EDUCATIONAL MATCHMAKING: ACADEMIC AND VOCATIONAL TRACKING IN COMPREHENSIVE HIGH SCHOOLS

MDS-127

Jeannie Oakes

Molly Selvin

Lynn Karoly

Gretchen Guiton

RAND

National Center for Research in Vocational Education
University of California at Berkeley
1995 University Avenue, Suite 375
Berkeley, CA 94704

Supported by
The Office of Vocational and Adult Education
U.S. Department of Education

September, 1992

FUNDING INFORMATION

Project Title:	National Center for Research in Vocational Education
Grant Number:	V051A80004-89A

Act under which Funds Administered:	Carl D. Perkins Vocational Education Act P.L. 98-524
Source of Grant:	Office of Vocational and Adult Education U.S. Department of Education Washington, DC 20202
Grantee:	The Regents of the University of California National Center for Research in Vocational Education 1995 University Avenue, Suite 375 Berkeley, CA 94704
Director:	Charles S. Benson
Percent of Total Grant Financed by Federal Money:	100%
Dollar Amount of Federal Funds for Grant:	$5,744,000
Disclaimer:	This publication was prepared pursuant to a grant with the Office of Vocational and Adult Education, U.S. Department of Education. Grantees undertaking such projects under government sponsorship are encouraged to express freely their judgement in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official U.S. Department of Education position or policy.
Discrimination:	Title VI of the Civil Rights Act of 1964 states: "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance." Title IX of the Education Amendments of 1972 states: "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving federal financial assistance." Therefore, the National Center for Research in Vocational Education project, like every program or activity receiving financial assistance from the U.S. Department of Education, must be operated in compliance with these laws.

PREFACE

This study, conducted as a project of the National Center for Research on Vocational Education (NCRVE), examines how three comprehensive high schools make decisions about what courses to offer and which courses are appropriate for various students. The study was guided initially by a desire to understand the range and quality of vocational offerings at comprehensive high schools that serve different types of student bodies and the student needs that secondary school educators hope their vocational programs will meet. The focus of the study shifted quickly when it became apparent that vocational course offerings and coursetaking were not a salient part of curriculum decisionmaking at any of the three schools. Instead, curriculum decisions centered almost exclusively on the schools' academic offerings and on mechanisms for placing students of different academic abilities into classes at the "right" level; decisions about vocational offerings and placements clearly took a back seat. Consequently, the authors spent two years observing and interviewing at the three schools and analyzing the transcripts of a recent graduating class to shed light on the broader process of curriculum tracking; in particular, what factors guide decisions about which academic and vocational classes students take. The information was used to suggest how the culture of comprehensive high schools may pose challenges for reformers wishing to institute curricula that integrate academic and vocational topics, skills, and staff.

SUMMARY

Since the early 1920s, U.S. high schools have offered a mix of courses--academics, arts, vocational preparation, and physical education--at difficulty levels ranging from low-level introductory or remedial courses to highly demanding

academic or technical courses. And since that time, schools have attempted to match students to programs that will accommodate their academic strengths or weaknesses and prepare them for an appropriate slot in the highly differentiated workforce. However, the matching of students to different high school programs has carried with it racial, ethnic, and social-class overtones, with immigrant, poor, and minority youth more often enrolled in low-level academic and vocational training and middle- and upper-class whites more often enrolled in academic, college-preparatory classes.

In the past decade this arrangement has come under fire for its failure to deliver either effective or equitable education. Policymakers and employers have become more and more dissatisfied with the workforce preparation given entry-level workers in the traditional high school and increasingly criticize the academic preparation of students who will attend college. At the same time, the equity of the split curriculum has been called into question by civil rights groups and advocates for low-income children--a concern increasingly shared by mainstream education and policy groups. Although a myriad of reform proposals have been put forward to address the ills of the contemporary high school, some reforms, falling under the rubric "integrated academic and vocational education," attempt to reconstruct the high school curriculum in ways that break down the distinctions between the academic and vocational domains. These reforms are not aimed simply at making vocational education "better" but at developing new programs comprising a rigorous, high status body of knowledge, skills, and attitudes and imparted through multimodal learning, problem solving, and activities lodged in real experience. Such reforms demand fundamental changes in both the structure and the content of the current curriculum. To engender schools' commitment for such reforms and build their capacity to undertake them, policymakers and educators must understand the practices and the assumptions that sustain the current split curriculum.

Most scholars who have studied the differentiated high school curriculum and the sorting patterns associated with it suggest that, for good or ill, they have served important educational and social purposes. Human capital theorists suggest, for example, that schools offer a wide array of opportunities that students can "invest" in as they prepare for different sectors of the workforce, and that the mechanisms for allocating various opportunities within schools are meritocratic (i.e., that placements are based on ability, effort, and achievement rather than race, social-class, or other status characteristics). Others argue that students' access to various curricula is constrained by school structures that interact with students' race and social-class characteristics. The most critical theorists contend that the distribution of curriculum has been used to transmit occupational and social position from one generation to the next.

Such explanations imply that schools act rationally, deliberately, and consistently, even if their procedures appear biased or grounded in educationally irrelevant factors. However, other researchers have pointed to the many irregularities and inconsistencies in schools' curriculum offerings, in the distribution of students among curricula, and in student assignment processes. They claim that these irregularities provide evidence that curriculum offerings and student placements are as affected by organizational contingencies and tradeoffs as they are by predetermined societal intentions or individual choices.

This report describes the results of a two-year effort to understand better the rationale and processes that underlie schools' course offerings and students' coursetaking and draws implications from these for the reform of vocational education.

STUDY METHODS

In the first year's research, we visited three very different comprehensive senior high schools--observing, studying school documents, and talking with educators and students about the curriculum offerings and student assignment practices at their schools. During the second year we analyzed transcripts from students in the 1988 senior class at the three schools to track the effects of these decisions. Taken together, the qualitative and quantitative data permit us to explore the usefulness of prior explanations of the processes and consequences of curriculum decisions and to propose a more comprehensive explanation.

The schools were located in adjacent communities within a major West Coast urban center. Their proximity to one another ensured that they shared local labor market needs, state resource and curriculum policies, and available postsecondary education and training opportunities. However, the schools differed in their student populations. Coolidge[1] served a racially and socioeconomically diverse group of students; Washington students were almost entirely middle- to upper-middle-class white or Asian; and McKinley comprised African Americans and Latinos--many of whom are low-income. These similarities and differences permitted us to raise some preliminary hypotheses about how schools shape their academic and vocational programs as they attempt to serve different groups of students.

Findings from the Field Study

Our schools were very similar in their curriculum offerings and their student assignment practices, yet they varied in important ways. Our field data make clear that all three schools make assumptions about the abilities, aspirations, and educational "needs" of their incoming students. These assumptions guide decisions about what courses to offer and are the basis for well-rationalized and articulated student placement policies. However, these assumptions also relate, in large part, to students' race and family socioeconomic status. These background characteristics, too, play a part in decisions about where to invest discretionary curriculum resources (those not tied to state requirements) and influence decisions about how to place individual students, particularly those on the achievement borderline.

However, we also found that this well-rationalized, if sometimes biased, approach to curriculum and placement decisions was constrained by state graduation requirements (which had a limiting effect on the extent of vocational offerings) and enrollment declines. Further, the day-to-day complexities of managing a large, bureaucratic institution often prevented the schools from carrying out rational decisions fully. Consequently, we found a lack of fidelity between the realities of the curriculum and that envisioned as ideal by the schools' staffs.

However, all schools and students were not affected in the same way. Advantaged Washington High appeared to be more resilient to external forces, perhaps because of community stability or the school's firm and consistent administrative style. McKinley seemed constantly rocked by changing internal policies, limited staff, and inadequate resources. Students in the highest status, academic curriculum at all schools appeared to have the best defined and carefully sequenced programs available and the most stable placement patterns. Those at the very bottom seemed to have access to few coherent programs (especially in their vocational options), but they appeared to experience considerable stability in their placements (especially in their low-level academic courses). School constraints appeared to provide those students in the middle with neither the coherent programs experienced by those at the top nor such stable placements as those found at either the top or the bottom. These students' placements seemed to receive less time and careful planning, either by the students or their counselors. However, when individual placements were made by happenstance, the effect seemed to be lesser rather than greater opportunity. For example, when a counselor needed to fill an empty slot in a student's schedule, unless the student was outstanding or assertive, the placement was far more likely to be in vocational education than in a rigorous academic class. This means that the scheduling process was less likely to optimize the educational program of each student by "stretching" him or her academically and vocationally.

We also found some combined between- and within-school factors that appeared to work to the advantage of the most advantaged students. In smooth running, more academic schools (Washington and Coolidge), high-achieving students (largely white and Asian and middle class) and their parents could exercise their political clout to get the schedules and courses they wanted. Low-achieving students (often non-white or of lower socioeconomic status) and many midrange students appeared less willing to challenge their curriculum placements or to be accommodated when they did. At our least smooth running, least advantaged school, there was less overall opportunity to negotiate changes in course assignments.

Findings from the Transcript Study

We "tested" the validity of our observations about curriculum offerings and students' placements by analyzing the transcripts of the senior class in 1988 at each of the three schools. The transcript analyses substantially bear out what we learned from our interviews and observations at the three schools.

Vocational Coursetaking

Consistent with national patterns, although most students took some vocational education, low-income students and disadvantaged minority students took more such courses, and particularly more occupationally oriented courses, than did whites and middle-class minority students. These differences appear both between and within schools.

Additionally, heavy vocational education participation is partially consistent with the picture that many of our case study respondents painted of vocational education: a program best suited for students who are not expected to be successful in academic programs. Only business courses appear to escape this syndrome. Within all three schools, concentrated vocational education coursetaking was largely, but not entirely, reserved for the least academically able students in the school, as measured by their scores on standardized achievement tests. On average, as achievement scores decreased the likelihood of concentrating on vocational courses increased. However, its relationship with achievement does not fully explain vocational coursetaking, since we find vocational concentrators across a very wide range of achievement at all three schools.

Factors both between and within the schools argue against either student choice or achievement screening as a single explanation for concentrated vocational coursetaking. First, the likelihood of taking a large number of vocational courses is not the same for similar students across the three schools. There are proportionately more vocational course "slots" at low-income, minority McKinley than at the other schools, so that even students in the top of their class have had a greater probability of concentrating on vocational courses there than their counterparts at the more advantaged schools. More important, differences in the number of slots do not correspond neatly to differences in overall achievement levels at the schools.

We also found evidence that race, ethnicity, and social class independent of achievement are related to the variation in vocational participation *within schools as well as between them*. Students with comparable achievement but from different racial and socioeconomic groups differed considerably in their vocational coursetaking, with the affluent students, Asians, and whites tending to take the fewest vocational courses overall.

Academic Coursetaking

Participation in college-prep math courses also varied among our schools--ranging from 22 percent of the eleventh graders at all-minority McKinley to 45 percent of their counterparts at affluent, white, and Asian Washington. Participation at Coolidge, our most diverse school, fell between the other two.

Participation in college-prep English was higher than in math at all three schools, with almost one out of every two students taking college-prep English in the 11th grade. This higher rate of participation was probably due to the higher English requirement for high school graduation. The comparable rate of participation in college-prep English contrasts sharply with the substantial school differences observed for college-prep math.

Differences in access to college-preparatory coursework appear to have been driven by a number of factors both between and within schools. For example, significant differences exist at both Coolidge and Washington in the college track participation of different racial and ethnic groups. Most notably, over 70 percent of the Asians at the two schools took college-prep math, whereas Latino students participated at a much lower rate than average. In contrast, African American and Latino students at McKinley participated at the same rate in college-prep math. Additionally, those students taking a large number of vocational courses were less likely than others to have completed college-preparatory academic courses.

These patterns cannot be entirely explained by achievement differences. Achievement is highly related to academic course participation, but after controlling for test scores, a student's race/ethnicity was often still important to participation in college-prep math and English. For example, Asian girls and boys at Coolidge were more than ten times as likely as their Latino classmates with the same math and reading scores to be enrolled in college-prep math. Race and ethnicity mattered most at the most diverse school.

We found some between-school differences in students' access to college-preparatory courses that suggest enhanced prospects for participation for students attending lower-achieving, all-minority schools. For example, even though all-minority McKinley had fewer slots available in college-preparatory math, a Latino student at all-minority McKinley was far more likely to take college-prep math than a peer with comparable test scores at the other schools. In sum, if we formed an imaginary queue of students from highest to lowest ability at the schools, a higher percentage of students at the most advantaged school would take college-prep math than at our least advantaged school. However, a student with above-average ability (for example, with percentile scores equal to 80) would have had less than a 50-50 chance of entering the college-prep track at the most advantaged school but would almost certainly have been in the college-prep track at the all-minority school.

THE DYNAMICS OF CURRICULUM AND TRACKING DECISIONS

Together, our findings from our field work and our transcript analyses begin to suggest how the curriculum decisionmaking process works. Without a doubt, the decisionmaking processes produced different placement and coursetaking patterns at each school and for groups of students within each school; these patterns resulted in a sorting of students with different background characteristics into different courses and programs. But there is considerable evidence that all of the schools tried to sort students according to their prior achievement, and much of the racial variation in course placements can be "explained" by students' prior achievement. But the match is not perfect, and some discrepancies relate quite clearly to race and social class. At the same time, the ability of schools to place students by either achievement criteria or on the basis of assumptions related to their race and social class seems to have been limited. We find considerable sloppiness in both patterns, both between our schools and within them.

Setting our qualitative work next to these analyses of student transcripts, we can suggest an eclectic explanation of how schools decide what courses to offer and how to place students in them. Combining elements of earlier theories, this explanation builds on eight propositions that are supported by our data.

1. Schools judge students' abilities, motivation, and aspirations, and they consider these characteristics relatively fixed by the time students reach high school.
2. Schools seek to develop and allocate curriculum opportunities in ways that accommodate these student characteristics. The notion that the curriculum might alter students' abilities and motivation is not salient.
3. Despite considerable curriculum similarity among schools, individual schools tailor their curriculum to their judgments about the characteristics of their student body. Within schools, educators accommodate student differences by assigning them to different levels or types of courses thought to match their different abilities, needs, and future prospects. In both cases, academically able students seem to reap the curriculum benefits of high expectations.
4. Even as schools attempt to match students to programs and courses according to ability and motivation, students' race, ethnicity, and social class serve to "signal" different ability and motivation and influence students' assignments. Educators usually attribute race- and class-linked curriculum differences to student choice and prior achievement at school. At the same time, they feel considerable ambivalence about the differentiated curriculum and the way it links curriculum opportunities to race and class.
5. Schools' efforts to provide courses tailored to students' needs are constrained by ideological and structural regularities in the school culture. A strong and widely shared commitment to the idea of the "comprehensive high school" presses schools to divide their curriculum into academic and vocational programs in similar ways at very different schools. At the same time, state policies press schools to skew the curriculum toward academic courses and college preparation. Within the structure that these pressures help create, local policies regarding student assignment work against students' mobility among the programs and courses their schools offer.
6. Declining resources and demographic shifts also constrain schools' efforts to offer a curriculum that meets their students' needs or to devote much attention to individual students' placements.
7. Although constraints interfere with the schools' ability to carry out decisions in the ways they would have liked, all schools and students are not affected in the same way. Irregularities in the distribution of curriculum opportunities tend to work to the advantage of the most advantaged students.

Our experiences in the schools and our analysis of the schools' curriculum documents suggest that a complex dynamic underlies curriculum decisions and student placements--one that combines as well as refines elements from previous explanations.

