Title

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HUMAN CAPITAL ACCUMULATION IN HIGH SCHOOL :

CAN CURRICULAR CHANGE REDUCE RACIAL AND ETHNIC DIFFERENCES IN EARNINGS AND EDUCATION?

by

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Abstract

This study examines the impact of the high school curriculum and its components on post-secondary education and earnings within the context of issues raised by recent School-to-Work educational reforms. We use High School and Beyond data to determine if reform efforts have the potential to decrease educational and labor market differences between whites, African Americans and Mexican Americans. We find that striking racial and ethnic differences exist in the courses taken in high school, despite the common labels assigned to programs or tracks. Results of this study suggest that, because of these differences, African and Mexican Americans leave high school with dramatically lower levels of academic skills than do whites. These differences are such that implementing the "standard-raising" reforms of the mid-1980s, without concurrent curricular innovations, would severely limit African and Mexican Americans in their ability to accrue post-secondary education by decreasing the probability of obtaining a high school diploma. Although traditional curricular elements (i.e., courses, structured work experiences) had little *direct* impact on earnings approximately 10 years after leaving school, results of this study suggest that they exert strong *indirect* impacts in the production of educational human capital, both in high school and in post-secondary endeavors.

The impact of the high school experience on future earnings, although long a topic of interest to labor and education researchers, has taken on additional significance in recent years as efforts get underway to radically change many young Americans' experience of high school. The increasingly technological focus of most work places, and the increased demand for young workers with new, diverse, and flexible skills, has led to a movement of curricular and organizational reforms in education known generally as School-to-Work. These programs, although quite varied across the United States, have as their core goals of increasing students' knowledge and skills; meeting the educational needs of all students, especially those who do not graduate with a baccalaureate degree; and revising curriculum so that students move smoothly into the labor market or into post-secondary education. Virtually all the programs blend a carefully structured and supervised work experience into course work that integrates academic and vocational classes, for both motivational and instructional purposes.

Most advocates of School-to-Work programs do not see them as simply a revamping of traditional vocational education nor limited to the students who would otherwise be in those programs. Instead, many advocates argue that these programs can meet the need for "standards raising" that is set forth in A Nation at Risk (National Commission of Excellence in Education, 1983). Many efforts place a particular emphasis on establishing connections between high school and community college, particularly through joint programs leading to specific occupational certification and many programs are designed to keep university attendance open as an option for students, even as they pursue the more technical training. Because many School-to-Work programs are aimed explicitly at "the forgotten half" of the high school population for whom college has not been a realistic option, they will be especially important in many inner city high schools with predominantly minority student bodies. As such, they become a vehicle for increasing the human capital of African and Mexican American populations, who have been traditionally over-represented in that forgotten half.

Because current School-to-Work programs are too new to have been the subject of longitudinal research, questions raised in the current debate about the significance of the high school curriculum must be explored using existing longitudinal data bases. For example, What if it is not the track in the general sense that matters significantly for a student's future earnings and education, but the particular courses and other opportunities available to them? And what if patterns of difference among students of different races could be systematically observed, in both their high school opportunities and their subsequent earnings and acquisition of human capital? The findings would have important implications for the design of new School-to-Work programs.

A related set of questions arise about efforts to reform high school education by raising standards for graduation. How would changes in academic standards affect different racial and ethnic groups in their ability to continue into post-secondary education? A wave of reform proposals beginning in the mid-1980s were based on a general perception that high school education was, for many students, becoming extremely inadequate as preparation for either skilled work or college. A short term solution was to propose higher and more numerous standards, often as requirements for graduation.

We examine components of traditional educational programs and academic skill levels for students who were in school in the early 1980s. The analysis is not only interesting in its own right for showing the consequences of different high school experiences but also has important implications for contemporary reforms that are intended to decrease education and labor market inequities. Results show that striking racial and ethnic differences exist in the high school courses taken, despite the common label assigned to tracks, and suggest that because of these differences, African-American and Mexican-American students leave school with dramatically lower levels of academic skills than whites. This supports the critique that invoking higher skill standards, without accompanying reforms that increase students' skills, would have

dramatic equity outcomes--the ability of African and Mexican Americans to graduate from high school would be greatly reduced.

Although we show that curricular elements had little direct impact on earnings ten years after leaving school, they exert strong indirect impacts by determining the skills necessary to obtaining a baccalaureate degree, which does increase earnings. Work experience, as a curricular component, may not be a positive use of high school students' time unless it is beneficial to and supportive of this academic achievement. Thus, there could be great efficacy in those aspects of School-to-Work that increase opportunities for higher education, but not those that preclude that option.

FRAMEWORK

Blending academic and vocational curricula in School-to-Work programs has its conceptual underpinnings in the inadequacy of tracks based on ability and interest to provide *all* students with the knowledge and skills necessary to succeed in post-secondary endeavors. Traditional curricular tracks theoretically differentiate the high school curriculum so that educational resources are tailored to the abilities of students. Students who demonstrate high academic abilities and university-oriented post-secondary plans enroll in an academic track, while students with lower academic abilities or with labor market plans enroll in the vocational track.[1] School-to-Work programs are designed meet the increased standards for academic achievement by integrating academic and vocational curriculum. Because this often means integrating the ability-levels of the students in these courses, the increased level of human

[1] Students without well-defined plans enroll in the less-developed general track. In practice, debate exists as whether abilities and plans are responsible for placing students into curricular tracks (e.g., Oakes and Guitar, 1995; Lee and Byre, 1988; Alexander and Cook, 1982, Oakes, 1985) or whether tracking exacerbates initial differences between high school students, in part, by affecting students' educational goals and achievements. For example, an academically-tracked student has an increased probability of applying and being accepted to college, ceteris paribus (Alexander et al., 1978) and high-ability grouped students gain in test scores during high school while low-ability grouped students lose (Kerchief, 1985). Mosteller et al. (1996) provide a review.

capital accumulated in high school would, in theory, afford *all* students the opportunity to pursue post-secondary education.

If these programs succeed, the impact on African and Mexican American students could be great. The increased return to basic skills in the labor market (e.g., Murnane et al., 1995) and the lower probability of African Americans to continue education past high school (e.g., Neal and Johnson, 1996; Maxwell, 1994) may underlie about one-half of the recent slowdown in racial wage convergence (e.g., Juhn et. al., 1991). Mexican Americans may be equally disadvantaged by increasing returns to education. In 1992, while 82% of the nonHispanic population 25 and older held a high school diploma and about 23% held a college degree, only 45.6% of Mexican Americans held high school diplomas and 6.1% Mexican Americans held college diplomas (Cattan, 1993).

