and high poverty schools continue to offer relatively few AP courses, and black, Hispanic, and low income students remain grossly underrepresented in AP classes. During the 1990s, AP incentive programs primarily subsidized test fees for low income students, but this provided no incentive for low income and rural schools to expand their AP course offerings and did nothing to strengthen the weak academic preparation of low income, black and Hispanic students. Recent federal funding changes provide a step in the right direction by supporting a comprehensive approach to increasing the AP access and participation of traditionally underserved students.

Introduction

The College Board's Advanced Placement (AP) Program, which allows students to take college-level courses while in high school, has historically been dominated by middle-class suburban white students. Courses taught in accordance with the AP curriculum are among the most rigorous high school courses available, and students have the opportunity to

demonstrate their knowledge by taking the national AP examinations in May. Since a rigorous high school curriculum has a positive impact on the likelihood of success in college (Rose & Betts, 2001; Adelman, 1999), most universities look favorably on applicants with AP experience and will grant academic credit for passing scores on the AP exams. The AP Program grew dramatically in the 1990s due to expanding government funding and student demand, and it is increasingly common for students to earn a full semester of AP credit prior to entering college.

The growth of the AP Program in the last decade occurred in part due to increases in federal and state funding, much of which was targeted towards low income students. Targeted funding is consistent with the College Board's Advanced Placement equity policy statement which "encourages the elimination of barriers that restrict access to AP courses for students from ethnic, racial, and socioeconomic groups that have been traditionally underrepresented in the AP Program" (College Board, n.d.b). However, a lack of systematic data has heretofore prevented a thorough analysis of the extent to which the recent expansion of the AP Program benefited the traditionally underserved groups of rural, low income, black and Hispanic students.

Using a new dataset of Texas public high schools, this paper provides a comprehensive analysis of the AP access of traditionally underrepresented students in terms of both course availability and enrollment. This work extends similar research by Darity, Castellino, Tyson, Cobb, and McMillen (2001) which examined the AP access of minority students in North Carolina. Texas provides a substantially larger sample of schools and a greater representation of Hispanics which allows for the disaggregation of minority students. Lessons from Texas can inform decision making in the many states that provide similar AP incentive programs.

This paper finds that government incentive programs in Texas increased the AP access of traditionally underserved students in absolute but not in relative terms. Although AP course availability increased for all demographic groups, students attending low income and rural schools were worse off in 2000 relative to their wealthier, non-rural counterparts than they were prior to the implementation of these programs. In contrast, schools serving large black or Hispanic populations provided AP courses comparable in number to predominantly white schools both before and after the funding changes. Among schools offering the AP Program, increased state and federal funding, which is primarily used to subsidize AP exam fees, generated limited increases in AP enrollment among traditionally underserved students. This result is unsurprising given that participation in advanced courses depends first and foremost on a student's prior academic experience (National Research Council, 2002).

The Great Advanced Placement Expansion

Nationwide, the number of high schools participating in the AP program increased by 40 percent between 1990 and 2000 (College Board, n.d.d). The increase in funding from federal, state, and local sources during this time was important because instituting or expanding an AP program is costly: AP courses require considerable preparation time and energy from teachers; AP courses use college textbooks; and, although there is no fee for the course itself, students must pay to take the national exams. Most prohibitively, small AP classes can only be offered by hiring additional teachers when class size limits bind in other courses.

In the 1998-99 academic year alone, the federal government spent 2.7 million dollars subsidizing exam fees for low income students and professional development for teachers from low income districts (College Board, n.d.c). In the mid-1990s, states also began substantial supplemental support for AP. The College Board (n.d.a, State Support section, para 1) sums up the current high level of state support enjoyed nationwide:

> Twenty-seven states and the District of Columbia, using their own resources, provide extra support that encourages participation in the Advanced Placement Program and benefits AP Participants. Their support takes several forms, including encouraging or mandating AP Courses in high schools, helping teachers attend AP workshops and seminars, paying- in whole or in part- students' AP Examination fees, and establishing statewide policies with regard to the use of Examination grades in state colleges and universities. …Arizona provides exam fee subsidies to minority students, while California and Oklahoma provide exam fee subsidies to all low income students. Additionally, the states of South Carolina and Georgia fully subsidize AP Exams for all students. Some states, including Massachusetts, Texas, and Utah, also provide grants for course materials and teacher professional development.