Schools attempt to provide a comprehensive curriculum that includes courses and programs that "fit" the varied needs of their students. Although a "human capital" rationale seems to be most prominent in the minds of educators and is expressed in terms of matching students to curriculum opportunities on the basis of their talents as indicated by their prior school performance (and their preferences, whenever they seem consistent with the schools' judgment about what they can accomplish), schools make less than perfect matches. The considerable sloppiness in the relationship between students' achievement and their enrollment in particular classes can be explained, but only in part, by students' race and social class and the cultural assumptions schools hold about the influence of these characteristics on students' suitability for particular classes. We also find evidence that structural constraints resulting from schools' determination to offer a fairly balanced curriculum, resource and staffing shortages, and policies and practices that limit students' mobility among curriculum tracks contribute to this sloppiness. Students and their parents are not simply passive participants in this process, however. The considerable slack in the system works to the advantage of efficacious parents and students who can often gain placement in classes that would not be recommended by the school. Moreover, admission to high-level academic classes is most tightly controlled, partly out of the fear that ill-prepared or unmotivated students would fail. However, fewer controls are exercised regarding low-level academic classes and vocational courses. Students are less likely to have lower expectations challenged, and those interested in courses at the bottom of the curriculum hierarchy--low-level academics and vocational classes--are more likely to have their choices honored, even if they might succeed in more challenging courses. All of these factors, working together, seem to favor advantaged students.

IMPLICATIONS FOR THE REFORM OF VOCATIONAL EDUCATION

Our findings make clear that high school vocational education programs and students' participation in them cannot be understood apart from their role and status relative to the rest of the comprehensive high school curriculum. Similarly, efforts to improve vocational education or to better serve its clients in both academic learning and workforce preparation must also consider the larger context in which these programs exist and compete for resources and status.

The Context of Vocational Education

Among the most striking of our findings was that vocational education commanded very little attention at the three high schools. Neither our examination of the curriculum and coursetaking decisions nor our queries about salient curriculum issues yielded much about vocational education. Rather, academic concerns dominated. Moreover, at all three schools, when we pressed the vocational issue, we encountered similarly negative perceptions of the role and quality of the vocational curriculum, of the faculty who taught those courses, and of the students who took them.

At best the current context for high school vocational education is characterized by benign neglect of its programs and students and at worst by disdain for programs, teachers, and students. In either case, vocational programs are unlikely to receive school-level support or resources for program or staff development or to be perceived as offering exciting curriculum challenges to any but the least motivated and least skilled students. At the same time, these programs are likely to be the first casualties of resource constraints or changes in curriculum polices, and, with the possible exception of business courses, they are often perceived as appropriate only for students with serious academic or behavioral problems.

Prospects for Improvement

Our study, then, suggests a number of obstacles in the culture of schools that will confront reforms aimed at improving vocational education by blurring the distinction between it and the academic curriculum. But it also establishes the strong need for these reforms. It also suggests that educators are eager for a new approach to serving their diverse student bodies.

The Need for Experimentation and Research

Experimentation and research are needed to provide a clearer understanding of the actual processes of developing and implementing integrated academic and vocational curricula. Such projects might focus, for example, on the process of curriculum development--e.g., by bringing together academic and vocational teachers, cognitive psychologists, and curriculum specialists to design programs. Other work might consider implementation of such curricula--e.g., by examining schools where teachers or administrators are attempting to introduce, develop, and sustain the concept of integration. Although both of these lines of work would of necessity focus on specific curricula, teachers, and schools, their major contribution should be generic--developing and implementing integrated curricula applicable in a variety of subjects and schools.

We recommend that schools press forward with experimentation and the evaluation of possibilities relating to a "strong" version of integrated academic and vocational education. Reconstruction of the high school curriculum seems to provide the best hope for overcoming the unfriendly disposition toward vocational education and the unwarranted assumptions about vocational students. A curriculum split into academic and vocational halves seems to be fundamental to current educational troubles--not only in vocational education but in educational quality and equity more generally. As long as this split is maintained, vocational educators will be consigned in large part to acting out the belief that some children, often those who are poor and minority, are unable to learn the things most valued by schools and society.

The Need for More "Good" Schools

However, the problems identified in this report stem as much from a shortage of good schools as from an uneven distribution of opportunity within schools. Consequently, solving these problems will require a serious effort by school systems to expand the supply of challenging academic courses and to think of vocational education as providing the knowledge and skills needed by high-performing sectors of the labor market. Then, schools must learn to use the placement process to expand, not limit, students' academic and vocational opportunities.

ACKNOWLEDGMENTS

We would particularly like to thank the NCRVE Board, Center Director Charles Benson, and Cathy Stasz of RAND for their continuing support of this work. Additionally, RAND researchers Kim Ramsey and Diane Schoeff made substantial contributions to the data collection and initial analyses of the study. Paul Hill of RAND and Julia Wrigley of CUNY provided helpful reviews of an earlier draft, and Patricia Bedrosian contributed her skillful editing. Responsibility for the conclusions herein, however, remains with us.

FIGURES

TABLES

I. INTRODUCTION

The curriculum of American high schools--a mix of academics, arts, vocational preparation, and physical education--has remained essentially unchanged over the past 70 years. Courses in each subject range in difficulty from low-level introductory or remedial courses to highly demanding academic or technical ones. This wide array of offerings stems, in part, from a nearly century-old belief that high schools should prepare students for work. Because the workforce is highly differentiated, with workers in different sectors requiring different knowledge and skills, high schools have developed a correspondingly differentiated curriculum. Demanding academic courses aim at preparing students for occupations that require college degrees; more rudimentary academic classes and vocational programs try to ready students for less-skilled jobs immediately following high school graduation or for postsecondary technical training.

Educators and the public have typically judged this range of curriculum choices as an appropriate and fair way to accommodate differences in students' intellectual abilities, interests, and aspirations. Thus, a high school curriculum divided into college-preparatory, general, and vocational programs or "tracks" has been viewed for most of the twentieth century as both functional and democratic--an educationally sound way to provide students with an education that best suits their abilities and to provide the nation with the array of workers it needs (Grubb and Lazerson, 1974; Kantor, 1986).

Today, however, many policymakers are challenging the traditional split between the academic and vocational sides of the curriculum. This challenge stems from the growing perception that, with the profound economic and social shifts currently facing the nation, a curriculum divided into distinct academic and vocational halves is no longer either useful or fair. On the economic side, employers have become increasingly disenchanted with the extent to which high schools prepare students for work. With rapidly changing work technology and the high cost of keeping equipment up to date, high schools have lost their ability to prepare students for the technical aspects of many jobs. And, as employers anticipate that more jobs in the future will require sophistication in literacy, numeracy, and problem solving (as opposed to simply knowing how to perform a few procedures accurately and efficiently), high schools have come under fire for not providing entry-level workers with sufficient intellectual competence. For these reasons--many of them beyond the control of schools--the nation's old confidence that most students will leave high school ready to work has been shattered.

Moreover, the nation is also losing faith in the fairness of the idea that high schools should place students with different intellectual capacities into different programs that will lead them to quite different opportunities after high school, with some students eligible for four-year colleges and others not. This diminishing confidence in high school "tracking" results, in part, because immigrant, low-income, and minority youth more often take low-level academic and vocational training, and middle- and upper-class whites more often take academic, college-prep programs. From the inception of a differentiated high school curriculum, the matching of students to programs carried with it racial, ethnic, and social-class overtones. Early on, vocational training was thought to be appropriate for immigrant, poor, and minority youth, and academic preparation was seen as meeting the needs of more affluent whites (Carnoy and Levin, 1985; Cohen, 1985; Grubb and Lazerson, 1974; Kantor, 1986; Oakes, 1985). The links between high school programs and students' background characteristics remain; they can be observed in differences among contemporary high schools' curriculum offerings and in students' enrollment in various courses. Few questioned the "rightness" of this pattern of unequal access to college preparation before the 1960s, just as few questioned the many other social and economic barriers faced by many immigrants and native-born minorities. Today, however, most Americans find these curriculum differences disturbing.

It is not surprising, then, that the recently reauthorized Carl Perkins Vocational Education Act requires that schools seeking federally funded program improvement funds develop programs that integrate academic and vocational curricula. Other reformers, seeking to improve both sides of the high school curriculum, hearken back to John Dewey's ideas that learning that takes place in the head can be enriched by that done with the hands--an idea remarkably similar to those proffered recently by cognitive psychologists (e.g., Sternberg, 1984). These reformers view a blending of academic and vocational studies as a promising approach to making the essential concepts from the college-preparatory curriculum more accessible to all students and enabling students to see connections between "school" knowledge and the world around them. Thus, such reforms are not aimed solely at benefiting those students who are poorly served by the current structure of the high school curriculum; they are also seen as having the potential to improve the high school curriculum for everyone (Oakes, 1986).

Obviously, blending academic and vocational studies in high schools is a daunting task. The most obvious difficulty is the purely technical challenge of redesigning the high school curriculum and staffing patterns so that students experience courses where essential academic concepts are taught in the context of functional and applied processes (see, for example, Stasz et al., 1990; in press). However, other obstacles may bring even tougher challenges to those trying to blur the boundaries between academic and vocational students and what they learn. These obstacles lie in the culture of American high schools--in the form of beliefs about why academic and vocational programs should be kept separate, in the form of beliefs about the limited intellectual capacities of some groups of kids, and in the policies and politics that shape everyday life in large high schools.

The research reported here aims to illuminate some of these obstacles in the culture of contemporary high schools. It is grounded in the premise that those who wish to upgrade the role and status of vocational education and to integrate academic and vocational curricula must understand current patterns of curriculum differentiation, student assignment practices, and the dynamics that keep current practices firmly in place.

CURRENT PATTERNS OF CURRICULUM DIFFERENTIATION

Differences in Schools' Course Offerings

Across the nation, students' access to and participation in vocational and academic curricula differ considerably, depending on the school they attend. Some schools focus on academic preparation and offer only a smattering of vocational courses; others are heavily vocational (NCES, 1985). Some schools' vocational offerings emphasize agriculture; others focus on business; others on industry and trade-related skills.

Some recent evidence suggests that the differences in schools' vocational offerings may relate less to local labor market needs than to the social and economic characteristics of students and their neighborhoods. For example, schools with large concentrations of disadvantaged students often offer the greatest *number* of vocational classes. However, these classes are less likely to be part of intensive, well-articulated programs than the classes offered at schools with more advantaged students. For example, the most recent National Assessment of Vocational Education found that only 45 percent of disadvantaged schools had access to area vocational centers, compared with 65 percent of schools with more advantaged students. Additionally, these disadvantaged schools tended to have a restricted range of program offerings (an average of 29 distinct credits offered) and fewer advanced courses (an average of 8 credits). In contrast, schools serving the most advantaged students have far richer vocational programs (e.g., course offerings, on average, of 46 distinct credits, with 15 of these credits in advanced courses). Yet students at these schools, on average, take only half the number of vocational courses as their peers at the most disadvantaged schools (NAVE, 1989).[2]

These findings echo work observing that the content, class length, and location of vocational courses vary with the racial and socioeconomic characteristics of a school's student population, with the most impoverished programs at schools serving low-income students (Goodlad, 1984; Oakes, 1983).

Academic programs also vary among schools with dissimilar student bodies. For example, schools enrolling the most advantaged students typically offer the most extensive and well developed science and mathematics programs (Oakes et al., 1990).

Differences in Students' Participation

Within schools, students' participation in vocational and academic courses differs, as students take various paths through the curriculum (NCES, 1985; Oakes, 1985; Ekstrom, Goertz, and Rock, 1988). In 1982, 38 percent of high school seniors reported that they were enrolled in the academic track (courses that meet college-entrance requirements), another 27 percent reported being enrolled in the general track (typically not thought of as a college-preparatory program), and 35 percent said they were in the vocational track (courses that prepare for entry-level work in a particular occupation) (Ekstrom, Goertz, and Rock, 1988). But students do not always report their curriculum tracks accurately (Rosenbaum, 1980), perhaps because the boundaries between programs may be fuzzier than such labels as "academic," "general," and "vocational" suggest. For example, recent analyses by the National Assessment of Vocational Education found that 97 percent of all high school students enroll in some vocational education (Hoachlander, Brown, and Tuma, 1987). And, students who plan to graduate from college earn a surprisingly large share (about 29 percent) of all vocational education credits. Their coursetaking extends beyond consumer, homemaking, and general vocational to include occupationally specific classes as well (NAVE, 1989). Moreover, the number of semesters of vocational courses taken by students from different racial and ethnic backgrounds is quite similar, except for Asian American students. For example, Asian American students in the HS&B sample took an average of 3.22 semesters of vocational education; whites, 5.5; African Americans, 5.82; and Mexican Americans, 6.12 (Ekstrom, Goertz, and Rock, 1988).

Despite these coursetaking overlaps, we find consistent racial and socioeconomic differences in track participation. Low-income and minority students participate in vocational curriculum tracks at higher rates and in academic curriculum tracks at lower rates than affluent and white students (NCES, 1985). For example, 48 percent of the white 1982 seniors who were a part of the federal High School and Beyond Study reported being in academic programs, compared with 32 percent of the African Americans and 23 percent of Mexican Americans (Ekstrom, Goertz, and Rock, 1988). In contrast, 29 percent of these white seniors reported participating in the vocational track, compared with 39 percent of the African Americans and 44 percent of the Latinos (Braddock, 1990). Even high-achieving African American students take more vocational education than do their white peers (NAVE, 1989). Perhaps this is because they often attend schools that offer larger numbers of vocational classes.

More interesting than racial and socioeconomic differences in *overall* vocational and academic participation are differences in the type of courses taken in the two domains. Case study data suggest that low-income and minority students are disproportionately enrolled in vocational courses that lead to jobs requiring only minimal skills (e.g., agricultural field work, institutional cooking, and housekeeping), whereas whites and more affluent students take vocational courses that impart more general skills (e.g., keyboarding) or courses with considerable academic content (e.g., aviation, agricultural science) (Oakes, 1983). Similarly, national data show that African American students, more than whites, enroll in courses designed to teach them specific skills for jobs in occupational home economics, health occupations, and construction (Hoachlander, Brown, and Tuma, 1987). And, academically disadvantaged black students spend more time than their white counterparts in work-based courses (e.g., work experience programs) and in courses preparing for low-level service-related jobs (NAVE, 1989). Across racial groups, economically disadvantaged students take a relatively larger percentage of occupationally specific courses and a somewhat smaller percentage of classes providing more general employability skills (e.g., typing and introductory courses in industrial arts) than do their more affluent schoolmates (Hoachlander, Brown, and Tuma, 1987).

Even more dramatic than differences in vocational coursetaking is the consistent overrepresentation of low-income and minority students in low-level and remedial *academic* courses. Racial differences are the most pronounced in the very highest college-preparatory tracks--honors class subjects such as English and mathematics--with white and Asian participation far outdistancing that of African Americans and Latinos (Braddock, 1990). These academic coursetaking differences, more than vocational course differences, explain racial differences in college eligibility (Oakes, 1987; Oakes et al., 1990).

COMPETING THEORIES

Despite our knowledge of these contemporary patterns and their historic roots, prior research provides little insight into the decisionmaking processes that shape the curriculum offerings and student coursetaking patterns in today's high schools and the rationale that support the patterns we observe. However, a number of theories have been offered to explain them.

Functionalist Theories

Most explanations of curriculum and placement patterns contend that curriculum offerings and coursetaking decisions are functional, that is, they serve important educational or social purposes. The most traditional of these explanations are "human capital" theories suggesting that schools (as primary agents for preparing students for work) offer a wide array of opportunities that students can "invest" in as they prepare for different sectors of the workforce. With such investments, students increase their human capital--their education and training--which will determine how much they can attain (income, status, etc.) as adults. Human capital theory recognizes that various education and training opportunities do not provide an equal return. However, it does suggest that the competition for various opportunities is fair and open, that the primary mechanisms for allocating various opportunities are meritocratic (e.g., decisions based on ability, effort, and achievement rather than race, social class, or other privileged status), and that usually students and their parents are free to choose among alternative curricula. Attainment of high-status education and the highly rewarding occupations that follow, then, results from an open contest based on merit. Thus, students who are able, ambitious, and hardworking can use schooling as an avenue for social and economic mobility (see, for example, Rehburg and Rosenthal, 1978).