Despite these conceptual linkages between labor market earnings and high school human capital accumulation, empirical studies are decidedly mixed in their conclusions regarding the impact of high school curricular track on post-secondary outcomes.[2] For example, while academically-tracked students receive increased labor market employment and earnings from their program (Meyer and Wise, 1982), specific academic classes provide few returns to earnings (Altonji, 1995).[3] Research results are equally disparate on the benefits of work experience during high school, a key curricular component in traditional vocational programs. Work experience during high school *can* serve as an academic motivator and increase labor market human capital, especially if the work experience is related to school (e.g.,

[2] In light of the increased value of skills in the labor market, it is somewhat surprising that research on the impact of high school quality on labor market earnings is mixed (e.g., Hanushek, 1996; Card and Krueger, 1992a; Betts, 1995), particularly with respect to its impact on Black-White earnings differentials (e.g., Grogger, 1995; Card and Krueger, 1992b). None of these studies have examined the impact of high school curriculum components, however.

[3] Two potential explanations could underlie this impact. Positive program effects could result from either a carefully selected package of complementary course work or negative program effects could result from externalities (e.g., decreased self esteem) that may exist in nonacademic tracks (e.g., Oakes, 1985).

Stern et al., 1992, 1990). Alternatively, if the school-year jobs interfere with sustained human capital development, either because they do not provide on-the-job training or because they take time that prevents students from taking more challenging courses, teens may reduce their long run opportunities to acquire more skills or experience (e.g., Greenberger and Steinberg, 1986).

We posit that it is the heterogeneity in human capital ***within*** each track that creates (racial and ethnic) differences in the probability to undertake post-secondary education and in labor market earnings. Specifically, differences in program "quality" within the loosely defined curricular tracks may account for the mixed support for a positive relationship between high school human capital accumulation and post-secondary outcomes. We argue that the production of human capital in high school depends not only on the track but also on the students' courses and experiences: the track's curricular components, which could vary by race and community wealth, among other factors. If some students (for example) take course work in advanced areas of the academic track, such as college-level mathematics or science, the quality of human capital that is accumulated within that track increases. Heterogeneity within tracks may be more significant than the differences between tracks in the production of human capital in high school.

EMPIRICAL FRAMEWORK

We examine human capital accumulated in high school by estimating an educational production function that links academic skills with curricular track and the components that may create heterogeneity within tracks such that:

1. $AS_t = \alpha_0 + \alpha_i \sum Track_i + \alpha_j \sum Content_j + \alpha_k \sum Race_k + \varepsilon_{as}$

where AS measures academic skills at time of leaving high school (t); Track variables indicate the student's curricular track during high school; Content variables measure the track

components; Race variables indicate the respondent's race or ethnicity,[4] and ε estimates the error term.

Unfortunately, this simple formulation of educational production overstates the impact of curriculum (track and content) on production of academic skills because other inputs are omitted. Most specifically, high school characteristics, skills brought to the high school, and family background may affect human capital accumulated in high school. Thus, we estimate an expanded version of equation (1) such that:

$$1a.\ AS_t^a = \alpha_0^a + \alpha_i^a \sum Track_i + \alpha_j^a \sum Content_j + \alpha_k^a Race_k + \alpha_c^a \sum Controls_{c,t} + \varepsilon_{as}^a$$

where Controls contains three sets of variables: high school characteristics, academic skills at high school entrance (AS_{t-3}), and family background characteristics.

We estimate equation (1a) under five specifications to ensure that our results are robust with respect to model specification. The full impact of track (α_i) and curricular content (α_j) on academic skill acquisition, is estimated with equation (1), without controls. We then add additional control variables in stages to determine the reduction in their impact that can be attributed to other factors.[5] We first add high school characteristics into the estimation. If the size of the Track and Content coefficients is not reduced with their entrance, the impact of curriculum is relatively independent from high school characteristics. Alternatively, if the coefficients are reduced with their inclusion, then part of the influence of curriculum on skill acquisition is mediated through the high school. We next add a control for the academic skills that the student brings to high school into the estimation. The inclusion of the lagged dependent variable on the RHS of the equation transforms equation (1a) into a *value-added* estimation of

[4] Because we posit that production of human capital in high school does not vary by race, we include race/ethnicity variables as controls in nonstratified estimations.

[5] We enter each set of control variables working backwards in time--high school characteristics, skills at high school entrance, family background. This ordering allows us to examine the extent to which family background (for example) is captured by academic skills at high school entrance.

production of academic skills (e.g., Hanushek, 1986)[6] so that the impact of track (α_j) and content become focused on skill acquisition during high school. We next enter family background variables into the estimation. If coefficients remain unchanged when these variables are included, we can assume that the lagged dependent variable captures this influence. As a final check on model specification, we estimate equation (1a) using percentage change in the measure of academic skills (AS_t).[7]

Significant coefficients on the track ($\alpha_i \neq 0$) or curricular content ($\alpha_j \neq 0$) variables with the inclusion of all control variables suggest that curriculum directly affects academic skills accumulated in high school. As a result, School-to-Work programs that focus reforms around curricular change would alter human capital accumulated in high school.

We next examine whether curricula facilitate post-secondary outcomes. Specifically, we examine whether the curricular track or curricular content, 1) *directly* increases post-secondary education and earnings; 2) *indirectly* increases both outcomes through academic skills acquired in high school; 3) *indirectly* increases earnings through post-secondary education; or 4) has no impact on post-secondary outcomes. For this analysis we extend the educational production function (equation 1a) so that the dependent measure becomes post-secondary education, and skills are measured at high school exit (AS_t):[8]

$$2.\ Educ_{t+n} = \beta_0 + \beta_i \sum Track_i + \beta_j \sum Content_j + \beta_k Race_k + \beta_1 AS_t + \beta_c \sum Controls_{c,t} + \varepsilon_e$$

[6] More sophisticated estimation models of educational production would control for both time and individual heterogeneity within a fixed-effect framework. Our data set (and virtually all data sets with detailed longitudinal educational data) contain but two time periods in which skills are observed. In this case, the fixed-effect model reduces to the lagged dependent variable model presented here.

[7] AS_{t-3} in this value-added formulation controls for regression toward the mean in testing.

[8] We include as control variables only those factors that estimation of equation (1a) has shown to be mediating factors on influences of high school curricular components.

where Educ is educational attainment n years after leaving high school. If the coefficients on curricular track and/or content variables are positive and significant (β_i, $\beta_j > 0$) then high school curriculum facilitates post-secondary education directly and curriculum reforms, per se, would alter levels of education past high school. If these coefficients are not significantly related to post-secondary education (β_i, $\beta_j = 0$) but do nonetheless significantly increase academic skills in high school (α_i^a, $\alpha_j^a > 0$ from equation 1a), which increases post-secondary education ($\beta_1 > 0$), then the impact of high school curriculum is indirect: it works through increasing human capital in high school. The difference between a direct or indirect effect could prove to be important for the approach taken by, and outcomes expected from, School-to-Work reforms. If, for example, effects are indirect, curricular reform may have a greater impact if it focuses on increasing skills as opposed to building educational expectations (a direct effect).