Partnerships between school districts and private donors are also on the rise. The O'Donnell Foundation implemented an incentive program in the 1990s to encourage Dallas area minority students to participate in AP. The nonprofit AP Strategies uses the O'Donnell model to connect education-minded donors with school districts; the organization currently matches more than 15 private donors with schools across Texas (Advanced Placement Strategies Inc, n.d.). Many local donors establish independent relationships with districts or schools.

Modeling AP Program Size and Growth in Texas

In the year 2000, 53 percent of Texas public high schools participated in the AP Program. On average, these schools offered eight different AP courses out of a possible 31 (Table 1).[1] However, broad access to AP is a recent development. In 1994, only 21 percent of public high schools participated offering an average of just 4.4 different AP classes out of a possible 25. While the recent expansion of the AP Program is promising, low income and rural students continue to be systematically excluded. As can be seen in Table 1, of the 250 high schools serving the highest percentage of low income students, 14 percent offered an AP program with an average of 2.7 AP courses in 1994. Conversely, among the 250 schools serving the lowest percentage of low income students, 38 percent provided an AP program with an average of 6.2 different courses. Disparate access between schools serving the least and most low income students persisted into the year 2000. Rural schools faced an even greater access gap relative to non-rural schools which is of particular concern given that two-

[1] The sample studied includes all regular instructional Texas public high schools. Magnet and alternative schools are excluded as are high schools serving only grades nine and ten. Due to data limitations, the number of AP courses reflects the number of unique course offerings; there may or may not be multiple sections of any particular course. Counting AP courses in this way is consistent with Darity et al. (2001).

thirds of Texas public schools are located in rural areas. On the other hand, students attending schools with large Hispanic or black populations generally experience AP opportunities comparable to or better than those offered at predominantly white schools.[2]

The distribution of courses observed in Table 1, including greater AP access for minority students, is consistent with that found in North Carolina (Darity et al., 2001). As in North Carolina, predominantly white schools in Texas tend to have small AP programs relative to mixed-race schools because they are usually small schools located in rural areas. The following analysis uses regression techniques to isolate the independent effects of location, student income, and race on the initial allocation of AP courses in Texas public high schools in 1994 and projected AP growth from 1994 to 2000.

Table 1

Availability of AP Courses by School Type

	Percent With AP Program		**Mean Number of Courses Given AP Program***			
			All AP		Math and Science	
School Type	1994	2000	1994	2000	1994	2000
All (N=1158)	21%	53%	4.4	7.9	1.4	3.3
			(3.7)	(5.6)	(1.5)	(2.3)
250 Most Low Income	14	50	2.7	7.0	0.5	2.7
			(2.2)	(4.3)	(1.0)	(1.9)
250 Least Low Income	38	69	6.2	10.2	2.0	4.2
			(4.4)	(4.2)	(1.5)	(2.4)
Rural (N=774)	12	44	2.7	4.6	0.8	2.1
			(2.2)	(3.3)	(1.1)	(1.4)
Non-Rural (N=384)	41	73	5.3	11.8	1.7	4.8
			(4.1)	(5.4)	(1.6)	(2.3)
250 Most Hispanic	18	57	3.1	8.1	0.8	3.2
			(2.6)	(4.5)	(1.3)	(2.0)
250 Least Hispanic	15	46	3.6	5.8	1.2	2.7
			(4.1)	(5.3)	(1.5)	(2.1)
250 Most Black	28	66	4.6	9.4	1.5	4.0
			(3.6)	(6.0)	(1.5)	(2.6)
250 Least Black	9	46	2.2	5.2	0.6	2.3
			(1.6)	(4.1)	(0.9)	(1.8)

Source: Texas Schools Microdata Panel, 1994 and 2000. *Standard deviations in parentheses.