Finally, more deterministic functionalist theorists suggest that curriculum decisions are quite directly influenced by society's expectation that schools play a central role in social and economic stratification. Not only do curriculum opportunities in schools mirror occupational opportunities in the larger society, schools' curriculum decisions maintain the occupational and social advantages of children from families with high-status positions. At the same time, schools provide lower-status students with curriculum opportunities that prepare or certify them for occupations much like those of their parents. Such theories are supported by work showing that guidance counselors' recommendations do not stem solely from educationally relevant criteria such as ability or achievement; sometimes their advice appears to be influenced by factors related to race and class--dress, speech patterns, and behavior. Under these conditions, low-income students may be more likely than others to be placed in lower-level classes (Cicourel and Kitsuse, 1963). Some argue that this reproduction takes place in an almost mechanical way (Bowles and Gintis, 1976). Others suggest that schools' contribution to social and economic sorting is not straightforward and argue that schools are also the battleground on which struggles for greater opportunities and equality for disadvantaged groups take place. Therefore, curriculum decisions are full of contradictions and tensions that reflect both democratic impulses and real inequities in society, even as they result in social and economic reproduction (e.g., Apple, 1982; Giroux, 1981; Carnoy and Levin, 1986).

Structuralist Explanations

In contrast to this view of an open contest or a rather mechanistic class-based allocation to the best schooling opportunities and attainments, other functionalist explanations argue that factors other than an open, meritorious contest determine students' access to various curricula. These other factors come into play as high schools enact society's intent to provide a comprehensive and differentiated program at each high school. Accordingly, curriculum opportunities are constrained by ideological (belief in the comprehensive high school), structural, and organizational regularities of schools and by students' characteristics. Such arguments center on the fact that schools allocate a limited number of places in each type of curriculum, including the high-status curriculum (high-ability groups in elementary school and the academic curriculum in high school) that provides students with access first to college and later to high-status jobs, regardless of the abilities of their student bodies (Hallinan, 1987; Sorensen, 1987). Moreover, the number of positions in any one curriculum are relatively fixed at a school, given staff and resource availability and norms suggesting that the number of students enrolled in each curriculum should not exceed or fall below particular limits. Thus, the chances of any individual student participating in the academic curriculum are not only a function of his or her own abilities and choices but also of locale--the most important feature of which is the characteristics of those students with whom a student must compete for limited positions in the high-status curriculum (Sorensen, 1987).

Not only are the number of high-status places in a school limited, but a considerable stability in individual students' placements prevents most students from moving from low- to high-status classes or groups. This stability results from two factors: First, students' early placements and status are used to signal their ability (Rosenbaum, 1986). Second, students assigned to low-status curriculum are often locked into such programs because they miss out on learning experiences considered prerequisite to moving into a "higher" curriculum (Hallinan, 1987; Oakes, 1987). Thus, students' early assignment to a curriculum largely determines their later curriculum opportunities. Rather than participating in a wide-open competition for slots in particular curricula, then, students follow rather narrow curriculum paths that are established quite early in their school careers by factors not limited to their ability to benefit from a particular path. Moreover, when movement between groups or tracks occurs, it is likely to be downward to lower tracks. Consequently, Rosenbaum (1986) suggests that curriculum opportunities function rather like a sports tournament, where access to the high-status curriculum is maintained only by a series of student "wins" (demonstrations of ability, effort, and achievement). In contrast, any "loss" (demonstration of less ability, etc.) removes students from further consideration for these curriculum opportunities.

These structural limits on the number of high-status courses that schools offer and, consequently, any one student's chances of being placed in them may reflect the longstanding and widely held belief that few American students are really capable or interested in rigorous academic work (e.g., Cohen, 1985). Although some argue that these limits are not necessarily a function of students' race and class (Sorensen, 1987), others contend that these characteristics interact in important ways with structural constraints, since educators' judgments about students' social class and racial characteristics link to judgments about students' abilities and their likely postsecondary destinations. Thus, students' background characteristics may affect both the number of high-track positions that a school makes available and the placement decisions about individual students within schools (Oakes, 1987; Rosenbaum, 1986).

Accounting for the Untidiness of Schools' Practices

The views discussed above all suggest that schools act rationally and consistently, even if their decisions sometimes appear biased or grounded in educationally irrelevant factors. Human capital, structural, and reproduction theories all imply that schools employ implicit or explicit models of attainment and well-reasoned decision rules. Further, they suggest that schools are able to carry out these decisions rather consistently. Other work, however, highlights considerable discrepancies between the tidiness of these functionalist perspectives and the less-orderly nature of what often happens in schools.

Close scrutiny of the inner workings of schools reveals irregularities and inconsistencies in the structure of schools' curriculum offerings, in the distribution of students among curricula, in the placement processes used to allocate students to various programs, and in attitudes toward placement in various tracks (Oakes, 1985; Garet and DeLany, 1988; Kilgore, 1991). In some schools (and in some subjects within schools), students do move into higher curriculum tracks. As a consequence, considerable overlap exists in the characteristics of students (e.g., in race, social class, and achievement) enrolled in various tracks at some schools. In some schools, high-achieving college-preparatory students take vocational courses without compromising their high status.

Such divergences from general (and rational) patterns may occur because schools are so constrained by the vagaries inherent in the management of their day-to-day operations that they are unable to make or carry out curriculum and placement decisions in the rational way that functionalist theories suggest (Garet and DeLany, 1988; DeLany, 1988). Some of these constraints are beyond schools' control, such as demographic changes (e.g., declining enrollment) or changes in state policies and resource allocations. In some states, for example, recent declines in student enrollments and increased academic requirements have acted in combination to virtually eliminate a "vocational track" in comprehensive high schools. In many schools, what remains is a smattering of vocational elective courses (e.g., Kirst, 1984; Clune, 1989; Selvin et al., 1990).

Within schools, other circumstances constrain staffs' best efforts to carry out curriculum and tracking policies. The logistics of creating a schedule each year can wreak havoc with schools' efforts to offer well-developed vocational programs and frustrate efforts to have students follow a well-defined sequence (or track) of courses across subject fields (Garet and DeLany, 1988). Lack of staff expertise and limited resources force other compromises (Kilgore, 1991). Additionally, other dynamics in the school culture can work against the implementation of formal policies. For example, in some schools peer influences on student choices, teachers' recommendations, the general climate of expectations for student achievement (Kilgore, 1991), and parent demands (Useem, 1990) all press schools to admit students to classes for which they may be under- or overqualified, according to more formal placement criteria. Thus, both the availability of courses and student placements in them may more likely result from constraints and organizational tradeoffs than from the rational processes that theories of predetermined societal intentions or individual choice would suggest (Garet and DeLany, 1988).

Accordingly, students' track placements--even when they reflect social stratification or the students' own choices--are undoubtedly far more constrained than widely believed. At the same time, these curriculum paths are probably far more open and serendipitous than functionalist theories claim. Schools do not *simply* offer a wide range of offerings from which students and their parents choose. But neither do they *simply* match students to curricular and occupational opportunities in ways likely to reproduce their current social and economic status.

ORGANIZATION OF THIS REPORT

The theories outlined above suggest that the courses schools offer and students' assignment to them reflect a wide array of factors: social expectations that schools will prepare students for work; beliefs about students' abilities and what educational programs are most appropriate for students of different ability levels; conceptions of how schools can distribute opportunities fairly; and the vagaries of managing large organizations. The remainder of this report describes research conducted in three high schools over a two-year period. This research sought to better understand the various influences on curriculum and student assignments and what they imply about efforts to reform high schools by creating programs that attempt to blur the distinction between academic and vocational subjects and students.

Section II outlines our strategy for better understanding curriculum differentiation in comprehensive high schools and the processes that sustain it, and it describes the schools and students we studied. Section III presents the results of our year of field work in the three high schools and the questions that work raised for our subsequent analysis of students' transcripts. Section IV includes results from our transcript analyses that help explain vocational coursetaking at the schools. We describe the extent and nature of student participation in vocational education programs, i.e., which students take how much of various types of vocational education. We also present analyses of the probability of vocational participation for students with different demographic and achievement characteristics. Section V focuses on what the transcripts revealed about students' academic coursetaking and track placements, including the relationship between their placement in "signal" English and math courses and their participation in vocational courses. Section VI brings together the results of our first and second years' work. It places the results of the transcript analyses in the context of the findings from our field work. We present this synthesis in the form of a framework for better understanding high school curriculum decisions and their consequences. We conclude with a discussion of the consequences of what we found for reforms that attempt to upgrade the quality and status of vocational education.

II. A CLOSE LOOK AT SCHOOLS AND STUDENTS: OUR RESEARCH STRATEGY

The complex and consequential process whereby matches are made between students and the diverse array of academic and vocational courses is little understood. To help sort out this matchmaking process, we looked closely at three comprehensive high schools and the students who attended them. We were particularly interested in assessing the importance of three possible factors: first, educators' judgments about students' abilities, their postsecondary destinations, and their educational needs--especially as these relate to race, gender, and social class; second, students' and parents' preferences; and third, limits and opportunities in different schools that stem from conditions outside of schools (changing demographics, state policies, and resources) and from schools' own traditions and structures. Our overarching goal was to understand the *culture* surrounding the differentiated curriculum--the dynamics that keep it in place and are likely to erect obstacles to blurring the boundaries between academic and vocational curriculum and students.

In the first year of our case studies, we spent a great deal of time doing field work in three very different schools--observing, studying school documents, and talking with educators and students. Administrators and teachers told us how they made decisions about what academic and vocational courses to offer and how to place students in various courses.[3] During the second year, we analyzed transcripts from students in the 1988 senior class at the three schools. The transcripts gave us rich information about the consequences of the curriculum decision processes at three schools and about which courses students actually took. As such, they allowed us to examine how the placement and coursetaking experience differed for students from different racial, ethnic, and socioeconomic groups, for boys and girls, for native-born as well as foreign-born students, and for those who appeared to be college-bound and those who did not. These data also permitted us to examine the role of vocational education in the high school careers of various student groups and to probe differences between the high school curriculum experiences and post-high school plans of students who took a relatively large number of vocational education courses and those who took little or no vocational education.

THE SCHOOLS

We selected three four-year senior high schools located in adjacent communities within a major West Coast urban center.[4] The schools differ in two important ways. First, they are part of three local school districts, each with its own interpretations of state policies and its own curriculum policies. The schools also differ in the student populations they serve. Coolidge serves a racially and socioeconomically diverse group of students who live in an integrated neighborhood. The student body at Washington is almost entirely middle-to upper-middle-class white and Asian. Students at McKinley are nearly all African American and Latino, a substantial proportion of whom are poor. These differences were of particular interest, since we wanted to explore how they might relate to differences in curriculum and placement decisions at high schools. Taken together, the similarities and differences among the schools permitted us to raise some preliminary hypotheses about how schools juggle academic and vocational programs in comprehensive high schools of various types. They also permitted us to explore how schools respond to the pressures from state and district policymakers, the needs of the surrounding labor market, and administrators' and teachers' own beliefs about what educational experiences different students need in high school.

The schools' geographic proximity held constant several factors that might otherwise confuse our understanding of similarities and differences in their decisionmaking processes. Because the schools are in the same labor market area, we could be more certain that, although the programs offered might reflect more or less sensitivity to the types of jobs likely to be available to students, they would not be geared to preparing students for communities with very different needs. The schools' proximity also held constant the type of postsecondary education and training opportunities available to graduates and dropouts. Finally, they were subject to the same state resource and curriculum policies--e.g., high school graduation and state college and university requirements; regulations governing the use of Perkins money for vocational programs; and other state-controlled vocational programs. For example, all three schools have similar access to state-supported regional occupational training programs. These programs provide courses both on high school campuses and in off-campus centers--courses that differ in several important respects from the "regular" school vocational offerings. Their programs are subject to state approval, their staff is more closely connected with work settings (many are part-time employees), and the state provides these programs with extra funding to purchase up-to-date equipment and materials. We expected that the additional resources available through the regional programs would have a similar effect on the quantity and type of vocational courses each of the schools offered as part of their comprehensive program.

FIELD WORK

We collected and analyzed each school's student handbook, course descriptions, and master schedule to obtain the "public" information about course offerings and enrollment processes. These gave us a comprehensive and "objective" picture of the curriculum opportunities available at the three schools and the official procedures through which students obtain them.

We relied on interviews to reveal the subtler, more "subjective" side of the story about how schools make curriculum and placement decisions. We conducted our interviews during the 1988-1989 school year, beginning with district-level administrators, then site administrators, counselors, and teachers. At each school we interviewed the district curriculum director, the district vocational education coordinator, the school principal, and assistant principals or deans responsible for overseeing curriculum or counseling. We interviewed all of the counselors and approximately 15 teachers at each school.

We designed our interview protocols for each respondent group as we proceeded to incorporate knowledge gained in the preceeding tier of interviews. Nevertheless, in each interview, we queried respondents about the influence on school decisions of several factors external to the school, including funding levels and policies at the state and local levels and demographic and socioeconomic characteristics of student populations. We also asked about the effects of internal school factors, including the philosophy of the site administration, the capacity and teaching preferences of the staff, and the logistics of building a schedule. We framed questions that might reveal educators' perceptions of the "appropriate" curricula for various students (e.g., those with particular race, class, gender, and prior achievement characteristics), guidance counseling practices, grades, and test scores. We also asked about students' and parents' influences on the nature of the schools' programs and on the assignment of students to various programs.

At two of the three schools we also interviewed students drawn from both vocational classes and academic classes in various tracks. We asked them about how various factors influenced their decisions to enroll in particular courses--their own current interests, their postsecondary aspirations, the guidance counseling provided by the school, parent involvement, and their perceptions of the purpose and quality of various curriculum offerings, particularly vocational education.

To ensure the validity of interview data, we used standard triangulation procedures. We collected data about each topic of interest from a variety of data sources (school records, interviews, and observations). Additionally, several data collectors conducted interviews and observations at each site.

We also used triangulation strategies as we analyzed the case study data. At least two members of the study team coded data from interviews and site visits and sorted these data into categories or themes central to the study. We also used teams of researchers to code the school record data to generate baseline quantitative descriptions of the curriculum at each of the schools and policies regarding student placement.

COMPARISON SCHOOLS

To place our findings about the curriculum at the case study schools in a broader context, we also collected data about the curriculum at three larger groups of schools. Each of these three "comparison groups" was similar to one of our study schools, that is, each enrolled student bodies comparable in parent education, English-speaking facility, mobility, and concentration of students from families receiving assistance under the Aid to Families with Dependent Children Program. The schools were located in counties that included large urban areas within the same state as our study schools. Additionally, all but one of these comparison schools were four-year comprehensive high schools. In total, we asked 82 schools to send copies of their master schedule for the 1988-1989 school year and their current course description booklet. Sixty-eight schools responded--22 that could be compared with Coolidge; 22 with McKinley; and 24 with Washington. From the materials these schools sent, we gained a better idea of how typical our three case study schools were in their graduation requirements, the types of vocational and academic courses offered, and the number of class sections of various courses that were actually scheduled. We were also able to use state data to compare achievement outcomes and some coursetaking patterns at our schools with the others in their group.