Finally, we examine the direct and indirect impacts of curriculum on earnings by extending the typical Mincerian estimation to include high school curricular components:

3. $$LnW_{t+n} = \beta_0' + \beta_i' \sum Track_i + \beta_j' \sum Content_j + \beta_1' AS_t + \beta_2' Educ_{t+n} + \beta_c' \sum Controls'_{c,t+n} + \varepsilon_w$$

where LnW is the log of wages n years after leaving high school, and $Controls'_{t+n}$ is a vector of labor-market accrued human capital and marital status. Because research has consistently shown racial differences in returns to education, estimation of equation (3) is stratified by race. Significant coefficients on curricular track and content (β_i', $\beta_j' \neq 0$) suggest that that the high school curriculum directly influences wages n years after leaving high school.

The high school curriculum can indirectly increase wages in two ways: by increasing the production of academic skills in high school (α_i, $\alpha_j > 0$) or by increasing post-secondary education ($\beta_1 > 0$), as long as either measure increases wages (β_1', $\beta_2' > 0$).Under this scenario, the high school curriculum only alters labor market outcomes indirectly and changes in high school curriculum will not alter racial and ethnic differences in the labor market without

also increasing academic skills imparted. (This may at first seem obvious, but an alternative outcome would apply if access to certain vocational courses were to lead to high-paying jobs without benefit of academic success. In that case the effect of curriculum would be direct.)

DATA AND EMPIRICAL METHODS

We use the fourth wave of data from the sophomore cohort from the High School and Beyond (HSB) data set (National Center for Educational Statistics, 1995) to estimate equations (1-3). Data collection began with 30,030 high school sophomores in 1980 in a national probability sample of over 1,100 high schools. Sophomores were reinterviewed in Spring 1982, when most individuals were seniors, with high school transcript data obtained for a national probability subsample of 18,500 individuals. This subsample was then reinterviewed periodically through 1992, the equivalent of ten years after a high school graduation.

We restrict our analysis of the HSB sample along three lines. First, we examine only males, to focus education and labor market analysis on race and ethnicity without incurring potential complications from gender. Second, we restrict analysis to whites, African Americans and Mexican Americans[9] to obtain adequate samples of each race and ethnicity. Finally, we limit analysis to individuals who received a high school diploma without leaving school and who attended the same high school in both the sophomore and senior years. This restriction best ensures that high school curriculum reflects continuity of program.

Most sophomores in HSB left high school in the early 1980s, left post-secondary education in the late 1980s and began their "post school floundering" labor market experiences before 1990. Thus, we can examine post-secondary outcomes for individuals who left high school having gone through largely traditional curricular tracks. However, they entered the labor market at a time when the demand for skills at entry was increasing (or, at least when the

[9] Race and ethnicity were self defined in each survey. We use the 1992 definition, which was edited for consistency by NCES. We separate Mexican Americans from "Hispanics" because of the diversity within the more aggregated group.

number and proportion of unskilled entry-level jobs was declining precipitously) and when widespread perception of this increased demand for skills was the subject of much public concern. The data set also provides extensive information on both high school curricular components (courses and work experiences), academic skills obtained in high school, and post-secondary educational and labor market outcomes.

To measure curricular track (Track), we construct binary measures of vocational and academic programs.[10] We differentiate between course content (Content) through a series of binary variables that measure 1) advanced course work in Math, Science, and English, 2) a binary measure of course work in specific labor market preparation, and 3) a binary measure of whether the work experience was linked to the high school curriculum (i.e., the student's job was arranged by school personnel). Conceptually, the advanced course work variables capture differences in the academic curricular track. The specific labor market preparation and work experience variables, core components of traditional vocational education, reflect differences in the vocational track. In practice, students in all tracks take all courses, although in different proportions.

HSB also contains the necessary measures of educational outcomes, both in high school and 10 years after high school graduation (n=10). Of critical import are the battery of academic tests given in both the sophomore and senior years. The composite score from the vocabulary, reading and level 1 math tests provides a direct measure of academic skills when students were near exit from high school (AS_t) and sophomores (AS_{t-3}). For post-secondary educational outcomes. HSB contains information on the highest degrees held allowing for

[10] Enrollment in the general track is the omitted variable. Curricular track in HSB is self-defined, however NCES has edited the variable for consistency during the base and first follow up years. A hierarchy was established such that if an academic track was ever mentioned, an academic track was designated. If no academic track was ever mentioned but vocational track was mentioned, a vocational track was assigned. If a general track was always reported, a general track was assigned. Individuals who are missing data on this variable must have been missing in both the base and first follow up survey.

measurement of whether the respondent holds either 1) a certificate, license, or associates degree or 2) a bachelors or higher degree. Unfortunately, HSB has less than adequate measures of wages. In fact, because the 1992 survey contains a CATI-derived measure of annual earnings without concurrent measures of work effort, our empirical measure of LnW in equation (3) is actually log of annual earnings and captures both employment and wages. As a result, our analysis does not capture "returns" to human capital acquired in high school as much as it captures labor market gains associated with high school human capital.

HSB control measures (Controls) include high school characteristics (high school per pupil expenditure, percentage of students who drop out of school, Catholic school),[11] and family of origin characteristics (socioeconomic status, first language as English). Labor market controls (t+n) include on-the-job training, tenure, and marital status.

Because both academic skills and log earnings are quantified as continuous measures, we estimate equations (1, 1a and 3) with ordinary least squares (OLS). Because post-secondary education is quantified as a categorical variable, equation (2) is estimated with a multinominal logit.[12] We illustrate the relative impact of high school curriculum on educational human capital using Blinder-Oaxaca type simulations to examine the percentage change in probability of obtaining a BA and License/Certificate/AA for African and Mexican Americans if reforms raise 1) the curricular content of each track to the level that whites currently hold, or 2) academic skills to the level of whites.

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[11] Numerous other measures of high school characteristics were included in early analyses, including student-teacher ratio, size of high school, percentage of faculty with MA or Ph.D. degrees, starting salary of beginning teachers, length of school year, percentage of teachers with greater than 10 years of experience, percentage of students that are African American, percentage of students that are Hispanic, Southern high school, urban high school and percentage of students that went to college. Inclusion of any of these variables did not alter the analysis presented here.

[12] If a hierarchical structure exists within education (i.e., a bachelor's degree is more valued than an associate's degree), an ordered probit might be a more appropriate estimation. However, because current educational reforms are structured to increase the articulation between high school and the junior college or license or certificate programs. We use the nonhierarchical multinominal logit.

RESULTS

As an exploratory analysis of racial and ethnic differences in human capital production in high school, we examine curricular differentials between and within each track (Table 1). Although modest differences in between-track enrollment exist (Mexican Americans are more heavily enrolled in the vocational track than either whites or African Americans), the within-track differences are much larger. Though the three labels of tracks are almost universally used, data in Table 1 show that they can represent very different collections of courses for different groups of students. This suggests that the definition of a track is ambiguous and that the potential for "tracking" within tracks exists. For example, it appears that course work within the academic track can be focused around advanced work such that some "academic" students are effectively doing an advanced college placement curriculum while other "academic" students are not. Within vocational tracks, some students may receive a great deal of specialized job-specific training, while others do not.