[2] Asian students are not traditionally underrepresented in AP and consequently are excluded from this discussion.

Theory

Theoretically, the *initial allocation* of AP courses depends on student expectations about college attendance, school size, and school resources. Black and Hispanic students attend college at lower rates than do white students, so AP offerings at schools with a large percentage of black and Hispanic students are expected to be lower than those at predominantly white schools, all else equal. For the same reason, schools serving a large percentage of special education, Limited English Proficient (LEP), or low income students and rural schools are also expected to have fewer AP courses. School size is expected to have a positive impact on the number of AP courses offered since the cost of an additional AP course is relatively low at schools with enough students to create large AP classes. District property value per pupil is expected to have a positive impact on AP offerings because property-wealthy districts have greater resources to devote to courses that target particular subgroups of students.

Projected AP *growth* also depends on student expectations about college attendance, school size, and school resources. Over the 1990s, college admissions became increasingly competitive which led adroit students to fortify their high school transcripts by taking more AP classes. Students are more likely to be savvy about college admissions if their parents or siblings went to college, and white, non-rural, middle-class students tend to have the most relatives with college experience. Therefore, AP growth is expected to be most rapid at predominantly white, non-rural schools that serve few low income students. AP growth at low income schools may be spurred by federal and state incentive programs, but if these programs fail to generate substantially higher expectations for college attendance, growth will not keep pace with that at middle-class white schools. Growth is also expected to be high at large schools, where adding AP courses is relatively inexpensive, and in high property value districts where resources are more plentiful.

Modeling the initial number of AP courses offered at schools in 1994 requires special care for two reasons: (i) the outcomes are discrete counts ranging from zero to 21, and (ii) 79 percent of high schools had no AP program and therefore are clustered at zero. There is a similar problem modeling the number of courses added between 1994 and 2000 since the dependent variable is also a discrete count and approximately half of high schools experience no change in the number of courses offered. The appropriate estimation technique in both cases is zero inflated negative binomial regression.[3]

Empirical Results

Table 2 presents results for the regression of the number of AP courses offered in 1994 on school characteristics, and Table 3 presents results for the regression of the change in the number of AP courses offered between 1994 and 2000 on the same school

[3] For a thorough discussion of the zero inflated negative binomial regression model, see Long (1997). The change in the number of AP courses offered ranged from –6 to 26 with a mean of 3.3 (standard deviation 4.6). The model does not allow for negative values of the dependent variable, so for the 15 schools that experienced a decrease in the number of AP offerings between 1994 and 2000, the change in courses was truncated at zero. Results are identical up to three decimal places to those produced when these 15 schools are dropped from the sample.

characteristics. Since the negative binomial regression model is nonlinear, the marginal effect of each independent variable depends on the observed values of all the variables. The results in Tables 2 and 3 are transformations of the estimated coefficients that represent the change in the predicted number of AP courses for the average non-rural high school when an independent variable increases from one-half a standard deviation below to one-half a standard deviation above the sample mean.[4]

Table 2
Differences in Predicted AP Offerings, 1994

	mean	s.d.	All AP	Math/Science
Enrollment	765	768	0.30***	0.12
Percent Black	10.8	16.5	-0.05	0.05
Percent Hispanic	26.4	27.8	-0.10	0.13
Percent Asian	1.1	2.7	0.00	-0.01
Percent Low Income	34.5	19.9	-0.13	-0.20*
Percent Limited English Proficient	4.4	9.4	0.03	-0.08
Percent Special Education	13.2	11.5	-0.20*	-0.03
District Property Value per Pupil/10,000	19.8	28.9	0.02**	0.04***
Rural	66.8	0	-0.07	-0.29*

N = 1,158

Analysis is conducted using zero inflated negative binomial regression.
Predicted change is based on a one standard deviation increase in x_k from (xbar-s_k/2) to (xbar+s_k/2) with all other continuous variables set equal to the sample mean and rural=0. Mean of rural is percent of sample reporting a one, and predicted change is effect of becoming rural.
*** $p < .01$; ** $.01 < p < .05$; $.05 < p < .10$
Source: Texas Schools Microdata Panel, 1994.