TRANSCRIPT ANALYSES

To understand students' coursetaking and vocational education experience at the three high schools, we collected background and transcript data for all students who were seniors any time during the 1987-1988 school year.[5] This sample included both graduates and nongraduates. Data were collected from the transcript of each student in the senior class, from other materials in the student's cumulative file, and in some cases from information provided by counselors and school or district administrative records.[6]

Background Data

We noted each student's gender, race or ethnicity, and date of birth. At Washington we were also able to record students' country of birth. As with most other school-based studies, we were unable to find a reliable measure of students' socioeconomic status (SES).[7] At Coolidge, the guidance counselors agreed to estimate the household income of the 1988 seniors who had been assigned to them. Using this information, SES was rated as "low" (family income less than $12,000), "middle" ($12,000-$50,000), or "high" (more than $50,000). Counselors at the other two schools felt that they did not know their students well enough to make an accurate assessment. However, state data, along with what we learned during our interviews and observations, make clear that, on average, students at McKinley were from lower-income families than those at the other two schools, and that Washington's students were the most affluent.

Achievement Measures

At Coolidge and Washington we had access to each student's eighth grade reading and math standardized achievement test scores (e.g., the Comprehensive Test of Basic Skills); at all three schools we located students' 10th grade reading and math scores.[8]

We also recorded each student's graduation status, final GPA, class rank, total course credits, and, at two of the schools, whether the student completed the state university's requirements for admission. For those students who took the SAT or ACT college admissions tests, we recorded scores on both the verbal and math subtests. At all three schools, we noted whether a student requested that his or her transcript be sent to two-year or four-year colleges and universities or to technical trade schools as part of the process of applying for entrance to that institution.[9] These end-of-high-school outcomes gave us an opportunity to understand the extent to which the schools altered overall achievement levels or the relative standing of various groups of students during their high school years.

Coursetaking Information

Finally, we collected data from the transcripts about the courses students had taken each semester (including summer school) for all four high school years. All mathematics, English, and vocational courses were recorded for all students. For students identified as vocational concentrators, all other subjects were noted as well.[10] We developed a course coding scheme based on the master schedule for each school that was consistent across schools but also allowed for the variation in each school's course offerings. In addition, the codes preserved considerable detail about the array of vocational course offerings. For each course, we noted the general subject area, specific course title, the ability level or track of students for which it was intended, and the number of credits and the grade the student received. The ability or track codes distinguished among ESL, low or remedial, regular, college-preparatory, or honors courses. In addition, since Coolidge and Washington offered courses that combined students from different levels, we developed codes to identify various combinations. For example, some courses grouped low students with regular non-college-prep students, and others combined regular non-college-prep students with college-prep students. The course location codes identified courses taken at another U.S. or foreign high school, at an adult or continuation school, at a junior college or university, or at the off-campus regional center (RC).

Composition of the Sample

These data enabled analyses of the curriculum experiences of the student cohort enrolled at the schools sometime during their senior year. Students who were present from their freshman to senior years are included, as well as those who transferred into the school between their freshman and senior years and remained there. This sample does not include students who were in the graduating class of 1987-1988 but who transferred to another school or dropped out before the start of their senior year.[11] The sample sizes for the senior class at three schools are shown in Table 2.1.[12]

It is important to note that our data permitted us to analyze subgroups of students within the senior class sample. For example, we can examine the coursetaking patterns for the cohorts of students who were enrolled continuously at their respective schools from 11th to 12th grades, 10th to 12th grades, or 9th to 12th grades.[13] We decided to focus our analysis of student coursetaking behavior on the cohort of students enrolled in the 10th through 12th grades at their respective schools.[14] The continuity of experience for this student cohort makes them most relevant to our analysis of who gets what and why at particular schools. These are the students likely to have been most affected by the decisionmaking processes operating at the school.

DIFFERENCES AMONG THE STUDENTS AT THE THREE SCHOOLS

As noted above, the student bodies at Coolidge, Washington, and McKinley High Schools differed in their racial and ethnic makeup, the number of foreign-born, their achievement levels, and their post-high school plans.

Table 2.1
Sample Sizes for Selected Cohorts, by School

	Washington		Coolidge		McKinley	
Grade	No.	% of Senior Class	No.	% of Senior Class	No.	% of Senior Class
12th	458	100.0	446	100.0	436	100.0
11th-12th	432	94.3	423	94.8	411	94.3
10th-12th	398	86.9	380	85.2	350	80.3
9th-12th	368	80.3	323	72.4	285	65.4

NOTE: We defined the 12th grade year as the 1987-88 academic year; 11th grade as 1986-87; 10th grade as 1985-86; and 9th grade as the 1984-85 academic year.

Student Demographic Characteristics

Table 2.2 displays the demographic characteristics of students at our three schools.[15] As noted above, Coolidge's senior class is the most ethnically diverse in contrast to Washington's largely white and Asian student body, and to McKinley's student population, which is overwhelmingly African American with a significant Latino cohort. More striking, however, is the fact that a large number of students at Washington and McKinley were born outside the United States. Eighty-six percent of the Asian students and 42 percent of the Latino students at the two schools are immigrants.[16] This pattern reflects national trends, particularly for high schools in metropolitan areas.

Table 2.2
Student Characteristics, by School and Grade

	Washington		Coolidge		McKinley	
	12	10-12	12	10-12	12	10-12
Number of students	458	398	446	380	436	350
Sex (%)						
Male	44.5	45.2	47.7	46.6	47.0	48.0
Female	55.5	54.8	52.3	53.4	53.0	52.0
Race/ethnicity (%)						
White	63.8	66.1	46.2	47.6	0.2	0.0
Black	0.4	0.3	12.8	10.8	72.9	72.3
Asian	29.7	28.1	12.6	13.2	1.6	0.9
Latino	5.7	5.0	27.1	27.6	22.5	24.0
Other/missing	0.4	0.5	1.3	0.8	2.8	2.9
Country of birth (%)[a]						
USA	71.0	73.1	--	--	68.8	70.6
Japan, Southeast Asia	24.2	22.9	--	--	1.8	1.4
Mexico, South/Central America	0.7	0.5	--	--	15.6	17.4
Europe, Africa, Middle East	3.9	3.3	--	--	2.7	2.0
Other/missing	0.2	0.2			11.1	8.6
SES (%)[b]						
Low	--	--	13.2	13.4	--	--
Middle	--	--	60.8	61.1	--	--
High	--	--	14.4	15.5	--	--
Missing	--	--	12.6	10.0	--	--

[a]Data on country of birth were not available for Coolidge High students.
[b]SES data were available for Coolidge High students only. Data were derived from retrospective assessment of each student's family income by that student's former guidance counselor.

Our data about the socioeconomic status of Coolidge students suggest that more than half (60 percent) come from middle-class families, significant percentages belong to poor (13 percent) and wealthy (14 percent) families. It is interesting to note that a large and roughly comparable percentage of Coolidge students from all racial and ethnic groups are in the middle SES group. The remaining Asian students are disproportionately low SES, and whites are disproportionately high SES. African American and Latino students not in the middle group are nearly equally divided between high and low SES.[17]

Student Achievement

On every measure for which we have data across the three schools, McKinley students rank the lowest: on 10th grade achievement test scores in both math and reading, SAT math and verbal scores, total number of credits taken, cumulative grade point average, and graduation rate (see Table 2.3).

Table 2.3
Student Achievement Measures, by School
(Sample: 10th-12th grade cohort)

Measure	Washington		Coolidge		McKinley	
Mean percentile scores						
Math, grade 8*[a]	70.9	(271)	68.4	(274)	--	
Math, grade 10**	72.2	(363)	62.0	(322)	44.8	(322)
Reading, grade 8*[a]	66.9	(269)	61.3	(276)	--	
Reading, grade 10**	60.8	(370)	54.9	(324)	40.2	(325)
SAT mean score, math**	545.3	(208)	470.6	(186)	352.8	(117)
SAT mean score, verbal**	429.8	(208)	422.5	(186)	328.1	(117)
Percentage who met state university requirements[a]	47.3		34.1		--	
Mean total credits[b]	244.1		233.1		229.4	
Mean GPA	2.8		2.5		2.3	
Percentage of 12th graders who graduated	92.5		92.9		86.6	

Sample size	398	380	350

NOTE: When sample sizes are smaller than the full sample because of missing data, the sample sizes are shown in parentheses.
*Differences among schools are significant at the .05 level.
**Differences among schools are significant at the .01 level.
[a] We were unable to obtain 8th grade achievement test scores or information on the number of students who met the state university course requirements for McKinley students.
[b] The total credits required for graduation at each school differed. Coolidge required 220 credits, Washington 220, and McKinley 230. The mean total number of credits for Washington students is lower than that required for graduation because (as at all three schools), although our sample includes 1988 seniors who did not graduate, as well as those who did, the graduation rate for McKinley students is lower than that for Coolidge or Washington.

Washington students score higher than students at Coolidge and McKinley on six of our ten measures. More Washington than Coolidge students met the state university course requirements, Washington students earned a slightly higher mean GPA, and they took more total credits during their four years. Moreover, the scores of Washington students on the 8th and 10th grade math achievement test and on the math portion of the SAT exam are significantly higher than those of Coolidge students. Only on their scores for the reading achievement scores (8th and 10th grade) and the verbal portion of the SAT did Washington students in our sample score lower than did Coolidge students but, nonetheless, still higher than students at McKinley.[18]

At Coolidge and Washington, Asian students score highest in math and somewhat lower than whites in reading and verbal competencies.[19] A significantly higher percentage of Asian students at both schools completed the state university entrance requirements than did students from any other ethnic group. Latino students at Coolidge and McKinley scored at the bottom on nearly every measure of achievement.[20] Foreign-born students at Washington, most of whom were Asian, performed significantly better than other (mostly white) students in math, and many more of them completed the university entrance requirements. Their reading scores, however, were lower than those of native-born students. At McKinley, this pattern did not hold; the scores of foreign-born students, who are mostly Latino, tended to be comparable to or lower than those of the native-born, largely African American, cohort.

Table 2.4 suggests that the achievement differences among the "best" students at each of the schools--those in the top 10 percent of the class, as defined by both GPA and class rank--follow patterns similar to those found among the schools as a whole. McKinley's "best" seniors scored lower than the comparable group of students at Coolidge or Washington on reading and math achievement tests and on both the verbal and math portions of the SAT. Moreover, the mean scores of McKinley's most academically talented students were also lower than the mean scores for all students at Coolidge and Washington on the reading and math portions of the SAT, and lower than the mean score of all Washington students on the 10th grade math achievement test. At the same time, the extremely high math scores and middling English scores that we observed among all Washington students relative to their Coolidge counterparts remain when we compare the top 10 percent cohort at each school.[21]

Despite these striking differences among the schools and subgroups within them, we observe an interesting similarity among them. None of the schools appeared to have increased their relative achievement rankings (in terms of national norms) over time. At Coolidge and Washington, in fact, we find some slippage in national percentile rankings between students' 8th and 10th grade test scores. At Washington this slippage appears in reading and at Coolidge in both reading and mathematics (see Table 2.3). The relative stability of percentile rankings for the top 10 percent at each school suggests that the slippage occurred primarily among middle and low-achieving students--suggesting that the schools were less successful with these groups than with their highest-achieving students.

Table 2.4
Student Achievement Scores: Top 10 Percent of 1988 Seniors, by School
(Sample: 10th-12th grade cohort)

	Washington		Coolidge		McKinley	
Math, grade 8[a]	96.5	(23)	90.8	(34)	--	--
Math, grade 10	97.1	(43)	89.1	(39)	70.1	(31)
Reading, grade 8[a]	77.1	(23)	82.7	(35)	--	--
Reading, grade 10	73.8	(43)	81.0	(39)	62.8	(31)
SAT mean score, math	653.6	(44)	581.3	(40)	412.4	(25)
SAT mean score, verbal	502.7	(44)	512.5	(40)	370.4	(25)
Sample size	45		43		34	

NOTE: Top 10 percent defined by both GPA and class rank. When sample sizes are smaller than the full sample because of missing data, the sample shown in parentheses.

[a] We were unable to obtain the 8th grade scores for McKinley students.

Additionally, within all three schools, comparing the numbers of SAT takers from various racial and ethnic groups and their SAT scores with 10th grade achievement scores suggests that none of the schools were particularly effective in increasing the academic performance of their Latino and African American students.

Post-High School Outcomes

The plans of 1988 seniors at each school are consistent with the differences in student achievement we observed (see Table 2.5). Again, McKinley students appeared least likely to apply to two- or four-year colleges, Coolidge students are more likely to apply to two- than four-year colleges, and Washington students are most likely to apply to four-year colleges.[22]

Few students from the 1988 senior class at any of our schools (between 1 and 3 percent) appeared interested in formal postsecondary technical education.

Table 2.5
Where Students Apply to Post-Secondary School, by School

(Sample: 10th-12th grade cohort)

	Washington	Coolidge	McKinley
Two-year college	14.7	40.8	6.1
Four-year college	72.6	37.1	29.0
Two- or four-year college	75.8	69.0	33.9
Technical school	2.8	1.3	3.1

WHAT THE COMBINED STUDIES CAN REVEAL

Taken together, the data from our interviews, observations, examination of school documents, and transcript analyses permit us to examine commonalities across the three schools and differences among them in the culture that supports a differentiated academic and vocation curriculum--i.e., the dynamics underlying schools' decisions about curriculum and student placement and the patterns of student coursetaking that follow.

Even so, there are important limitations to what our case study research can provide. Our field work focused on decisionmaking processes in general, rather than on decisions about specific students that could be linked to their coursetaking. The transcripts give few clues about how or why a student enrolls in courses and particular levels of courses. Moreover, transcripts report only final semester course placements; they do not indicate whether a student might have initially enrolled in other courses and subsequently requested a transfer or was transferred into the courses or sections recorded. As a result, it is difficult to verify whether the schools or the students make curriculum decisions, to make judgments about the degree of coursetaking "coherence" at our three schools, or to understand how well schools are able to carry out their plans to have students take the courses they "need." Finally, although we believe that our schools are similar to many others, it is impossible to generalize our findings to a larger population of high schools.

Nevertheless, as we detail in the sections that follow, the combination of intensive field work and transcript analyses allowed us to examine, close up, the dynamics of curriculum differentiation in contemporary high schools and its effect on students' academic and vocational placements.

III. CURRICULUM OFFERINGS AND STUDENT ASSIGNMENTS: FINDINGS FROM OUR FIELD WORK

In this section we describe what we learned during our year of fieldwork about the curriculum and the dynamics of student assignment at the three schools. Most striking in what follows is how similar our schools were in their curriculum priorities and in the factors that influence the various paths students take through the curriculum--in their *cultures* of curriculum differentiation. Within the overall pattern of sameness, however, we see important differences--differences that relate to characteristics of the students that each school serves.

CURRICULAR SIMILARITIES

Given the many differences among Coolidge, Washington, and McKinley High Schools and their students, we were struck by a number of curriculum similarities among them. All three schools had a strong commitment to the comprehensive high school that pressed them to offer a wide array of academic courses ranging in difficulty level from remedial to advanced placement. Each school offered vocational programs that ranged from those allowing students to earn credit for work experience or school service programs to highly technical and occupationally specific training. Although not comprehensive, vocational programs at each school included both general/nonoccupational subjects (e.g., cooking, parenting, typing) and job-specific training (e.g., auto shop). Students at all three schools also had access to a wide variety of courses as part of a state regional occupational program.

At all three schools, however, the "squeeze on elective programs" resulting from increased graduation and university admission requirements had reduced the number of vocational offerings. Their vocational programs were less comprehensive than in the past and constituted a relatively small percentage of the total curriculum. None has or purports to have a cohesive, comprehensive vocational "program." Rather, except for business-oriented classes and the occupation-specific programs offered by the regional centers, vocational education was a loose configuration of classes offering the most general, often introductory skills. Many courses suffered from equipment shortages or used "antiquated" equipment. At Coolidge, one administrator told us that the shops' equipment and technology were basically unchanged since being built in the 1950s. And, at all three schools we encountered similarly negative perceptions of the role and quality of the vocational curriculum, of the faculty who taught those courses, and of the students who took them. Despite these similarities, however, the curriculum at the three schools differed in ways that followed national trends. The more "advantaged" the school in terms of its student population, the more advantaged was its curriculum.