All differences in within-track course work shown in Table 1 suggest that African and Mexican Americans leave school with a weaker program[13] than do whites. Within the academic track, African Americans take fewer academic units than do whites and within the vocational track both African and Mexican Americans take fewer vocational units. As well, a lower percentage of African and Mexican Americans than whites in the academic track take higher level math and science and a lower percentage of African Americans take higher level English. Within the vocational track, a lower percentage of African and Mexican Americans undertake specific labor market preparation than do whites.[14]

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[13] This conclusion gains support in results not shown here. A higher percentage of African Americans in the academic track are enrolled in the "lower level" math and English courses and a greater percentage of African and Mexican Americans than whites who are in the vocational track take vocational units in noncareer home economics.

[14] While fewer racial and ethnic differences exist for individuals in the general track, those differences that do exist reflect weaker programs for African and Mexican Americans as compared to whites.

Because within-track course differences could reflect initial differences in academic skills, or the school/ family environment, Table 2 presents within and between track differences in these areas. In general, racial and ethnic differences in these areas are consistent within each track and reflect well known patterns. For example, African and Mexican Americans are disproportionately (as compared to whites) from lower socioeconomic status (SES) families irrespective of track and a lower proportion of low-SES families are in the academic track. Perhaps most importantly, our data consistently show lower test scores at high school entrance for African and Mexican Americans than for whites in each curricular track (Test Score).

These race and ethnic differentials in curricular inputs to education coexist with differences in educational human capital accumulated (Table 3). Although all races have about the same probability of obtaining a sub-baccalaureate degree, a significantly lower percentage of African and Mexican Americans obtain a baccalaureate degree. Most importantly for School-to-Work program development, African and Mexican Americans leave high school with academic skills that are about 10% lower than whites.

It is, of course, this divergence in the quality of the high school diploma that underlies the movement for exit standards from high school. However, setting these academic standards in isolation (i.e., without accompanying steps to improve the levels of skills) has dramatic equity implications, as our distributional analysis of test scores shows (Figure 1). If even modest academic standards are set without altering current skill levels, a relatively large percentage of African and Mexican Americans will not obtain a high school diploma, a necessary but not sufficient condition for completing a baccalaureate degree. For example, should schools mandate that students exit high school with academic skills falling at least 1.5 standard deviations below the current mean, 21.4% of the African Americans and 16.7% of the Mexican Americans (as compared to 6.6% of the Whites) would not graduate from high school. This

dramatic outcomes turn our attention to educational reforms in the high school that could increase the academic skills at graduation.

PRODUCTION OF HUMAN CAPITAL IN HIGH SCHOOL

Do these curricular track differences affect production of human capital in high school such that they underlie academic skill differences for different race and ethnic groups? Estimation of equations (1 and 1a), which examine the impact of curricular components and race on academic skills taken from high school (Table 4), suggests that they are. Estimation of the truncated model of educational production (equation 1) shows that the higher levels of academic course work and enrollment in an academic track increase academic skills upon leaving high school, while course work in specific labor market preparation and enrollment in a vocational track decrease academic skills upon exiting high school. The coordination of the student's work experience by the school appears to be unrelated to the student's level of academic skills. All of these correlations are not impacted by the characteristics of the high school (model 2): coefficients on the curricular components change little when high school characteristics (aspects of school other than the curriculum) are entered into the model.

However, the association between academic skills and curricular components is mediated by the level of skills that a student brings to the high school (model 3). In fact, once initial differences are controlled for, the impact of most of the curricular influences is reduced about 70% and course work in specific labor market preparation is no longer significantly related to academic skill acquisition.[15] Still, because curricular components *are* significantly related to academic skills, they can be the focus of policies for increasing human capital accumulation in high school. This finding is relatively robust. Neither the addition of family

[15] With inclusion of AS_{t-3} into the estimation, the coefficient(s) on vocational track falls by 45%, on academic track falls by 74%, and for higher level course work in Math, Science and English falls by 78%, 66%, and 83% respectively. The coefficient on the African American variable falls by 85%. This inclusion also reduces the independent impact of race on academic skills. The African American coefficient falls by about 70% and the Mexican American coefficient becomes insignificant.

background controls nor the respecification of the value-added function (model 4 and % Change) qualitatively alters the results.

PRODUCTION OF POST-SECONDARY HUMAN CAPITAL AND EARNINGS

Results so far suggest that curricular reform could alter levels of academic skills accumulated in high school. Could this reform also impact post-secondary education and employment? Analysis suggests that the impact would be indirect and work through academic skills imparted. *As such, reform, per se, would not decrease race and ethnic educational and labor market differences except by raising academic skills.*

For post-secondary education (Table 5) a strong academic curriculum, including course work focused in the academic track and higher level course work in math and science, increases the probability (log odds) of completing a baccalaureate degree in two ways. First, enrollment in higher level math and science courses and the academic track *directly* increases the probability of completing a baccalaureate degree, ceteris paribus, most probably because the additional knowledge imparted by these courses and track are built upon in college. Secondly, these factors *indirectly* increase the probability of completing a baccalaureate degree by increasing academic skills acquired in high school (Table 4). This, in turn, increases the probability of attaining the degree (Test Score—Table 5). Because fewer African and Mexican American students undertake this high quality curriculum (Table 1), their successful articulation probability is lowered and curriculum reform might have its greatest impact on these groups.

Results about the vocational educational track and vocational courses stand in contrast to the apparent success of high-quality academic programs. Neither specific labor market preparation nor arranged high school employment significantly increase the probability of completing a higher degree, either at the baccalaureate or sub-baccalaureate level. In fact, because enrollment in the vocational track may reduce the academic skills that a person gains in high school (Table 4), the probability of completing a baccalaureate degree is indirectly

reduced for vocational students by their lower level of academic skills. And even though articulation into an associate's degree, license or certificate program is the expected post-secondary educational outcome for vocational students, the probability of their completing such sub-baccalaureate work appears unrelated to their high school experience.

We use the Blinder/Oaxaca simulation technique to amplify the consequences of the racial differences cited above (Table 6). Raising academic skills *upon high school graduation* to white levels would increase the probability of baccalaureate degree completion by nearly seven percentage points for African Americans and nearly four percentage points for Mexican Americans (white test score at exit). Raising the level of academic skills *at high school entrance* would nearly achieve post-secondary education convergence (white test score at entrance) since African Americans average 5.3 and Mexican Americans average 3.8 points than whites on their test scores (Table 3). This, of course, is not a policy option for those who administer high schools and must work with the skills that students bring to the schools. The finding does, however, emphasize the degree to which differences which appear in high school and beyond have been created through the elementary and middle-school grades.

Results of the log earnings estimation (Table 7) show that the impact of the high school curriculum on earnings is almost entirely indirect. Although employment during school arranged through the high school decreases post-secondary earnings for African Americans, in contrast to its increase for whites, neither curricular track or content, nor academic skills upon leaving high school were significantly related to earnings 10 years after high school graduation.[16] However, because curricular components associated with a strong academic track increases the probability of completing a baccalaureate (Table 5), the high school curricular components exert an indirect impact on labor market earnings. Because the significant relationship between completing a baccalaureate degree and increased earnings is over 2.5 stronger for African and

[16] This is consistent with Murnane et al. (1995) who show that the direct impact of cognitive skills obtained in high school on wages declines by 6 years out.