For example, consider the impact of school size on AP offerings at a typical school. If two non-rural Texas public high schools each have an average representation of minority, low income, LEP and special education students, and average district property value per pupil, the high school with 1,149 students (one-half of a s.d. above the mean of 765) is expected to offer nearly one-third of an AP course more than the high school with 381 students (one-half of a s.d. below the mean) in 1994 (Table 2). While a difference of one-third of a course sounds small, it is considerable given that the average number of AP courses across all high schools was 0.9. Between 1994 and 2000, the typical non-rural high school with 1149 students enjoyed an average increase in AP offerings 0.15 courses greater than the school with 381 students (Table 3).[5] Thus, large high schools enjoyed an initial AP

[4] See Long (1997). When one-half of a standard deviation below the mean results in a negative number, the lower value of the independent variable is truncated at zero.
[5] Marginal effects are similar but in some cases slightly attenuated for rural schools. Results for non-rural schools are presented here because although the majority of Texas schools are

advantage over smaller high schools in 1994, and this advantage grew significantly greater over the decade.

Table 3

Differences in Change in Predicted AP Offerings, 1994-2000

	mean	s.d.	All AP	Math/Science
Enrollment	765	768	0.15***	0.14***
Percent Black	10.8	16.5	0.04*	0.05**
Percent Hispanic	26.4	27.8	0.14***	0.09*
Percent Asian	1.1	2.7	0.02	0.02*
Percent Low Income	34.5	19.9	-0.14***	-0.14***
Percent Limited English Proficient	4.4	9.4	-0.02	0.03
Percent Special Education	13.2	11.5	-0.21***	-0.19**
District Property Value per Pupil/10,000	19.8	28.9	0.00	0.00
Rural	66.8	0	-0.21***	-0.18***

N = 1,158

Analysis is conducted using zero inflated negative binomial regression. Predicted change is based on a one standard deviation increase in x_k from (xbar-s_k/2) to (xbar+s_k/2) with all other continuous variables set equal to the sample mean and rural=0. Mean of rural is percent of sample reporting a one, and predicted change is effect of becoming rural.

*** $p < .01$; ** $.01 < p < .05$; $.05 < p < .10$

Source: Texas Schools Microdata Panel, 1994.

Based on two-tailed hypothesis tests, the only statistically significant determinants of the number of AP courses offered in 1994 are school size, the fraction of students in special education programs, and district property value per pupil (Table 2). However, the percentage of students who are low income is negative and significant at better than ten percent under the one-tailed hypothesis test indicated by theory. Low income is also significant under a two-tailed test for math and science AP courses, the classes that provide the strongest preparation for college (Rose & Betts, 2001).[6] While district property value per pupil is positive and significantly different from zero for all AP and for math and science, the magnitude of the effect is too small to generate a practical difference. Although the rural coefficient is insignificantly different from zero in Table 2, rural schools tend to be penalized indirectly through low enrollment: 1994 average enrollment at rural schools was 393 students compared to 1515 at non-rural schools. In addition to the enrollment penalty, rural schools are significantly less likely than non-rural schools to offer AP math and science. Thus, the analysis suggests that some students traditionally underserved by the AP Program in Texas faced systematically diminished access to AP in 1994 while others did not: students at high

rural, approximately 75 percent of Texas public school students are educated in non-rural schools.

[6] AP math and science courses include calculus, biology, physics, chemistry in both 1994 and 2000. In 2000, statistics, environmental science, and computer science were added.

poverty schools had relatively limited access as did students at small, primarily rural, schools, but students at predominantly black and Hispanic schools enjoyed access comparable to that at predominantly white schools.