The schools were also similar in that each had a well-articulated set of policies and procedures for determining the best match between its students and the courses it offered. However, at each school, more subtle, informal processes also worked to affect students' assignments to various classes. As we describe below, both the formal and informal processes seemed to limit the curriculum opportunities of the least advantaged students in the schools.

PREDICTABLE CURRICULUM DIFFERENCES

Consistent with national data, the curriculum at affluent Washington High was the richest of our three high schools in both the academic and vocational domains. Although Washington offered somewhat fewer academic classes overall, it offered more advanced-level and honors courses than did either Coolidge or McKinley and fewer low-level academic courses. The lower percentage of academic courses in the total school curriculum (46 percent compared to 58 percent at the other two schools) also reflected the school's effort to provide all students with a comprehensive program by requiring two courses in "practical arts" for graduation. Practical arts courses were defined as either general or occupationally specific vocational education courses or computer science. In addition to their on-campus offerings, access to a well-developed regional vocational center enhanced Washington students' vocational education opportunities far beyond what could be supported by the school alone.

In rather striking contrast to Washington, the curriculum offerings were the least well developed at McKinley, our low-income, high-minority high school. McKinley's 65 scheduled vocational classes contrasted sharply with Coolidge's 28 and Washington's 36. Yet, despite the greater number of classes offered, McKinley's program was far less developed or articulated than Washington's. McKinley's seven two-year course sequences compared unfavorably with Washington's seven two-year sequences and four longer ones. Moreover, although McKinley was connected to the same regional vocational school as Washington, two school policies constrained students from attending. First, of all three of our schools, McKinley required the greatest number of academic courses for graduation. These requirements made freeing up the three-hour blocks required by the regional center a near impossibility for students. Second, a generally chaotic atmosphere on campus prompted administrators to discourage students from leaving for any reason--even to attend the regional center. In spite of these constraints, the greatest overall vocational coursetaking took place at McKinley.

Opportunities at Coolidge, our school with a mixed population, fell somewhere in between the other two. Although the school listed a diverse array of vocational courses, its stringent academic graduation requirements prevented many of these courses, especially the advanced sections, from being offered. The offerings in the regional occupational program to which Coolidge is attached were somewhat more limited than at the center serving the other two schools, but counselors reported that a slightly larger percentage of students at Coolidge took advantage of these opportunities.

In general, our study schools are quite like their "comparison" schools--schools serving similar student bodies--in the total number of credits they require for graduation, in their core academic requirements, in the percentage of academic courses meeting college entrance requirements, and in the proportion of the academic curriculum devoted to honors and advanced placement courses.[23] In none of our study schools were vocational courses permitted to substitute for academic classes in meeting graduation requirements. Both Coolidge and Washington followed the pattern of the majority of schools in their comparison groups. McKinley, on the other hand, was unlike many other high-minority, high-poverty schools in that it did not allow students to take vocational courses in place of academic requirements (only 9 of the 22 schools prohibited substitutions). Both McKinley and the other two schools, however, offered similar types and numbers of vocational classes on campus as did those schools with whom they were compared.

The larger groups of schools also reflected the same differences in their vocational programs that we found among our three case study schools. The group of schools at the low end of the socioeconomic spectrum was generally more likely to enroll their students into large numbers of beginning-level vocational courses and general academic courses than were other schools. In contrast, the more affluent groups of schools tended to offer students a richer mix--more rigorous academic courses and richer, better developed vocational course sequences. Consequently, we believe that the curriculum at our case study schools is quite representative of schools with similar student bodies, and that the differences among these school types are fairly typical.

Not only did we examine these quantifiable characteristics of the curriculum at our case study and comparison schools, we also examined staff expectations for the students and their perceptions of the range and quality of their curriculum. Additionally, we considered other features of the schools likely to affect both the range of course offerings and staff perceptions of curriculum quality: organization and style of management, the morale of faculty and staff, and local traditions or history. These more subtle features also suggested that the greatest curriculum advantages were available to students in the most advantaged schools.[24]

THE DYNAMICS OF STUDENT ASSIGNMENTS

All three schools had well-defined, formal placement policies that relied on judgments about students' abilities and decisions about their educational needs. A mix of students' coursetaking history, grades, test scores, and students' own course preferences served to determine the best curriculum path for each student. In the attempt to involve students and their families in the decisionmaking process, counselors at each school articulated alternatives to feeder junior high schools and to individual families. Additionally, at the end of each year we had students indicate their course preferences for the following September. Usually this involved meeting with students in their classroom and asking them to fill out forms indicating their choices.

Despite these formal procedures, counselors at all three schools expressed considerable discomfort with the placement process. The large number of students assigned to each counselor, the activism of parents of college-bound students, and the severe personal and academic problems that many students face combined to erode the time counselors had to spend ensuring fair and appropriate assignments for all of their students. Consequently, the guidance and placement structure at each school seemed to serve *least well* untroubled students who were not college-bound. Additionally, at each school administrators, counselors, and teachers told us (with considerable regret) that the counseling and placement processes seemed to result in race and social-class differences in the composition of various classes and programs. Below, we examine the dynamics at the three schools that contributed to these patterns.

Perceptions That Ability Is Fixed

We were struck by the pervasiveness of the belief that by the time students reach senior high school (and probably long before), their abilities and aspirations are fixed. We found little evidence that educators at any of the three schools thought that the courses students took could or should attempt to increase students' abilities or raise their expectations.

Coolidge's faculty and administrators' comments about the expectations of and for the students, their sense of student needs, and their perception of the role of schools in meeting those needs clearly illustrate this core belief. The principal, for example, told us that kindergarten teachers can accurately identify those children who will be "at-risk" in high school, conveying his own sense that the high school is largely powerless to interrupt predictable patterns. His views were almost universally held among faculty. One Coolidge counselor reported that high school teachers generally believe that once a student gets to high school, he or she is either intrinsically motivated or not, and this level of motivation cannot be changed.

To test the extent of this assumption, we asked respondents at all of our schools to give us an example of a student "who comes to this school with low-level skills and makes fairly dramatic improvements--for example, moves from general to college-prep classes." Of 20 Coolidge teachers interviewed, only six could recall such a student. A teacher with a long tenure at the school recalled one student "probably 25 years ago." Another said this sort of improvement "is rare, . . . real problem kids are neglected here, . . . hidden in slow classes. The good kids are taken care of." One teacher said students could move if they were placed in the "wrong level, . . . not the true level of the student," indicating that she believed students have relatively immutable ability levels, and that mobility between classes at different levels results from selection errors, not student change. Sharing this belief, another teacher predicted that his average students, although they might be successful once they left high school, would never move to the college track, and that they would raise kids just like them--that is, kids who also disliked school.

Comments at the other two high schools further demonstrated the pervasiveness of this view. At McKinley, only two of the twelve teachers interviewed supplied specific instances of students who made dramatic improvements, although a few teachers identified classes or groups that had made exceptional progress in specific courses. Teachers' perceptions of the likelihood of a student actually making such an improvement ranged from "slim to impossible" to "rare" to "possible." Several teachers commented that help was available, but that it was up to the individual student to take advantage of it. One teacher attributed his pessimism to this very reliance on student initiative, saying, "the commitment to individuals is not here. A student who is failing has to get involved with the school's program before the school will invest in the student."

Seven of the 18 Washington teachers cited examples of individuals who had improved. Here, though, teachers' estimates of the likelihood of student improvement varied more. A number pointed to the quality of Washington's program and to the supportive, "nurturing" nature of many teachers as factors that increased students' opportunities for improvement; but many of them also emphasized that students must want to achieve and must put forth effort before improvement was possible. Many who gave examples attributed improvement to the students' development of a (serendipitous) interest in a particular subject, to maturity, or to exceptional effort resulting from a strong desire to attend college. A number of teachers held little hope for improvement, either because students lacked essential basic skills or because the students held negative attitudes that "were difficult to break through." As one teacher put it, "[of those] kids who learn to fail early . . . the majority never pick themselves up." These comments suggest a corollary to this proposition: To the extent that schools recognize the potential for improvement in a high school student, the responsibility for improvement is on the student.

Tailoring the Curriculum to the Student Body

It is not surprising, given this perception of stability in students' intellectual capacity, that the schools saw their job as developing curriculum offerings that *accommodate* their students' abilities and needs. This accommodation seems to happen in two ways. First, within the constraints of state policy requirements, educators try to offer courses in academic and vocational subjects that match their view of the student body's needs as a whole. The overall differences in the three schools' curriculum offerings that we noted above stem, in part, from the effort by the schools to offer what they perceived their student bodies to need.

Second, providing different "tracks" or "ability levels" of classes in academic subjects was seen by the schools as the most appropriate way to accommodate students' various capacities and needs. Because the prevailing view was that high school students' abilities are virtually intractable, lower-level classes were not talked about as providing opportunities for students to "catch up" with their higher-achieving peers. To the contrary, these classes were considered places where students with less ability would have a chance to succeed because the material was at their "level."

On the vocational side of the curriculum, counselors and vocational educators told us that college-prep students were most likely to take general skills courses such as typing, or business courses such as accounting. However, widespread negative perceptions about vocational education, combined with the absence of an aggressive counseling system for non-college-bound students, acted synergistically to drain the little remaining vitality and cohesion from other vocational offerings and to cluster those students in the lowest positions on the academic side of the schools' curriculum in more mechanically oriented vocational courses. For example, a surprising number of administrators, counselors, and teachers confessed that they sometimes considered their on-campus courses like auto and wood shop to be "dumping grounds" (a term heard frequently during our study) for low-level students, especially those with behavior problems. As a result, some classes were overloaded with problem students, which stigmatized the course and, in turn, lowered its ability to attract higher-level students. The generally low enrollments in vocational education compounded these problems because vocational teachers felt pressure to accept any student assigned, whereas other teachers were more likely to fail students or refuse them admission to their classes.

These patterns of vocational enrollments seem to bring about more tracking than originally intended. Numerous respondents identified groups of students who proceeded through the day together, although most agreed that such grouping was not intentional and that few, if any, students were identifiable as "voc ed students," in the sense that they were pursuing a coherent sequence of vocational courses.

Judgments of Merit and Motivation Drive Track Placements

The educators we talked with almost uniformly attributed student assignments to students' own choices, motivation, and prior school performance. At each school, students were asked to indicate their preference for academic, vocational, and other elective courses. This choice-making process was most elaborate as students made the transition from junior to senior high school. Parents were often involved through evening meetings at the feeder junior highs, wherein the high school counselors would explain the various options in the curriculum and the prerequisites for various classes. Students' choices were added to a store of information about them that, as a whole, determined where they would be placed. However, as the counselors discussed the placement process with us, students' choices played little role in their final placements. As described below, when courses had established academic prerequisites, a combination of test scores, grades in prior courses, and teachers' recommendations were used to determine whether a student had met them. In courses without academic prerequisites, students' choices were honored.

Counselors at Coolidge routinely placed incoming students in their academic classes on the basis of the student's eighth grade Comprehensive Test of Basic Skills (CTBS) scores, grades, and their prior teachers' recommendations. Middle-school teachers recommended fast-, medium-, or slow-track placement in English, social studies, and science, and recommended placement in a specific math course. When a disparity existed between other criteria and the teacher's recommendation, the teacher's recommendation prevailed.

Placement procedures at Washington and McKinley followed similar processes. Counselors at Washington considered the same information as those at Coolidge. Test results and grades affected Washington placements directly for some courses: In eighth grade and all subsequent grades, students failing a portion of the district proficiency exam were placed in remedial lab classes, and students passing an admissions test were placed in honors classes. (However, the honors test is waived for students earning an A in the previous honors course, and sometimes for students whose parents specifically request honors placement.) Test performance in one area guided placement in other subjects. For example, students enrolled in the reading lab (on the basis of their English proficiency) were placed in remedial social studies. Similarly, math test performance guided science class placement, a practice that often led to erroneous placement according to the science teachers interviewed.

As at Coolidge, Washington counselors also obtained teachers' recommendations for placements in math and science courses, and for honors, remedial, or ESL placement in English and social studies. Middle-school teachers evaluated students on the quality of their work, study habits, and any special aptitudes (e.g., arts, athletics, leadership). At Washington, test results received more weight than teacher recommendations, but in borderline cases teachers' recommendations were weighted "very highly."

At McKinley, 8th graders met with their counselor to complete their fall schedules. The counselor used achievement test scores and the teacher's course recommendations to guide the student. After the freshman year, course grades formed the primary basis for placement, although teachers could recommend placement in core subjects.

Track Placements Remain Stable

Once placed in a particular track or ability level of a course, students tend to be placed similarly in subsequent years. At Coolidge, more than one respondent told us that track movement, when it occurs, is usually from a higher to a lower track. For instance, Coolidge offers an extended, two-year version of algebra 1 called introductory algebra. The math teachers interviewed estimated that 20 percent of the students moved down to life math or business math after the first year; whereas less than 10 percent went on to the algebra 2 course after completing the two-year introductory algebra series. These teachers also described systematic placement into math courses based on test results and teacher recommendations. When students wished to enroll in higher-level courses than the level indicated, their parents were required to sign a waiver eliminating teacher responsibility and agreeing to the stipulation that an F received in the course would stand. For students wishing to move to a lower-level course, teachers discouraged such moves, but the student made the decision. Teachers in other areas also told us that honors and AP students dropped courses because the courses were "too tough" or students feared lowering their GPA.

The likelihood of any track mobility being in a downward direction was most prevalent at Washington and McKinley, although differences were observed between the three schools. Judging by our interviews with faculty and administrators, Washington appeared to have a less-rigid tracking system than Coolidge, perhaps as a consequence of their more homogeneous student population. A number of teachers provided examples of students making dramatic improvements. English teachers said that most of the remedial students routinely moved into regular courses upon passing the proficiency examination. One counselor described looking for students with high test scores whose grades start dropping and her efforts to intervene to get them out of remedial classes. Nonetheless, movement between tracks was uncommon. One student commented that "the average person just stays in the same level all the way through." Teachers expressed reluctance to move students out of remedial classes or tracks. For example, completion of remedial U.S. history often led to automatic placement in remedial economics. One teacher estimated that only "three or four times during the past seven or eight years" were requests made to transfer students out of his remedial classes. He observed as many instances of honors students requesting downward transfers in half as many years--requests he attributed to students' fear of failure. Likewise, in science downward movement was more frequent than upward movement. Of students completing the biology class, a middle-level science course, approximately 40 percent take a comparable-level physics course, 60 percent move to a lower-level fundamentals of physics course, and one or two students move to honors physics.

McKinley's system of course offerings was less hierarchical than at Coolidge. Even so, ability grouping persisted, even after a "no tracking" policy was enacted during the 1988-1989 school year. In English and social studies, all courses met university admissions requirements, but there was differentiation between AP, honors, regular, and ESL classes. Math and science courses were differentiated into levels by course names. Since these departments had the most stratified programs, cross-track mobility usually affected math or science placement. Again, movement seemed to be rare, and when it occurred, the direction generally was downward rather than upward.

Curriculum sequences and prerequisites limited students' opportunities as well. Although many of the examples of students making dramatic improvement involved foreign students, we learned from a counselor at Coolidge that these students faced difficulties in meeting college admissions requirements because they must complete ESL courses before moving on to courses that qualified for college entrance. A Washington counselor described access to college-prep science courses as highly competitive. Because many students signed up for the courses, and the science teachers were senior faculty with a great deal of influence, the screening process is stiff. Students placed in the general track classes had little opportunity to develop "the discipline of study habits," and therefore were less likely to be placed in the more rigorous course. Lack of prerequisites limits students' access to high-track courses at McKinley as well. For instance, placement in general chemistry, an 11th grade course, is contingent on successful completion of algebra and physical science. However, students taking Math A and Math B did not take algebra until 11th grade and, as we mentioned above, only a small percentage of these students actually went on to algebra.