Mexican Americans than for whites, increasing post-secondary education among these groups would dramatically decrease earnings differentials.

SUMMARY AND DISCUSSION

This study illustrates that striking racial and ethnic differences exist in the high school courses taken, despite the common labels assigned to programs or tracks and that, because of these differences, African and Mexican Americans leave high school with dramatically lower levels of academic skills than do whites. These differences are such that implementing the "standard-raising" reforms proposed in the mid-1980s, without concurrent curricular innovations, would severely limit African and Mexican Americans in their ability to accrue post-secondary education by decreasing the probability of obtaining a high school diploma.

Although traditional curricular elements (i.e., courses, structured work experiences) had little *direct* impact on earnings approximately 10 years after leaving school, they exert strong *indirect* impacts in the production of educational human capital, both in high school and in post-secondary endeavors. For example, the lower level of participation in higher level math, science, and English courses of African and Mexican Americans, *even for students in the academic track*, reduces the academic skills gained in high school and limits their ability to complete a baccalaureate degree. As of this writing, School-to-Work reformers are redesigning curriculum so that students not previously bound for baccalaureate degrees are afforded the skills to undertake this option. If they are successful, this would ultimately reduce racial and ethnic earnings differences.

School-to-Work efforts to increase the articulation of high schools with community colleges may be of limited utility, however. We find that the certificate, license or Associate's degree is not an investment that increases wages for any race or ethnic group. These new School-to-Work programs might be inefficient investments unless two other connections are made possible for students: keeping the option open for acquiring four-year degrees, or building

an explicit ties to the labor market such that employment is readily available in the field of preparation (e.g., Bishop, 1989). The latter is almost always an explicit School-to-Work program goal, and the former is sought in some but not all cases.

The objectives of other program elements of School-to-Work reforms are more directly encouraged by the findings in this study. For example, the nature of vocational education and work experience arranged through high school are being changed radically. Results of this study strongly suggest that such reforms are necessary, especially for "minority" populations. School-arranged work experience, a key curricular element of traditional vocational education programs, reduced earnings for African Americans, yet had a positive correlation for whites. There is no inherent reason why some form of work experience or vocational courses could not be beneficial and supportive, rather than detrimental to academic achievement for students of all backgrounds. The difference in impact is presumably in the specific content and management of those experiences and how they fit into the students' overall high school program. The School-to-Work reforms are intended to improve those experiences, and if successful, they could decrease racial earnings differences in the labor market as long as 10 years after leaving high school.

In general, the reforms proposed under the School-to-Work rubric could address the types of disparities in the efficacy of high school found in the analysis of the HSB sample. Students in the sample succeed in post-secondary education more often if they were academically successful in high school. The School-to-Work approach is intended to improve access to higher education for students from traditionally noncollege-bound backgrounds, with the longer-term goal of increasing the earnings and career prospects of students whom the older system served less well. Once the newer programs have trained several cohorts of students, research comparing them to their HSB counterparts would be an important way to test the assumptions and the impacts of the School-to-Work approach.

TABLE 1: RACIAL AND ETHNIC DIFFERENCES IN HIGH SCHOOL PROGRAM

	ACADEMIC TRACK			VOCATIONAL TRACK			GENERAL TRACK		
	African American	**White**	**Mexican American**	**African American**	**White**	**Mexican American**	**African American**	**White**	**Mexican American**
Curricular Track									
% in track	59.7%	56.1%	**43.8%**	23.1%	20.9%	**33.1%**	17.1%	23.0%	23.1%
Carnegie Units[a] (means)									
Total Units	**21.60**	22.33	**23.31**	**19.57**	20.77	20.62	20.34	20.76	20.78
Academic Units	**15.81**	16.69	16.02	11.78	11.52	**12.13**	13.09	13.18	12.76
Vocational Units	**3.08**	2.76	**3.47**	**5.16**	6.65	**5.16**	**3.96**	4.67	4.31
Academic Courses[b] (percent taking)									
Higher-level Math	**59.74%**	78.48%	**64.15%**	**10.74%**	19.22%	18.33%	27.27%	30.46%	29.76%
Higher-level Science	**50.13%**	69.73%	**50.94%**	8.73%	13.36%	11.67%	21.82%	28.55%	**16.67%**
Higher-level English	**5.97%**	9.53%	9.43%	2.69%	2.70%	2.50%	3.64%	3.69%	2.38%
Vocational Courses (percent taking)									
Specific Labor Market Preparation	77.14%	77.69%	82.39%	**89.93%**	97.00%	**90.83%**	88.18%	91.67%	86.90%
Arranged High School Employment	**11.95%**	4.43%	**11.95%**	18.12%	15.47%	20.83%	13.64%	7.65%	9.52%
N	385	1784	159	149	666	120	110	732	84

Data are computed only for males who receive a high school diploma without leaving school. Numbers in **bold** indicate that significant differences ($p \leq .05$) exist from the white sample **within each track**.

[a]The Carnegie unit is a standard of measure that represents one credit for the completion of a 1-year course. Carnegie units are computed only for individuals who have undertaken course work in the area.

[b]Course classifications are based on the Secondary School Taxonomy (Brown et al., 1989). Higher-level math includes advanced algebra, advanced mathematics, and advanced calculus. Higher-level science includes physics and chemistry. Higher-level English includes Advanced Placement course work. Specific Labor Market Preparation includes agriculture and renewable resources, business and management, marketing and distribution, health, *occupational* home economics, mechanics and repairers, or precision production.

TABLE 2: RACIAL AND ETHNIC DIFFERENCES IN SCHOOL AND INDIVIDUAL CHARACTERISTICS BY TRACK

	ACADEMIC TRACK			VOCATIONAL TRACK			GENERAL TRACK		
	African American	**White**	**Mexican American**	**African American**	**White**	**Mexican American**	**African American**	**White**	**Mexican American**
High School Characteristics									
Per pupil expenditure	$4948.84	$4767.65	$4791.68	**$6771.48**	$5777.74	$5194.63	$4994.54	$5153.26	$5629.49
% Dropout	**7.83%**	5.48%	**10.28%**	**11.62%**	8.44%	**12.88%**	**11.20%**	7.62%	**11.92%**
% Catholic	30.65%	32.01%	**24.53%**	5.37%	6.15%	8.33%	18.18%	11.48%	8.33%
Family Background									
% Bottom SES	**23.91%**	8.14%	**47.02%**	**36.67%**	25.21%	**67.01%**	**42.86%**	18.61%	**56.52%**
% Top SES	**24.49%**	46.67%	**11.92%**	**7.50%**	15.06%	**4.12%**	**9.52%**	26.36%	**4.35%**
% English native language	**98.44%**	96.53%	**57.23%**	95.30%	95.50%	**55.00%**	95.46%	92.90%	**51.11%**
Test Score (Sophomore Year)	**50.42**	57.49	**52.55**	**42.42**	48.14	**44.29**	**44.00**	50.48	**48.30**
N	385	1784	159	149	666	120	110	732	84