Patterns observed in the 1994 distribution of AP courses were reinforced by differential AP growth rates in the latter half of the decade.[7] All else equal, the access gap for low income and rural schools significantly widened in this period (Table 3). The rural/non-rural gap widened both directly, through the rural variable, and indirectly through school size. In contrast, AP Programs at largely black and Hispanic schools, which, all else equal exhibited near-parity with predominantly white schools in 1994, grew significantly faster than those at other schools. While these results are statistically significant, the difference in the predicted growth rate at predominantly black schools was too small to generate a practical difference. The AP growth rate at Hispanic schools is three times larger than that for black schools but is still small: a one standard deviation increase in the percentage of Hispanic students increased AP growth at the average non-rural high school by approximately one-eighth of a course.

Student access to AP increased overall during the 1990s, but it decreased at low income and small, rural schools relative to wealthier and large, non-rural schools. The overall increase in access is encouraging because a rigorous high school curriculum has a positive impact on adult earnings and increases the likelihood of successfully completing college (Adelman, 1999; Rose & Betts, 2001). However, relative AP access matters: if colleges do not fully consider differential access across high schools, students with greater AP access enjoy an unfair advantage in the admissions process. Furthermore, once admitted, students who do not have access to a rigorous preparatory curriculum are less likely to successfully complete their degree (Adelman, 1999; Rose & Betts, 2001). The ability of low income and rural students to move up the socio-economic ladder through post-secondary education is constrained when they do not have access to the tools necessary to compete successfully in the marketplace of higher education.

The Participation Problem

Although schools serving black and Hispanic students offer AP courses comparable to white schools, black and Hispanic students enroll in AP at just half the rate of white students and low income students participate at approximately one-third the rate of students who are not low income (Klopfenstein, 2004).[8] This section examines whether the representation of black, Hispanic, and low income students enrolled in the AP Program improved between 1994 and 2000. Consistent with Darity et al. (2001), representation in AP is measured using a ratio of the fraction of AP students who are members of a group (e.g., percent AP students black) divided by the fraction of students in the school population who are members of the same group (e.g., percent all students black). This "disparity index" equals one if a group is equally represented in AP courses relative to their presence in the

[7] Results in Table 3 are similar in sign and significance when the initial number of AP courses offered in 1994 is included as an independent variable.

[8] This participation problem is further exacerbated by the fact that the majority of black and Hispanic students in Texas are low income. Klopfenstein (2004) finds that low income students of all races participate in AP classes at depressed rates, but low income has a greater impact on the AP participation of high-achieving black students than on similar white students.

school population, less than one if the group is underrepresented in AP, and greater than one if the group is over represented. In order to generate the disparity index for a school, the school must offer at least one AP class and have at least one student from the group examined in attendance.

Table 4 shows that black and Hispanic representation in AP increased only modestly (by three to five percent) between 1994 and 2000 while the representation of low income students increased by 20 percent.[9] In rigorous AP math and science classes, black student representation increased by 81 percent although it should be noted that black students were grossly underrepresented in these courses in 1994 and that after the increase the disparity index was still only 0.56 (Table 5). The Hispanic presence in AP math and science remained unchanged over the period while low income representation increased by 24 percent.

Table 4
Representation in AP Classes by Demographic Group

	Ave. percent of all students in school		**Ave. percent of AP students in school**		**Ave. Disparity Index[1] (Number of Schools)**	
Group	1994	2000	1994	2000	1994	2000
White	**56.7**	**54.1**	**67.9**	**65.0**	**1.46 (244)**	**1.31 (537)**
Black	**16.6**	**13.7**	**10.4**	**9.0**	**0.56 (228)**	**0.59 (467)**
Hispanic	**25.0**	**32.4**	**15.7**	**23.6**	**0.59 (245)**	**0.61 (536)**
Asian	**3.4**	**2.4**	**8.2**	**5.1**	**2.89 (205)**	**2.10 (392)**
Low Income	**25.6**	**50.6**	**13.4**	**30.9**	**0.45 (245)**	**0.54 (539)**

[1] One signals parity, less than one signals underrepresentation, greater than one signals overrepresentation. Each row is limited to schools that enroll students from the group of interest and offer AP.
Source: Texas Schools Microdata Panel, 1994 and 2000.