In addition to barriers erected by course sequences and prerequisites, barriers to students' track mobility may be raised at the district or state level. For example, a math teacher at Washington described a district-mandated modification in course offerings to meet state model curriculum guidelines. One change was the revision of a low-level general math course from a two-year to a one-year course. The teacher noted that the two-year sequence had given a number of students the necessary algebra foundation to move to college-track math, and that she currently had two students in her trigonometry course who had made such a gain. To move into the college-prep track, these students took the two-year course in 9th and 10th grades, geometry in 11th grade, algebra 2 in summer school, and then were enrolled in trigonometry in 12th grade. This teacher was concerned that the new one-year course would not allow adequate time for students to absorb the amount of theory necessary to shift into the higher math tracks.

One teacher at McKinley described an even more troubling policy barrier--one that had recently limited summer school to remedial courses open only to those students who failed classes during the year. This policy, she reported, permitted a small group of students who had failed geometry and retaken it in summer school to become interested in math. However, such a policy precludes the type of improvement the students were able to make at Washington. Thus, this Coolidge teacher lamented the district's failure to reinstitute a comprehensive summer school, in place of the present remedial one, so that students would have more opportunity to move up.

Race, Social Class, and Student Assignments

At each school, perceptions of students' suitability for classes at various track levels were confounded with race, ethnicity, and social class. As a result, at each school racial groups often became identified with particular tracks--a circumstance perpetuated by the stability of students' placements throughout their high school years.

Most striking, Asians, nearly uniformly considered highly capable and motivated, were strongly identified with the high tracks at all three schools. One Coolidge honors class teacher observed, for example, that his current class was almost three-fourths Asian, that over the years he had had fewer and fewer white students, and had not had a Latino student in the class for more than seven years. This association was not unique to Washington. At McKinley, where Asians constituted a very small fraction of the student body, teachers also identified Asians with college-prep and AP academic courses. Latinos, almost always judged as the least well-suited for academic work, were most often associated with low-track academic courses and vocational programs. For example, most teachers at Coolidge reported a disproportionately large number of Latinos in the ESL, remedial, and low-level courses and a disproportionately small number of Latinos in the upper-level courses. White students at Coolidge and Washington seemed to rank somewhat below Asians, and at both Coolidge and McKinley, blacks were typically viewed as more able to handle academic courses than Latinos.

On the vocational side of the curriculum, business courses were seen as attractive to and appropriate for a wide range of students. A number of respondents told us that many white, middle-class, college-prep students took business courses to acquire the general typing and computing skills they would need for college. But, in general (and in concert with the lower academic expectations for low-income, African American, and Latino students), other types of vocational courses, particularly general shop classes and those training for specific occupations such as cosmetology, were thought to be most appropriate for low-income, Latino, and (to some extent) African American students, because these groups were not seen as college-bound. Interestingly, at all-minority McKinley, a number of teachers associated Latino students, rather than African Americans, with vocational education, noting that for this group employment after high school was a major goal.

Many teachers denied any direct link between race/ethnicity and course placement, or, as a McKinley teacher put it, "If there is, it is not deliberate." Such assertions are not entirely unfounded. Latinos, as a group, did score lower on standardized tests than did other groups at the two schools. And Asians, as a group, at both Coolidge and Washington, outscored other groups in mathematics achievement. But, global judgments made about students who belong to these groups went far beyond students' past achievement. At their most extreme, these judgments reflected stereotypical views about differences between racial groups.

Most respondents explained the relationship between students' race and social-class characteristics and their course assignments in terms of group differences in support, motivation, and interest. For example, one Coolidge teacher linked wealth with increased parent involvement, which does affect placement. "Poverty does tend to make a difference because the parents are less involved in the child's education." A Coolidge administrator told us that although wealth was not related to academic placement, having a "two-parent strong family" (a factor affecting student wealth) increased the likelihood of kids being in the tougher academic classes.

Many faculty attributed Asians' placement in higher-level classes to effort. For example, at Washington High School, which has a large and growing cohort of Asian immigrants (Asians constitute almost 30 percent of the student population), one teacher commented: "I love classes with lots of Orientals; there are no discipline problems, they are motivated." Another teacher said that he was the "only Caucasian in the classroom--all the white kids went to the beach," while the Asians attended his summer school classes. One Coolidge teacher noted "[they] work longer and harder . . . they study seven hours a day, six days a week." This teacher, along with a number of others, attributed the Asian students' work ethic to "cultural expectations." A science teacher at Washington made a similar judgment about recent Asian immigrants. He had recently asked that immigrants from Brazil and French-speaking Canada be transferred into lower-level classes because their poor English skills made the material difficult. However, he believed that Asians with limited English-speaking skills should be retained in the class, since they would "network" to keep up with the material. At all three schools, we were told of the extraordinary motivation and abilities of Asian students. Faculty seem to assume that these students will attend four-year colleges and universities.

Latino students suffered the most negative judgments about their culture's impact on school effort and motivation and, as a consequence, on their class placements. Educators at all three schools characterized Latinos as having poor basic skills and low interest in school, and as being culturally disinclined to aspire to postsecondary education. One Coolidge teacher said that Latinos, as a result of the way they were raised, do not want to learn and view school only as something to get away from. Another attributed their low representation in higher-level courses (and minority students' failure to work up to their potential, generally) to their home environment and lack of parental support. Other teachers and administrators mentioned the transiency of the Latino population at Coolidge. One administrator estimated that 20% of the students were highly mobile or frequently absent because of family obligations.

One counselor at all-minority McKinley attributed the disproportionate representation of Latinos in vocational education to the value placed on vocational education by the Latino community. In a similar vein, a teacher at the school blamed students' self-perceptions, noting that minority, particularly Latino, students were "prejudiced within themselves about their expectations for themselves . . . they feel there is an ethnic path chosen for them." As an example, he related the story of a student who thought she should become a secretary, so the counselor accepted this choice and steered her on a secretarial path despite the student's high potential. Another McKinley teacher expressed his frustration with Latino students with college ability who appeared to have their minds set on entering the workforce immediately after high school. However, one McKinley teacher distinguished between two groups of Latinos on campus--one group characterized as large and highly motivated, and a second, smaller group of less-motivated students. A few others identified Latinos with AP courses. Perhaps this mix of perceptions relates to the fact that across the entire student population (large numbers of whom drop out between grades 10 and 12), we found only small differences in tested achievement between African Americans and Latinos who remained in school through the 12th grade.

At Washington, little mention was made of the academic track placements of the few African Americans or Latinos. However, one teacher noted that the African American and Latino students did not fit the gang member stereotype because of their high socioeconomic status and that both groups "did all right." However, another teacher, who was half Latino, commented on Latinos' absence from higher-level courses and their "invisibility" on campus.

A number of respondents at both Washington and Coolidge cited the lack of effort and academic motivation among white students as a primary factor in determining their course placement. One Coolidge administrator, referring to white students, described a "type" of student in low-level courses as the "able but lazy" student. A second Coolidge administrator characterized middle-class white kids as apathetic, "smart, but spoiled . . . never had to apply themselves." A Washington teacher observed that white students' "interests seem to lie more outside of academic achievement than the Asian kids'."

Global judgments about the capacity and educational needs of various racial groups were particularly evident when Coolidge and Washington faculty described how curricular changes follow, or should follow demographic changes in the school population.

As noted above, Coolidge's student body consisted almost entirely of white, upper-, and upper-middle-class students in the 1970s (30 percent immigrant and second-generation Latino, 14 percent African American, 12 percent Asian, and 44 percent Anglo). During these changes faculty have been relatively stable, with many current members having taught at Coolidge throughout this period. Some faculty saw the increase in ethnic diversity as providing, in the words of one teacher, a "marvelous mix," whereas others are less positive. Nearly all, however, perceived a decline in student ability and motivation and thought that curriculum changes had accommodated this decline. One Coolidge teacher told us that there used to be two fast-track classes to every slow one, but now the ratio was reversed. A counselor echoed this perception, stating "What we now consider [to be an] average [class] used to be slow."

These changes at Coolidge have generated much discussion about what constitutes the "appropriate" curriculum or range of curricula--both vocational and academic--for the schools' new group of students. Most faculty and students believe that Coolidge provides a consistently high-quality program for college-bound students. At the same time, there is growing concern that this curriculum no longer serves the needs of many students.[25]

However, the Coolidge staff members were not uniform in their view of the types of curriculum changes needed to respond to the new mix of students. One teacher suggested that outdated policies promoting honors classes needed to change with the times, meaning that more "slow" classes should be made available. Another teacher identified discrepancies between the state's model curriculum and the number of "lower"-level courses offered at Coolidge but felt that it was "difficult to raise standards because of the kids." One counselor said that he was trying to implement a program of more vocationally oriented academic courses. Despite this mix of views about what changes were needed, nearly everyone agreed that changes to date had been slow and unresponsive to students' needs. One district official described Coolidge's resistance to curriculum change as a "valley of inertia."

At Washington, both administrators and teachers attributed an increase in the number of math and science courses offered, especially upper-level courses, to the influx of Asian students. Also, teachers reported that Asian parents did not support student coursetaking in sports, practical arts, or vocational education, and pushed to have their children removed from ESL courses. For example, a group of mostly Asian parents and students opposed the one-year practical arts requirement at Washington; their opposition resulted in a policy change whereby students could receive practical arts credit for completing computer courses offered by the math department. Such changes were clearly a response to demands placed on the school. But it was also clear that these changes were made willingly, in part, *because the parents' wishes coincided with prevailing school assumptions about the abilities and needs of Asian students*.

Despite the predominant view that race and social class affected student assignments only indirectly--through group differences in parent support and student motivations and effort--some faculty felt that the tracking system permitted blatant discrimination. One English teacher showed us a list of students who, according to their previous teacher, were "misplaced" in the fast track. She considered the previous teacher prejudiced, noting that many students on the list were Latino and "50 percent of the kids on this list belong in the fast class, they're doing the work." On the other hand, she had identified a number of white students with "glaring deficiencies" whose names did not appear on the list.

Ambivalence About Tracking

Despite the prevailing view that tracking was necessary to accommodate students' differences and the widespread conviction that assignments were made fairly, many at the schools felt considerable discomfort about how the tracked curriculum and assignment criteria promoted race- and class-related differences in course placements. Others expressed considerable ambivalence about tracking practices generally.

The obvious links between course assignment and students' status characteristics caused ambivalence and discomfort for some. As one Coolidge counselor put it when asked about students from different groups enrolled in different tracks, "I don't like the words coming into my head." One Coolidge teacher, after describing the predominantly white and Asian composition of her honors English class, said "Of course, anyone can take the course, because it is a student decision theoretically . . . [but other minority students are] smart enough to know if they are prepared or not for a class."

However, ambivalence about tracking extended beyond concerns with race and social-class sorting. This became apparent in administrators' and counselors' comments related to tracking reforms, a curriculum issue that was salient at all three schools.

Some discomfort was triggered by the likely political consequences of efforts to eliminate tracking. An administrator for Washington described many in the district as "committed to equity," and agreed with the district's plan to eliminate tracking "slowly, but dogmatically." However, she anticipated teachers' and parents' resistance to initial efforts to eliminate tracking of English classes at the high school level. Her expectation was based on the district's experience at the middle school, which had recently detracked. However, strong parent opposition forced the school to retain separate classes for students identified as "gifted."

Other ambivalence stemmed from their uncertainty about the effects of various grouping schemes on students. A McKinley counselor told us that she personally supported grouping most students by ability but believed that students with low ability benefited from a nongrouped system. One Coolidge teacher said that, although heterogeneous grouping was beneficial, since bright students could help the poorer ones, she could give more assistance to low-functioning students in grouped classes. Also, she feared that she would be forced to teach to the middle if all ability levels existed in the same class. Another teacher described herself as being "philosophically against tracking"; however, she worried that her remedial students who made excellent progress in the lab setting would be lost in a regular class. A McKinley teacher, experiencing his first year teaching heterogeneously grouped classes, reported that the effect on his teaching was "devastating." He said he covered less material and found that the lower-level students were "lost" and the higher-level students were "bored." When asked if there were any positive results from the elimination of tracks, he identified the reduction in elitism on campus generally and improvement in the functioning of the below-average students (but not the exceptionally low student).

State Policies Emphasizing Academics Influence Assignments

As noted above, all three schools offered a similarly full range of academic and vocational courses. The similarity in the overall percentage of academic courses offered seems to have had two sources: the state's emphasis on academics and college preparation and the schools' interest in maintaining a comprehensive program. At each school, administrators and counselors took pride in the school's ability to offer both a strong college-preparatory program and an array of other courses, arguing that this arrangement allowed all of its students to follow a path best suited to their abilities and aspirations.

However, some of our respondents felt that these mission-related pressures on the curriculum inhibited their attempts to make the best matches between students and courses. For example, one Coolidge counselor stated his support for the state superintendent's emphasis on every students' right of access to a college-prep curriculum, but countered this support by saying, "not every kid can handle it . . . every kid has [a] right to [the] courses they should be in." One McKinley math teacher lamented the school's insistence on offering calculus given the limited number of qualified students. Even at affluent Washington, one teacher criticized the effects of the state's curriculum emphasis as "unrealistic," since not every kid is college-prep, and not all kids can use higher-level thinking skills.

Despite individual misgivings, state policies affected not only the structure of offerings, they affected students' placements. At both McKinley and Coolidge, respondents indicated that the curriculum structure pressed students who otherwise might be in low-level classes to enroll in college-preparatory courses--a phenomenon that some felt provided minority students with greater access to academic classes. At all-minority McKinley, for example, the principal, assistant principal, and college counselor consistently emphasized the school's enactment of the state's interest in college as the desired postsecondary goal for students. This focus influenced the school's graduation requirements, course offerings, and the grouping system. As noted above, the school had instituted a "no tracking" policy, and the college counselor (herself an African American) had worked energetically to have all of McKinley's academic courses meet university entrance requirements. She expressed enormous pride that her actions ensured minority student participation in high-track classes.[26]

College-prep courses constituted the vast majority of the academic courses at Coolidge as well, attributable, in part, to the state's priorities. Even so, because so many of the staff did not see the schools' diverse student body as prepared for college-prep courses, they instituted a range of "levels" of college-preparatory courses. For example, English, social studies, and some science courses are internally classified as fast, medium, or slow college-preparatory sections. These designations (although not recorded on students' transcripts) guided grading practices: students can earn no more than a B in a medium section and no more than a C in a slow section. This policy (albeit hidden from parents and the public) helped teachers feel more comfortable about enrolling "slower" students in college-preparatory courses.

And, as noted above, state policies raising academic requirements for graduation and holding schools accountable for enrolling students in advanced academic courses have been a factor in the decline of vocational education offerings. As a result, schools are less able to assign students to vocational programs, even when they believe (or students believe) that such programs best match their abilities and interests.

DECLINING RESOURCES CONSTRAIN SCHOOLS' CURRICULUM DECISIONS

External changes such as demographic shifts and declining enrollment create resource difficulties that further constrain schools. The problems caused by declining enrollments and reduced funding had the greatest effect on the vocational programs at each of our three schools, but declining resources also affected the ability of the school to pay careful attention to student assignments in both academic and vocational courses.

All three schools felt the "squeeze" of reduced electives because of increased state graduation requirements, a change that has been particularly detrimental to vocational education. This squeeze has taken the form of reduced enrollments in vocational courses, and as a consequence, fewer teacher resources and less funding. At all three schools, the need to maintain minimum enrollments has forced counselors and teachers to abandon prerequisites, to combine introductory and advanced sections, and to retain disruptive students; the decline in resources has meant that the schools have had to make do with outmoded equipment. One administrator pointed to how these changes had led to a discrepancy between philosophy and practice: He noted that district philosophy called for vocational courses that reflect the labor market, but because of "the reality of program survival," classes in electronics, metal, and graphic arts--areas for which there is a market--had been reduced or eliminated, whereas the avocational woodworking classes were maintained and a new woodworking teacher was hired. These classes persisted because they required the least new equipment and because they were seen as more accommodating of students with low ability and behavior problems.