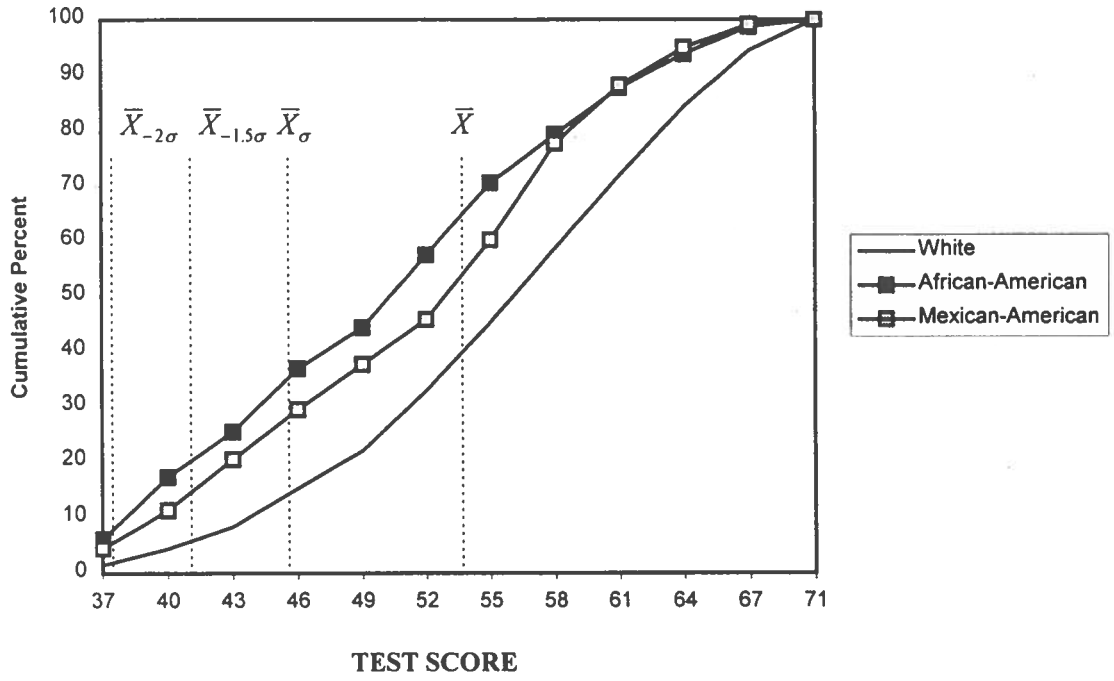
Data are computed only for males who achieve a high school diploma without leaving school. Numbers in **bold** indicate that significant differences ($p \leq .05$) exist from the white sample **within each track**.

TABLE 3:
RACE AND ETHNIC DIFFERENCES IN EDUCATIONAL HUMAN CAPITAL

	African American	White	Mexican American
% Baccalaureate Degrees	**28.6 (45.2)**	38.2 (48.6)	**22.6 (41.9)**
% Subbaccalaureate Degrees	14.0 (34.8)	14.7 (35.4)	15.8 (36.6)
Mean Test Score (Senior Year)	**49.968 (8.710)**	55.285 (8.120)	**51.406 (8.371)**
N	378	2330	221

[a]Sample is restricted to males who achieved a high school diploma without leaving school. Numbers reflect mean values for each race or ethnicity. % Baccalaureate Degrees include a BA degree of higher and Sub-baccalaureate includes a certificate, license, or AA degree.

FIGURE 1:
RACE AND ETHNIC DIFFERENCES IN HUMAN CAPITAL AT HIGH SCHOOL EXIT: DISTRIBUTION OF SENIOR YEAR TEST SCORES



The graph shows the cumulative distribution of senior year test scores by race. $\bar{X}$ is the sample mean, $\bar{X}_{-\sigma}$ is one standard deviation below the mean, $\bar{X}_{-1.5\sigma}$ is 1.5 standard deviations below the mean, $\bar{X}_{-2\sigma}$ is two standard deviations below the mean.

Back up numbers:

	Test Score Value	% African American Fail	% White Fail	% Mexican American Fail
$\bar{X}_{tot}$	54.31	68.8%	42.7%	57.0%
$\bar{X}_{-\sigma}$	45.86	36.8%	14.9%	29.4%
$\bar{X}_{-1.5\sigma}$	41.64	21.4%	6.6%	16.7%
$\bar{X}_{-2\sigma}$	37.45	6.6%	1.9%	4.5%

TABLE 4:
PRODUCTION OF HUMAN CAPITAL IN HIGH SCHOOL:
REGRESSION COEFFICIENTS

	Test Score (Senior Year)				% Change
	Model 1	Model 2	Model 3	Model 4	Test Score
Curricular Track					
Vocational	**-1.750**	**-1.753**	**-.967**	**-.949**	**-.019**
Academic	**3.094**	**3.126**	**.814**	**.776**	**.015**
Curricular Content					
Higher-level Math	**.037**	**.037**	**.008**	**.008**	**.0001**
Higher-level Science	**.044**	**.044**	**.015**	**.014**	**.0003**
Higher-level English	**.037**	**.037**	**.006**	**.006**	**.0001**
Specific Labor Market Preparation	**-.007**	**-.007**	.001	.001	.0000
Arranged High School Employment	-.609	-.563	-.398	-.400	-.010
Race					
African American	**-4.506**	**-4.387**	**-.642**	**-.613**	**-.011**
Mexican American	**-2.538**	**-2.345**	.245	.470	.004
Control Variables					
High School Characteristics	no	yes	yes	yes	yes
Test Score (Sophomore year)	no	no	yes	yes	yes
Background variables	no	no	no	yes	no
Test score (Senior Year) Mean (Standard Deviation)	54.306 (8.445)				
R^2	.444	.446	.776	.777	.168
N	2929	2929	2929	2929	2929

Sample is restricted to males who achieved a high school diploma without leaving school. See Appendix Table 1 for a full description of all variables and Appendix 2 for full estimation results. Numbers represent regression coefficients estimated from text equations (1) and (1a). Each model specification represents inclusion of a different set of control variables with model 1 including no controls and model 4 including a complete set of controls. Coefficients in **bold** are significant at $p \leq .05$.