The situation for Hispanic students is more encouraging than it might first appear because the Hispanic student population increased substantially during this time period. An unchanging disparity index indicates that growth in Hispanic AP participation kept pace with the increase in the number of Hispanic students in the school system, many of whom were recent migrants and/or low income.[10] However, despite these gains, or the absence of losses, in AP representation, Tables 4 and 5 show that black, Hispanic and low income students remained substantially underrepresented in AP courses in 2000.

[9] Note that in Tables 4 and 5, the average disparity index reported in columns (v) and (vi) is calculated as $\frac{\sum(\%\ group\ in\ AP / \%\ group\ in\ school)}{\#\ schools}$. This is not equal to $\frac{\sum(\%\ group\ in\ AP / \#\ schools)}{\sum(\%\ group\ in\ school / \#\ schools)}$, which would be derived from dividing column (iii) by column (i) and column (iv) by column (ii).

[10] Ideally, regression analysis would be used to isolate the independent effects of school characteristics on changes in the disparity index from 1994 to 2000 as was done earlier for the change in AP course offerings. Due to the small number of schools offering AP classes in 1994, such an analysis is not possible.

Table 5
Representation in AP Math or Science Classes by Demographic Group

	Ave. percent of all students in school		Ave. percent of AP students in school		Ave. Disparity Index[1] (Number of Schools)	
Group	**1994**	**2000**	**1994**	**2000**	**1994**	**2000**
White	**62.1**	**53.5**	**70.2**	**65.6**	**1.28 (144)**	**1.47 (503)**
Black	**13.4**	**13.8**	**4.6**	**8.3**	**0.31 (139)**	**0.56 (446)**
Hispanic	**21.3**	**32.4**	**11.8**	**21.3**	**0.56 (144)**	**0.56 (502)**
Asian	**3.8**	**2.5**	**14.2**	**7.6**	**5.65 (134)**	**2.92 (378)**
Low Income	**20.6**	**50.0**	**9.5**	**27.1**	**0.38 (144)**	**0.47 (504)**

[1] One signals parity, less than one signals underrepresentation, greater than onesignals overrepresentation. Each row is limited to schools that enroll students from the group of interest andoffer AP math or science. Source: Texas Schools Microdata Panel, 1994 and 2000.

Conclusions and Policy Analysis

Increasing amounts of money are being invested, privately and at all levels of government, to expand the AP Program nationwide, but there has been little detailed research regarding the effect of this money on the access and participation of traditionally underserved students. The present research finds that in Texas, a state that generously supplements federal AP subsidies, students at high-poverty and rural schools continue to have limited access to AP courses, and black, Hispanic, and low income students remain grossly underrepresented in the AP courses that are offered. Why did large increases in financial support largely fail to diminish disparities in AP access and participation among traditionally underserved groups in the 1990s?

The majority of federal and state AP incentive program funding during the 1990s provided test fee subsidies, but these subsidies provided no incentive for schools to expand their AP course offerings. Moreover, test fees are usually not the barrier preventing low income, black and Hispanic students from taking AP classes, which are offered at no charge. In fact, most AP students do not decide to take the national AP exam until midway through the course. Low income, black and Hispanic students often fail to enroll in AP classes because they lack the academic preparation necessary to undertake college-level work, and most of the funding available in the 1990s failed to address this issue.