In the face of resource shortages, administrative preferences can exert a powerful influence on curriculum. This was particularly evident in the vocational area where programs had fallen generally out of favor. At our three schools, administrative disposition toward vocational education ranged from supportive at Washington, to more laissez-faire at Coolidge, to hostile at McKinley.

At Washington, the administration responded by creating the two-course "practical arts" requirement, which ensured the preservation of at least some of the schools' vocational offerings. At Coolidge, however, although many perceived their students as needing vocational rather than college preparation, no administrator championed the high school vocational program, neither with policies promoting student enrollments nor by seeking a share of state monies available for special programs. Consequently, individual teachers were forced to take the initiative in obtaining state and local support to maintain existing programs or develop new ones. The end result is a very haphazard program with inconsistent quality.

At McKinley, the principal's outright lack of support for vocational education weakened the program considerably. For instance, one teacher said, "Woodshop is dead." Later we learned that the woodshop teacher was on sick leave and the

class had been closed for the semester. Instead of hiring a substitute, the principal had students placed in study hall where they
received credit for woodshop. The principal, in his words, "took out the career placement center" to focus more attention on college preparation. The courses in the regional program,
regarded favorably by many, had lower participation at all three schools, because the off-campus courses entail significant travel time. However, McKinley students' participation was curtailed by the principal, who refused to provide information on off-campus courses or to allow buses on campus. (The campus had been closed during lunch to keep out neighborhood gang members.)

Teacher shortages affected the type of courses that could be offered. For example, one administrator attributed problems in vocational education to poor quality teachers and teaching. He argued that capable college business majors would select a more lucrative field than teaching. Respondents also described assigning vocational educators to academic courses. This practice permitted vocational teachers to keep their position but relied on their having an academic credential. In addition, this type of joint appointment usually entails more preparations each day and can undermine the quality of both the academic and vocational programs.

Finally, counselor loads severely limited the extent to which they could advise students about courses. At each of the schools in our study, counselors played an important but difficult role. Responsible for placement, career guidance, and scheduling, counselors have tremendous influence on the matching of students and curriculum. However, the counselors we spoke with were frustrated by the large number of students assigned to them. Counselors were each responsible for 450 students at Coolidge and for 400 students at Washington, assigned alphabetically. At McKinley, counselors were assigned to students in the 9th grade and stayed with them for four years. Because of the school's high attrition rate, their caseloads ranged from 350 to 700 students each. Counselors described spending large portions of their time on scheduling issues, which left them with inadequate time for assisting students. The time they did spend with students frequently addressed crisis issues rather than long-term counseling in terms of the student's future career.

AN UNEVEN DISTRIBUTION OF ADVANTAGE

As the previous subsections make clear, the schools were not always able to make the curriculum decisions they thought best for students. In some cases policies interfered; in other cases resources constrained schools' choices. However, the constraints the schools faced in developing an appropriate curriculum for their students and in making appropriate matches between students and courses affected students on different curriculum paths differently. Those in the highest status, academic curriculum appeared to have the best defined and most carefully sequenced programs available to them, partly because of the policy priority given to these programs and to the special attention these students garnered.

State policies governing college admissions requirements and the college-prep track at all schools left little room for deviation in the courses to be taken or in the course sequence. Moreover, teachers reported that the curriculum of the college-track courses was better defined and the sequencing of courses better articulated. Certainly, in the AP courses teachers strictly covered the material needed to receive college credit. In addition, the "better" teachers were assigned to these classes, because, as one counselor told us, mastery of the material necessitated it.

These same high-achieving students were given additional time and consideration by counselors. At two of our schools, a counselor was specifically designated to assist the high-achieving students, and this counselor generally served fewer students than the other counselors. At Coolidge, the "pull-out" counselor was assigned to high-ability students, and at McKinley, one extra counselor was hired to assist college-bound students only.

Although not assigned to a special counselor, students at the very bottom were given more attention than those students falling in the middle academically. Low-functioning students received special attention when placed in remedial labs, especially when class size was reduced--a benefit mentioned by many respondents. However, unless eligible for special education, the low-functioning student generally had access to few coherent programs (especially in vocational education). In direct contrast to the teacher assignment policies for high-achieving students, "slow" classes were more likely to be assigned a less-qualified teacher. As one counselor put it, the "PE teacher who doesn't have enough classes." Judging from the lack of track movement, these students were likely to experience less-qualified teachers throughout their high school careers, especially in academic courses.

Students in the middle level, however, appear to have had the least coherent and least stable programs. Counselors reported spending little time with these students. One counselor told us she sees about 75 percent of her students during the semester, but rarely sees the rest. The 75 percent includes the "top students" and "the problems." A number of counselors recognized that students "fall through the cracks," especially the poor to average student who is passive or undecided about his or her future. These are the very students for whom counseling may be most important.

Further, because more courses were available and the course sequence was less rigid at the middle level, these students were less likely to receive a coherent program--a problem exacerbated by the inadequate counseling most of these students receive. These students are more likely to have an empty slot in their schedule filled with any available course. Although this serendipitous placement might result in a higher-track placement, generally the prerequisites associated with these courses precluded it. Thus, the scheduling process operated haphazardly for these students, and did not lead to greater opportunity.

Not only did the schools establish more responsive systems for the high-achieving student, but the students in this group and their parents were more efficacious. All three schools accommodated parent preferences with regard to placement, even when the school's initial placement differed. And at all three schools, the high-achieving, affluent (largely white and Asian) parents and students were the group that faculty reported as most willing to "push the system." The low-achieving and midrange students (often non-white or of lower socioeconomic status) frequently had less-involved parents and were less willing to challenge the system. If they did, they often met resistance and skepticism. At both Washington and Coolidge, parents were asked to sign forms waiving the school of responsibility for students' failure in higher tracks. The clear message was that the school lacked confidence in those students' ability to succeed, but that parents could assume the risk if they wished. Such messages often serve to discourage all but those most certain about their ability to help their children negotiate the bureaucratic and academic demands of school. And typically, these are the most educated and wealthy parents at the school.

The picture of curriculum offerings and student assignment practices that emerged from our field study in the three high schools is based largely on documentary evidence about course offerings and placement routines and on our interpretation of what administrators, counselors, teachers, and students told us about these processes. In the remainder of this report, we elaborate on this picture by examining how these processes played out for students at Coolidge, Washington, and McKinley high schools in terms of the courses they took. By doing so, we can determine whether and to what extent the patterns described by our respondents are borne out.

WHAT CAN THE TRANSCRIPT ANALYSES ADD?

By examining the the actual coursetaking experiences of students in the 1988 senior class at the schools, we can trace *de facto* as well as *de jure* decisions schools make regarding students' assignments to various courses, and we can explore intended and unintended outcomes of those decisions at each school.

In particular, we address the following research questions:

First, are there identifiable links between students' race, social class, immigrant status, and various curriculum paths that correspond to the beliefs of our case study respondents about the capabilities and aspirations of different students?

- Do African American and Latino students take more vocational education than white and Asian students?
- Do African American and Latino students take more lower-level academic courses than white and Asian students?
- To what extent do other demographic characteristics such as immigrant status or socioeconomic status help explain the academic and vocational coursetaking patterns we observe?

Second, to what degree are these associations "explained" or mediated by differences in students' academic performance, as believed by most school adults?

- Do African American, Latino and immigrant students score lower on achievement measures than do other students?
- How consistently do students' achievement scores relate to coursetaking?
- Do background characteristics relate to students' coursetaking behavior, even when achievement is comparable?

Third, is vocational education a "dumping ground" for students with behavioral or academic problems, as many at our schools believe? Does this characterization apply to all vocational education?

- Is there an association between low-level academic coursetaking and vocational coursetaking?
- What combinations of academic and vocational coursetaking do we find among different groups of students?

Finally, do the patterns and associations that emerge from the analysis of questions 1-3 differ systematically for students who attend different schools?

We turn to these questions in the following section.

IV. WHO TAKES VOCATIONAL EDUCATION? FINDINGS FROM STUDENTS' TRANSCRIPTS

Clearly, there were major differences among our three schools and the students who attended them. Yet, as we noted in

Sec. II, the data regarding student achievement outcomes suggest that none of the three schools appeared to make much headway with their students, in terms of either improving their overall achievement standing relative to other high school students across the nation, altering the achievement disparities among groups of students within them, or promoting the access of Latino and African American students to either college or postsecondary vocational training. The similarities among the schools' cultures regarding curriculum offerings and student assignment processes described in Sec. III begin to suggest why this is the case.

In this section and the next, we examine actual patterns of student coursetaking--patterns that reflect the decisionmaking dynamics at schools and help produce students' achievement outcomes. Here, we describe the vocational coursetaking of students at Coolidge, Washington, and McKinley and show how particular student characteristics predict different patterns of vocational coursetaking at the three schools. In Sec. V we examine students' participation in academic courses. These analyses enable us to explore the consequences of the curriculum opportunities and placement routines at the three schools and to explore the usefulness of various theories offered to explain them.

As we detail in this section and the next, the decisionmaking processes produced different placement and coursetaking patterns at each school and for groups of students within each school; these patterns resulted in a sorting of students with different background characteristics into different courses and programs. But there is considerable evidence that the schools tried to sort students according to their intellectual capacity and that these judgments appear to be informed largely by students' prior achievement. Much of the racial variation in course placements, in fact, can be "explained" by students' scores on achievement tests. But the match is not perfect, and some discrepancies relate quite clearly to race and social class. At the same time, the ability of schools to place students by either meritocratic criteria or on the basis of assumptions related to race and social class seems to have been limited. We find considerable sloppiness in both patterns, both between our schools and within them.

VOCATIONAL COURSETAKING

Like most comprehensive high schools, Coolidge, Washington, and McKinley offered a range of vocational courses, although at all three schools vocational courses constituted a relatively small percentage of the total curriculum.[27] Each school offered vocational courses in a variety of general or non-occupational subjects such as cooking, parenting, or introductory typing, as well as training in specific occupational skills. (Appendix B lists the vocational courses offered at our three schools in two broad categories: introductory or non-occupationally specific and occupationally specific.) Most vocational courses were offered as part of each school's regular curriculum, but students at Coolidge, Washington, and McKinley also had access to a wide variety of courses offered as part of a regional program. These regionally sponsored courses, generally speaking, provided more training in specific job skills than did the "regular" vocational courses. Yet, although the occupational orientation of these courses made them attractive to many students, most were offered at off-campus centers some distance from the high school, which constituted a formidable obstacle to attendance for some students.[28] However, a smaller number of courses offered under the auspices of these regional programs were held on campus.

In looking at the vocational coursetaking of students at Coolidge, Washington, and McKinley, we identify variation in the rates of participation for students among the schools, for different groups of students within the same school, and for similar groups attending different schools. We also consider how participation rates differed across the types of vocational courses offered, among courses that are held on and off campus, and among those offered as part of regional programs and those that are a part of the high school's curriculum.[29]

Most Students Take Some Vocational Education

Hoachlander and his colleagues observed that an extremely high proportion of high school students (90 to 97 percent) take at least one vocational course during their high school career (Hoachlander and Choy, 1986; Hoachlander, Brown, and Tuma, 1987). Table 4.1 indicates that this holds true for students at our three schools, despite the fact that only Washington requires that students take any vocational education courses for graduation.[30]

Table 4.1
Percentage of Students Taking One Vocational Education Course or More, by School
(Sample: 10th-12th grade cohort)

	Washington	Coolidge	McKinley
Any vocational course	100.0	89.7	99.4
Occupational	51.5	49.2	77.4
Non-occupational	99.7	87.4	98.3
On-campus	99.3	88.2	98.6
Off-campus	27.9	36.3	65.7
Sample size	398	380	350

NOTE: Frequency differences between schools are significant at the .01 level.

At Coolidge, 89.7 percent of students who attended 10th through 12th grade took at least one vocational course, all students at Washington, and 99.4 percent of those at McKinley took one or more vocational courses.

Students at all three schools participated much more heavily in non-occupationally specific vocational courses, such as home economics or introductory typing, than in those designed to teach job-specific skills.[31] This pattern is consistent with the fact that students took many fewer vocational courses held off campus at regional centers than on campus. The off-campus courses were generally much more focused on occupationally specific skills, such as airframe repair, than are most of those held on campus.[32]

Yet, we also found important between-school differences. McKinley students participated at significantly higher rates in both occupational courses and off-campus vocational courses than did students at Coolidge or Washington. More than three-quarters of all McKinley students took at least one occupational course during their high school career, whereas about half the students at the two other schools did so. Furthermore, despite discouraging actions by the school administration, almost two-thirds of the McKinley students in our sample took an off-campus vocational course, a participation rate nearly twice that of Coolidge students and nearly two and a half times the rate for Washington students.

Upon close examination, other significant between-school differences emerge with respect to the number of vocational courses and credits taken, the distribution of those courses over a student's high school career, the type of courses taken, and the demographic and academic characteristics of students in those courses.

McKinley Students Took the Most Vocational Education

Figure 4.1 shows the distribution of vocational courses taken by students at the three schools. As was also evident from Table 4.1, all Washington students, nearly all McKinley students, and 90 percent of Coolidge students took at least one vocational course during their high school career.

Yet, at the other end of the coursetaking spectrum, significant differences emerge. A majority of McKinley students (69.1 percent) took five or more vocational courses. Yet less than half of the students at the other two schools (49.1 percent at Washington and 40.8 percent at Coolidge) took five or more courses.[33]

The numbers at Washington High are not perfectly comparable with those at Coolidge or McKinley, since Washington required students to take two vocational courses. Moreover, among those courses meeting Washington's vocational requirement (and included in Table 4.1 and Fig. 4.1) were rigorous computer science courses that the school also classified as mathematics or science courses.

NOTE: The distribution between schools are significantly different at the .01 level.

Fig. 4.1--Distribution of Vocational Courses Taken, by School

Figure 4.2 depicts the vocational coursetaking patterns of students at the three schools when we subtract the two required courses from the number of courses taken by Washington students.[34]

We must be cautious about these comparisons as well, since it is likely that at least some of Washington's students would have taken additional courses, even without the requirement. Nevertheless, this figure graphically displays the difference in the vocational coursetaking pattern at low-income, all-minority McKinley, and at the two schools enrolling large numbers of white and middle-class students.

McKinley Students Sought Job Training; Coolidge and Washington Students "Dabbled"

The connection between school demographics and vocational coursetaking becomes even clearer when we examine differences in the *types* of vocational courses students at the three schools took. Table 4.2 displays student coursetaking patterns by vocational course type.[35] McKinley students took significantly more occupational courses than their Washington and

NOTE: The distribution between schools are significantly different at the .01 level.

Fig. 4.2--Distribution of Vocational Courses Taken, by School
(Less Two Required Courses for Each Washington Student)

Coolidge counterparts, and they took most of those courses through their affiliated regional centers. Figure 4.3 graphically displays McKinley's much higher rate of participation in occupational courses.[36]

Many regional courses were held off campus and during regular school hours, factors that presented a significant obstacle for students' participation at each of the schools. McKinley's principal strongly opposed student attendance at these classes, both because he believed high school should prepare students for college rather than for jobs and because he feared that allowing students to leave campus during the day would make McKinley more vulnerable to gang activity. These constraints made attendance at regional program classes even more difficult for low-income, minority McKinley students, and thus makes their relatively high rate of attendance even more significant. Further, participation in off-campus courses divides our two schools with significant white and middle-class populations. Coolidge with its far more racially and socioeconomically diverse student body evidenced greater regional vocational coursetaking than did more homogeneous, middle-class white and Asian Washington. And, it is probably safe to speculate that the difference between the two schools would be even larger without Washington's practical arts requirement.