TABLE 5:
PRODUCTION OF POST SECONDARY EDUCATIONAL HUMAN CAPITAL: MULTINOMINAL LOGIT COEFFICIENTS

	BACCALAUREATE		SUBBACCALAUREATE	
	Model 1	Model 2	Model 1	Model 2
Curricular Track				
Vocational	-.374	-.263	.103	.117
Academic	**1.132**	**.934**	.110	.089
Curricular Content				
Higher-level Math	**.011**	**.009**	.002	.001
Higher-level Science	**.010**	**.007**	.002	.002
Higher-level English	**.004**	.001	-.001	-.001
Specific Labor Market Preparation	-.002	-.001	.004	.004
Arranged High School Employment	-.323	-.274	.042	.046
Race				
African American	**-.401**	-.098	-.217	-.176
Mexican American	**-.657**	**-.485**	-.183	-.165
Test Score Senior Year	--	**.073**	--	.008
Dependent Variable Mean (and Standard Deviation)	.357 (.479)		.147 (.354)	
N	2929	2929	2929	2929

Sample is restricted to males who achieved a high school diploma without leaving school. Baccalaureate includes a bachelor's degree or higher and Subbaccalaureate includes a License, Certificate, or Associate's degree. See Appendix Table 1 for a full description of all variables and Appendix Table 3 for full results. Numbers represent and multinominal logit coefficients that are estimated from text equation (2). Model 1 is estimated without inclusion of senior year test score and model 2 is estimated with its inclusion. Numbers in **bold** are significant at $p \leq .05$.

TABLE 6:
IMPACT OF HIGH SCHOOL SKILLS AND PROGRAM ON RACIAL AND ETHNIC DIFFERENCES IN EDUCATIONAL HUMAN CAPITAL: SIMULATED DIFFERENCES

	African American	White	Mexican American
Using test score at exit for whites			
Percentage Point Change in Baccalaureate Degrees	6.98	--	3.79
Percentage Point Change in Sub-baccalaureate Degrees	-0.89	--	-0.36
Using test score at entrance for whites			
Change in Average Test Score at Exit	4.384	--	3.635
Using "average" curriculum taken by whites			
Percentage Point Change in Baccalaureate Degrees	2.16	--	3.84
Percentage Point Change in Sub-baccalaureate Degrees	0.02	--	-0.55
Change in Average Test Score at Exit	0.273	--	0.451
N	378	2330	221

See Appendix Table 1 for complete variable definition. Numbers in **bold** represent significant differences ($p \leq .05$) from whites.

[a]Simulated outcomes are computed from the fully specified estimations presented in Table 3 (Test Score) and Table 4 (Baccalaureate, Sub-baccalaureate). We computed the Percentage Point Change by subtracting the actual probability of attendance in higher education (or change in test score) for each race/ethnicity from the simulated probability of attendance (or change in test score). The latter was computed by inserting the mean value of test score or curriculum for whites into the estimation equations (2 and 1a).

TABLE 7:
IMPACT OF EDUCATIONAL HUMAN CAPITAL ON ANNUAL EARNINGS: REGRESSION COEFFICIENTS

	African American	White	Mexican American
Post Secondary			
Baccalaureate	**.490**	**.184**	**.499**
Subbaccalaureate	.124	-.013	.115
High School			
Test score (Senior Year)	-.008	.002	.008
Curricular Track			
Academic	.048	.059	-.079
Vocational	-.128	-.004	-.341
Curricular Content			
Higher-level Math	.0007	.0005	-.0000
Higher-level Science	.001	.0007	.0003
Higher-level English	-.0009	.001	-.002
Specific Labor Market Preparation	.0008	.0006	.001
Arranged High School Employment	**-.530**	**.189**	.198
Mean of Log Earnings	9.00 (1.07)	9.13 (.944)	8.98 (1.01)
N	304	2012	198

Sample is restricted to males who achieved a high school diploma without leaving school and who had earnings reported in 1992. Sample sizes are lower for each race/ethnicity, as compared to previous analysis, because of the nonresponse 10 years after high school. See Appendix Table 1 for a full description of all variables and Appendix Table 4 for full estimation results. Numbers represent OLS regression coefficients estimated from text equation (3). Coefficients in **bold** are significant at $p \leq .05$.

APPENDIX TABLE 1: DEFINITION OF VARIABLES

Variable	Definition
ENDOGENOUS	
Log Earnings	Log of (computed) annual earnings in 1992.
EDUCATION (Baccalaureate and Subbaccalaureate)	A trichotomous variable with 1 indicating that the respondent held a bachelors degree or higher, 2 indicating that the respondent held a certificate, license, or associate degree and 3 indicating no post secondary degree held by 1992.
Test Score (Senior Year)	Composite standardized score on tests given in the Spring of 1982 (the senior year for students still in school). Tests include vocabulary, reading, and math (level 1).
EXOGENOUS	
Race	
African American	A 0, 1 binary variable with 1 indicating an African American respondent.
Mexican American	A 0, 1 binary variable with 1 indicating a Mexican American respondent.
High School Entrance	
Test Score (Sophomore Year)	Composite standardized score on tests given in the Spring of 1980, when all students were *sophomores*. Tests include vocabulary, reading, and math (level 1).
English Language	A 0, 1 binary variable with 1 indicating that a respondent's first language was English.
Bottom SES quartile	A 0, 1 binary variable with 1 indicating a respondent whose family fell into the bottom quartile of the measure of SES (standardized). SES was based on father's occupation and education, mother's education, family income and material possessions in the home (% multiplied by 100).
Top SES quartile	A 0, 1 binary variable with 1 indicating a respondent whose family fell into the top quartile of the measure of SES (standardized). SES was based on father's occupation and education, mother's education, family income and material possessions in the home (% multiplied by 100).
High School Curriculum	
Track	
Academic	A 0, 1 binary variable with 1 indicating that a respondent was in an academic program in high school (% multiplied by 100).
Vocational	A 0, 1 binary variable with 1 indicating that a respondent was in a vocational program in high school (% multiplied by 100).
Components	
Higher-level Math	A 0, 100 binary variable with 100 indicating that the respondent undertook course work in advanced algebra, advanced mathematics or calculus.
Higher-level Science	A 0, 100 binary variable with 100 indicating that the respondent undertook course work in physics or chemistry.
Higher-level English	A 0, 100 binary variable with 100 indicating that the respondent undertook advanced placement in English course work.
Special Labor Market Preparation	A 0, 100 binary variable with 100 indicating that the respondent undertook course work in agriculture and renewable resources, business and management, marketing and distribution, health, *occupational* home economics, mechanics and repairers, or precision production.
Arranged High School Employment	A 0, 1 binary variable with 1 indicating that a respondent's current or last job was obtained through school (e.g., cooperative program, work-study, school employment agency (% multiplied by 100).
HIGH SCHOOL CHARACTERISTICS	
Per pupil expenditure	High school expenditure per pupil.
% Dropout	Percentage of students who drop out of school.
Catholic	A 0, 1 binary variable with 1 indicating that the respondent attended a Catholic school (% multiplied by 100).
Post High School Human Capital	
Baccalaureate	A 0, 1 binary variable with 1 indicating that the respondent held a bachelors degree or higher by 1992 (% multiplied by 100).
Subbaccalaureate	A 0, 1 binary variable with 1 indicating that the respondent's highest degree by 1992 was a certificate, license, or associate degree (% multiplied by 100).
Tenure	Years at current or last job in 1992.
On-the-Job Training	A 0, 1 variable with 1 indicating that the respondent received formal training or education for the current or most recent job in 1992.
Married	A 0, 1 binary variable with 1 indicating that the respondent had a wife or partner in the household in 1992.