Recent federal funding changes under the No Child Left Behind Act of 2001 support a comprehensive approach to increasing the AP participation of disadvantaged students. The legislation continues exam fee subsidies for low income students, but it also provides three-year grants to school districts and other entities wishing to explore innovative ways to expand AP participation among students attending high-poverty schools. In 2003, 22 projects in 14 states received grant money to experiment with ways to expand AP access in

high-poverty schools (U.S. Dept of Education n.d.).[11] Grant recipients hope to break down barriers to AP by various methods, including: identifying talented students as early as the fifth grade and aligning the middle school curriculum so that these students are prepared for advanced coursework in high school; providing year-round academic support for students; linking university students with AP students and AP students with middle school Pre-AP students; communicating frequently with parents, using translators as necessary; providing professional development opportunities for teachers to improve their instructional techniques, content knowledge, and perceptions of economically disadvantaged students; and facilitating mentoring between experienced and new AP teachers.

Most of the proposed strategies for high poverty schools will not ameliorate the access problem in small rural schools. Many states are providing online AP courses to students attending schools that cannot afford to offer a conventional AP Program. While online courses are not a desirable substitute for a live AP course with a qualified teacher, they are a reasonable solution for rural and low income schools that otherwise cannot provide AP courses. However, online AP courses provide their own challenges: students must be capable, independent learners, disciplined about time management, and have access to a computer with an uninterrupted internet connection for extended periods of time. Since extensive computer time is a luxury many low income students cannot afford, sufficient funding must be made available for schools to obtain adequate computer resources for online courses.

The reform efforts discussed above have the potential to dramatically increase student access to AP courses and the number of traditionally underrepresented students succeeding in AP. However, the number of schools actively engaged in substantial reform efforts is small. The extent to which AP participation among disadvantaged groups increases in the future will depend in large part on how diligently reform-minded schools publicize their successes and failures and the enthusiasm with which other schools apply these lessons. In addition, funding must be expanded if successful outreach programs are to be broadly implemented. Expanding AP access and the participation of traditionally underserved students will be a perpetual battle requiring ongoing dedication and financial support.

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[11] In each of the fiscal years 2001-03, 22 million dollars was available (U.S. Dept of Education n.d.).

References

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

Advanced Placement Strategies Inc. (n.d.). Retrieved January 16, 2004, from www.apstrategies.org/clients.htm

College Board (n.d.a). *AP Program: State & Federal support*. Retrieved December 12, 2003, from http://apcentral.collegeboard.com/program/support/1,3061,150-159-0-0,00.html

College Board (n.d.b). *Advanced Placement Equity Policy Statement.* Retrieved December 17, 2003, from http://apcentral.collegeboard.com/repository/ap03_ap_equity_policy_22057.pdf

College Board (n.d.c). *The Story of AP, the Advanced Placement Program.* Retrieved December 12, 2003, from http://apcentral.collegeboard.com/members/article/1,3046,184-0-0-21502,00.html

College Board (n.d.d). *Participation in AP: Annual Participation.* Retrieved December 12, 2003, from http://apcentral.collegeboard.com/article/0,3045,150-156-0-2055,00.html.

Darity, W. Jr., D. Castellino, K. Tyson, C. Cobb, & B. McMillen. (2001). *Increasing Opportunity to Learn via Access to Rigorous Courses and Programs: One Strategy for Closing the Achievement Gap for At-Risk and Ethnic Minority Students.* Report prepared for the North Carolina Department of Public Instruction.

Klopfenstein, K. (2004). Advanced Placement: Do minorities have equal opportunity? *Economics of Education Review*, *23*(2), 115-131.

Long, J.S. (1997). *Regression models for categorical and limited dependent variables.* Thousand Oaks, CA: SAGE Publications.

National Research Council (2002). *Learning and understanding: Improving advanced study of mathematics and science in U.S. high schools.* Center for Education, Division of Behavioral and Social Sciences and Education. Washington, D.C.: National Academy Press.

Rose, H. & Betts, J.R. (2001). *Math matters: The links between high school curriculum, college graduation, and earnings.* San Francisco, CA: Public Policy Institute of California.

U.S. Department of Education. (n.d.). *Advanced Placement Incentive Program Grants.* Retrieved January 1, 2004, from http://www.ed.gov/programs/apincent/index.html

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