APPENDIX TABLE 2:
PRODUCTION OF HUMAN CAPITAL IN HIGH SCHOOL:
ORDINARY LEAST SQUARES ANALYSIS

	Test Score (Senior Year)[a]				% Change
	Model 1	Model 2	Model 3	Model 4	Test Score
Vocational	-1.750[4]	-1.753[4]	-.967[4]	-.949[4]	-.019[4]
	(.370)	(.371)	(.236)	(.236)	(.005)
Academic	3.094[4]	3.126[4]	.814[4]	.776[4]	.015[4]
	(.333)	(.335)	(.216)	(.217)	(.004)
Arranged High School Employment	-.609	-.563	-.398	-.400	-.010[1]
	(.427)	(.428)	(.272)	(.272)	(.005)
Higher-level Math	.037[4]	.037[4]	.008[4]	.008[4]	.0001[4]
	(.003)	(.003)	(.002)	(.002)	(.0000)
Higher-level Science	.044[4]	.044[4]	.015[4]	.014[4]	.0003[4]
	(.003)	(.003)	(.002)	(.002)	(.0000)
Higher-level English	.037[4]	.037[4]	.006[2]	.006[2]	.0001[2]
	(.005)	(.005)	(.003)	(.003)	(.000)
Specific Labor Market Preparation	-.007[2]	-.007[2]	.001	.001	.0000
	(.003)	(.003)	(.002)	(.002)	(.000)
African American	-4.506[4]	-4.387[4]	-.642[3]	-.613[3]	-.011[2]
	(.353)	(.354)	(.232)	(.234)	(.005)
Mexican American	-2.538[4]	-2.345[4]	.245	.470	.004
	(.447)	(.452)	(.290)	(.342)	(.006)
Per pupil expenditure		.000	-.000[2]	-.000[2]	-.000[3]
		(.000)	(.000)	(.000)	(.000)
% Dropout		-.051[3]	-.005	-.004	-.0001
		(.016)	(.010)	(.011)	(.0002)
Catholic		-.716[2]	.147	.133	.003
		(.326)	(.208)	(.208)	(.004)
Test Score (Sophomore year)			.738[4]	.736[4]	-.005[4]
			(.011)	(.011)	(.000)
English Language				.362	
				(.391)	
Bottom SES quartile				.065	
				(.214)	
Top SES quartile				.431[2]	
				(.174)	
Intercept	49.825	50.507	13.780	13.403	.270
R^2	.444	.446	.776	.777	.169
F	259.01	195.86	776.47	632.22	45.473
N	2929	2929	2929	2929	2929

[a]See Appendix Table 1 for a full description of all variables. Numbers represent regression coefficients (Test Score) estimated from text equations (1) and (1a). The dependent variable is the Senior year test score for all estimations except the % change model. For this estimation, the dependent variable is:

$$\frac{\text{Senior year test - Sophomore year test}}{(\text{Senior year test - Sophomore year test})/2}$$

and sophomore year test score on the RHS captures regression toward the mean.

[4]$p \leq .001$
[3]$p \leq .01$
[2]$p \leq .05$
[1]$p \leq .10$

APPENDIX TABLE 3:
PRODUCTION OF POST SECONDARY EDUCATIONAL HUMAN CAPITAL: MULTINOMINAL LOGIT ANALYSIS

	BACCALAUREATE		SUBBACCALAUREATE	
	Model 1	Model 2	Model 1	Model 2
Curricular Track				
Vocational	-.374[1]	-.263	.103	.117
	(.198)	(.200)	(.153)	(.153)
Academic	1.132[4]	.934[4]	.110	.089
	(.139)	(.143)	(.148)	(.149)
Curricular Content				
Arranged High School Employment	-.303	-.274	.042	.046
	(.195)	(.199)	(.182)	(.182)
Higher-level Math	.011[4]	.009[4]	.002	.001
	(.001)	(.001)	(.001)	(.001)
Higher-level Science	.010[4]	.007[4]	.002	.002
	(.001)	(.001)	(.001)	(.001)
Higher-level English	.004[2]	.001	-.001	-.001
	(.002)	(.002)	(.003)	(.003)
Specific Labor Market Preparation	-.002	-.001	.004[2]	.004[3]
	(.001)	(.001)	(.002)	(.002)
Race				
African American	-.401[3]	-.098	-.217	-.176
	(.145)	(.153)	(.167)	(.172)
Mexican American	-.657[4]	-.485[3]	-.183	-.165
	(.197)	(.200)	(.201)	(.202)
Test Score (Senior Year)	--	.073[4]	--	.008
		(.008)		(.008)
Intercept	-2.004	-5.752	-1.772	-2.175
N	2929	2929	2929	2929

See Appendix Table 1 for a full description of all variables. Numbers represent multinominal logit coefficients (Baccalaureate and Subbaccalaureate) that are estimated from text equation (2). Baccalaureate includes a BA degree or higher and Subbaccalaureate includes a certificate, license, or AA degree. Model 1 excludes test score at entrance.

4p ≤ .001
3p ≤ .01
2p ≤ .05
1p ≤ .10

APPENDIX TABLE 4:
IMPACT OF EDUCATIONAL HUMAN CAPITAL ON Log ANNUAL EARNINGS: ORDINARY LEAST SQUARES ANALYSIS

	African American	White	Mexican American
Post Secondary			
Baccalaureate	.490[3] (.151)	.184[4] (.054)	.499[2] (.224)
Subbaccalaureate	.124 (.176)	-.013 (.062)	.115 (.205)
High School			
Test score (Senior Year)	-.008 (.009)	.002 (.003)	.008 (.011)
Curricular Track			
Academic	.048 (.176)	.059 (.060)	-.079 (.215)
Vocational	-.128 (.202)	-.004 (.066)	-.341 (.218)
Curricular Content			
Higher-level Math	.0007 (.001)	.0005 (.0005)	-.0000 (.002)
Higher-level Science	.001 (.001)	.0007 (.0005)	.0003 (.002)
Higher-level English	-.0009 (.003)	.001 (.0008)	-.002 (.003)
Specific Labor Market Preparation	.0008 (.002)	.0006 (.0006)	.001 (.002)
Arranged High School Employment	-.530[3] (.177)	.189[2] (.080)	.198 (.210)
Control Variables			
Tenure	.081[4] (.022)	.031[4] (.007)	.062[2] (.027)
On-the-Job Training	.369[3] (.122)	.137[3] (.043)	.025 (.155)
Married	.121 (.119)	.207[4] (.042)	.235 (.162)
Intercept	8.664	8.471	8.065
R^2	.174	.054	.091
F	4.689	8.716	1.409
N	304	2012	198

See Appendix Table 1 for a full description of all variables. Numbers represent OLS regression coefficients estimated from text equation (3). Estimations exclude individuals who do not report earnings in 1992.

[4] $p \leq .001$
[3] $p \leq .01$
[2] $p \leq .05$
[1] $p \leq .10$

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