Table 4.2
Percentage of Students Taking One Vocational Education Course or More, by School
(Sample: 10th-12th grade cohort)

	Washington	Coolidge	McKinley
Any vocational course*	100.0	89.7	99.4
Occupational course*	51.5	49.2	77.4
ROC/ROP*[a]	22.9	34.0	64.0
Child care*	8.0	0.0	2.9
HIP*[b]	0.0	0.0	1.4
Business**	31.4	30.3	23.1
Commerce*	0.0	10.8	0.9
Personal services*	0.3	3.7	0.0
Health care**	0.5	1.6	0.0
Electronics*	0.0	0.0	8.3
Construction	0.0	0.3	0.0
Industrial arts*	10.1	9.7	29.1
Non-occupational course*	99.7	87.4	98.3
Consumer/home economics*	42.7	32.6	32.3
Business*	89.2	56.8	96.9
Work experience*	11.6	1.6	27.7
Industrial arts*	36.4	50.3	36.0
Other*[c]	2.0	36.3	4.3
Sample size	398	380	350

NOTE: See Appendix B on development of the course typology used in this table

and accompanying discussion.
*Frequency differences between schools are significant at the .01 level.
**Frequency differences between schools are significant at the .05 level.
[a] The Regional Occupational Center/Regional Occupational Program (ROC/ROP) category is not exclusive for all schools. At Washington and McKinley, transcripts indicated simply that a student had taken an ROC/ROP course but did not record the course name. At Coolidge, however, student transcripts indicated both that a student had taken an ROC/ROP course as well as the title of that course. We recorded ROC/ROP participation for Coolidge students in both the ROC/ROP category and in the subject category (all were in the occupational subgroup). ROC/ROP courses taken by students at Washington and McKinley were recorded only in the ROC/ROP category.
[b] The HIP program, offering students hands-on employment experience with a large local firm, was offered at Washington and McKinley but not at Coolidge.
[c] The high rate of participation in this course category by Coolidge students largely reflects high enrollment in a course entitled "School Service Aide." Students who are enrolled as a School Service Aide work in various school offices and are taught the "practical applications" of basic business skills.

Table 4.2 also shows significant school differences in the *types* of occupational courses students took. Washington and Coolidge students gravitated overwhelmingly toward business courses; those at McKinley were somewhat more likely to take trade courses than business courses. Nearly twice the percentage of McKinley students took trade-related occupational courses than at the other two schools.

Fig. 4.3--Distribution of Occupational Courses Taken, by School

These patterns does not hold, however, when we examine participation in non-occupationally specific vocational courses. Substantial percentages of students at all three schools took non-occupational or introductory courses in consumer education/home economics, business, and industrial arts. Here, Coolidge differs from the other schools, in that a larger percentage of students took industrial arts and a smaller percentage took business classes.[37]

In addition to its vocational course offerings, each case study school offered credit to students for "work experience," i.e., employment outside of school. Although students could get high school credit for a variety of jobs, most held minimum-wage, service positions that offered neither skill training nor advancement possibilities. As a result, the school administrators and counselors with whom we spoke offered generally negative assessments of the value of work experience programs in preparing students for the workforce. Students at McKinley participated much more heavily in their school work experience program than did Washington and Coolidge students, with almost no participation at Coolidge. However, at Coolidge, similar credit was given to a substantial percentage of students who performed routine clerical services at the school as "aides."

Washington Students "Got It Out of the Way" Early

The patterns we observed in the *type* of vocational courses that students at our three schools took are consistent with differences in the timing of vocational coursetaking. Table 4.3 displays vocational participation.

At Washington, the timing of vocational participation may be driven by that school's two-semester requirement. Most students either took those courses early, during their freshman year, or waited until they were close to graduation. More than half of the students in our sample took at least one vocational course during their freshman year, more than twice the rate of 9th grade participation at McKinley, and significantly higher than at Coolidge as well. As we noted above, 93 percent of these students attended Washington during their freshman year and from 10th through 12th grade. Another sizeable chunk of students in the Washington sample (close to 35 percent) took vocational courses in their senior year. Moreover, the mean number of courses Washington students took during their freshman and senior years is the same (1.6 courses), close to the two-semester requirement.

The coursetaking patterns of students at Coolidge and McKinley, however, are quite different from those at Washington. At Coolidge, no clear trend in the timing of vocational coursetaking emerges; students took a vocational course during their sophomore year only somewhat less frequently than during the other three years. At McKinley, the rate of vocational participation was lowest during 9th grade and highest during 10th and 11th grades, dropping off somewhat during the 12th grade.

The mean numbers of courses taken by 10th, 11th, and 12th graders at McKinley (1.5, 2.0, and 2.3, respectively) are the highest in our sample. During these three years, then, a greater proportion of McKinley students (except for the equivalent proportion of Washington seniors) took vocational courses, and those who did took more than vocational coursetakers at Coolidge or Washington. Moreover, the 11th and 12th grade means at McKinley are significantly higher than are the means for 9th grade Washington students, even though the rate of participation was extremely high for these 9th graders.

Table 4.3
Participation in Vocational Courses, by School
(Sample: 10th-12th grade cohort)

	Washington	Coolidge	McKinley
Percentage who took any vocational course in			
9th grade	50.5	29.1	20.4
10th grade	29.5	23.9	46.4
11th grade	29.3	31.9	39.8
12th grade	34.8	30.3	34.8
Mean number of vocational courses taken in			
9th grade	1.6	0.9	0.8
10th grade	0.7	0.6	1.5
11th grade	0.9	1.1	2.0
12th grade	1.6	1.5	2.3

NOTE: Differences are significant between schools at the .01 level.

The greater vocational coursetaking at McKinley, however, should not mask a general pattern at all three schools--the increasing mean number of courses taken in grades 10, 11, and 12. This increase at all three schools may indicate that as graduation approaches many students may view college entrance as increasingly unrealistic, because of either academic or financial deficiencies, and turn to vocational training courses as an alternative. And, it would not be surprising that such a shift would occur more often at a school enrolling low-income, minority students.

Asian Students Take the Least, Latino and White Students Take More

The transcripts also reveal significant differences at each school in the nature and extent of vocational coursetaking by students with different demographic characteristics and from different academic tracks. Table 4.4 displays the mean number of vocational courses taken by students according to their sex, race, and academic-track participation.

Gender differences in a number of vocational courses taken were significant only at Washington High. However, we found significant racial and ethnic group differences at both Coolidge and Washington.

Table 4.4
Mean Number of Vocational Courses Taken, by School
(Sample: 10th-12th grade cohort)

	Washington[a]		Coolidge	McKinley
Total	4.8	(2.8)	3.9	6.4*
By sex				
Male	4.4**	(2.4)	3.9	6.4
Female	5.2**	(3.2)	4.0	6.4
By race/ethnicity				
White	5.3**	(3.3)	3.8**	
Black	4.0**	(2.0)	3.5**	6.3
Asian	3.4**	(1.4)	2.3**	4.3
Latino	4.5**	(2.5)	5.0**	6.7
By academic/nonacademic track				
Algebra 2[b]	3.6**	(1.6)	1.9**	5.1**
Non-algebra 2	5.7**	(3.7)	5.0**	6.7**
College English[b]	4.0**	(2.0)	2.4**	5.3**
Non-college English	5.5**	(3.5)	5.1**	7.6**
Sample size	398		380	350

*Differences between schools are significant at the .01 level.
**Differences within schools are significant at the .01 level.
[a]Washington's two-course requirement for graduation combined with the fact that high-level computer science courses taught by math teachers could satisfy this requirement undoubtedly inflate Washington's means and decrease the differences among groups relative to the other two schools with quite different policies. The

numbers in parentheses are the means with Washington's two required courses subtracted.

[b]We defined participation in Algebra 2 or a college-prep English course during the junior year as indication that the student was enrolled in a college-preparatory curriculum.

At these two schools, Asian students took the fewest vocational courses and whites and Latinos took the most.[38]

But College-Bound Students Take the Least

Table 4.4 also compares the number of vocational courses taken by students at each school who we defined to be in a college-preparatory curriculum--those who were enrolled in Algebra 2 or "college-prep" English during their junior year--with that taken by students in a non-college-prep course of study. Not surprisingly, college-bound students at all three schools took significantly fewer vocational courses than did non-college-bound students. However, Washington's practical arts requirement and the ability of advanced computer science courses to meet that requirement make us cautious about between-school comparisons, since these factors probably both increase vocational coursetaking and alter its character for many Washington students. With these required courses subtracted from Washington's mean, we again find a pattern related to the student composition of the schools: As the percentage of white and affluent students at a school increases, participation in vocational education by college-prep students decreases. This finding suggests a modification to our speculation above that McKinley students turn toward vocational education as college attendance becomes more remote. This is still likely to be the case, even for those enrolled in college-preparatory programs, but it may also be that low-income, minority students who intend to go to college have less confidence than their more-advantaged peers in their chances of getting through postsecondary schooling without some episodes of full-time work, and therefore may place greater value on vocational training.

Generally speaking, college-prep students at all schools participate less frequently in occupationally oriented courses, particularly those offered as a part of regional occupational programs (see Tables 4.5 and 4.6).

In contrast to this overall pattern, however, participation in occupational business courses is roughly comparable for both groups of students at all schools, and business courses generally attract more college-preparatory students than any other types of vocational courses. Again, with the above cautions about between-school comparisons in mind, we find that participation in non-occupational courses generally and non-occupational business courses in particular is quite comparable for both groups at Washington and McKinley but significantly lower for college-prep students at Coolidge. In fact, Coolidge stands out as the only school where overall participation in vocational courses generally, and in non-occupational and on-campus courses in particular, is significantly lower for college-prep students. Coolidge may be more typical of schools with large, middle-class, white populations than is Washington with its practical arts requirement, which eliminates any distinction between college-bound and non-college-bound students.

Table 4.7 compares the vocational coursetaking of students in the top 10 percent of their class with those who are not. Here too, Coolidge is the only school where the participation of the most academically talented students is significantly different from other students overall, and in non-occupational and on-campus vocational courses.

Table 4.5
Percentage of Students Taking at Least One Vocational Course, by English Enrollment

(Sample: 10th-12th grade cohort)

	Washington		Coolidge		McKinley	
	Other English	College English	Other English	College English	Other English	College English
Any vocational course	100.0	100.0	95.7	82.3*	100.0	98.9
Occupational	57.1	46.0**	61.6	33.7*	87.2	68.3*
ROC/ROP	29.1	16.8*	42.7	23.1*	76.2	53.2*
Business	28.1	34.7	33.2	26.6	20.7	25.3
Industrial arts	15.3	5.0*	15.2	3.0*	38.4	21.0*
Non-occupational	99.5	100.0	93.8	79.3*	99.4	97.3
Consumer/home ec.	49.0	36.6**	41.2	21.9*	42.1	23.7*
Business	87.2	91.1	64.9	46.8*	97.0	96.8
Work experience	15.3	7.9*	1.9	1.2	20.7	33.9*
Industrial arts	43.9	29.2*	64.4	32.5*	50.0	23.7*
On-campus	100.0	98.5	94.8	79.9*	99.4	97.9
Off-campus	32.7	23.3*	46.5	23.7*	76.8	55.9*

NOTE: A college prep English student is one enrolled during the junior year in an English course designed by the school as college-preparatory.

*Differences are significant at the .01 level.

**Differences are significant at the .05 level.

Table 4.6
Percentage of Students Taking at Least One Vocational Course, by Math Enrollment
(Sample: 10th-12th grade cohort)

	Washington		Coolidge		McKinley	
	Other Math	Algebra 2	Other Math	Algebra 2	Other Math	Algebra 2
Any vocational course	100.0	100.0	97.2	74.6*	99.3	100.0
Occupational	63.0	37.4*	57.5	32.5*	80.6	64.9*
ROC/ROP	36.1	6.7*	39.8	22.2*	68.9	46.8*
Business	32.9	29.6	32.7	25.4	22.3	26.0
Industrial arts	12.3	7.3	13.4	2.4*	32.6	16.9*
Non-occupational	100.0	99.4	96.5	69.1*	98.5	97.4
Consumer/home ec.	60.3	21.2*	42.5	12.7*	35.5	20.8**
Business	87.2	91.6	64.6	41.3*	96.7	97.4
Work experience	16.9	5.0*	2.4	0.0	26.0	33.8
Industrial arts	36.5	36.3	62.6	25.4*	40.3	20.8*
On-campus	100.0	98.3	96.5	71.4*	98.5	98.7

Off-campus	37.9	15.6*	43.3	22.2*	69.2	53.2*

NOTE: An algebra 2 student is one enrolled in algebra 2 during the junior year.
*Differences are significant at the .01 level.
**Differences are significant at the .05 level.

Yet the best Coolidge students participate at rates only slightly lower than other students in consumer/home economics courses, whereas differences between these groups is two to four times as great at Washington and McKinley.

Table 4.7
Percentage of Students Taking at Least One Vocational Course, by Class Rank
(Sample: 10th-12th grade cohort)

	Washington		Coolidge		McKinley	
	Other	Top 10%	Other	Top 10%	Other	Top 10%
Any vocational course	100.0	100.0	91.4	76.7*	99.7	97.1
Occupational	55.2	22.2*	52.2	25.6*	78.8	61.8**
ROC/ROP	25.8	0.0*	35.6	20.9	65.5	50.0
Business	33.1	17.8**	32.3	14.0**	23.1	23.5
Industrial arts	10.8	4.4	10.7	2.3	30.1	20.6
Non-occupational	99.7	100.0	89.9	67.4*	98.4	97.1
Consumer/home ec.	46.7	11.1*	33.5	25.6	34.2	14.7**
Business	88.1	97.8**	59.9	32.6*	96.8	97.1
Work experience	12.8	2.2**	1.8	0.0	27.5	29.4
Industrial arts	37.4	28.9	54.3	18.6*	39.2	5.9*
On-campus	99.2	100.0	90.5	70.0*	98.7	97.1
Off-campus	30.3	8.9*	38.3	20.9**	66.5	58.8

*Differences are significant at the .01 level.
**Differences are significant at the .05 level.

At McKinley, students in the top 10 percent participate with other students at comparable rates in a number of areas including regional occupational courses, occupational and non-occupational business courses, work experience, and off-campus courses.

Taken together, these rates of participation of students from various academic and vocational tracks reveal some interesting patterns. The differences in the rate of vocational coursetaking are most often significant at Coolidge, with its large middle-class contingent where there is no vocational requirement. At Washington, the two-semester requirement appears to have mitigated strong differences in coursetaking behavior such as we observe at Coolidge. Such differences are also muted at McKinley, but for different reasons. At this lower-income, minority school, all students participate in vocational education at significantly higher rates than at Coolidge or Washington (see Tables 4.1 and 4.2). As our field study suggests, this may result both from the widespread view that vocational courses are more appropriate for low-income, minority students and from the school's tradition of offering a far larger number of vocational courses than the other schools. These factors, possibly in combination with students' lower confidence about college, may overwhelm or carry equal weight with McKinley administration's emphasis on college preparation.

FACTORS EXPLAINING VOCATIONAL CONCENTRATION

What factors determine or predict whether students take a little vocational education or a lot when other factors are taken into account? Do these factors vary by school? To investigate these questions, we classified the students at the three schools into two groups, "concentrators" and "non-concentrators," and examined the factors that determine whether a student is a vocational concentrator.[39] We defined concentrators as those students who took six or vocational courses at their high schools.[40] In addition, to account for the practical arts requirement at Washington, we have alternatively defined concentrators at that school as those students who took six or more courses beyond the two-course practical arts requirement.

Who Concentrates in Vocational Education?

Table 4.8 reiterates the differences across the three schools in the fraction of students who are vocational "concentrators." Using our definition, McKinley had the most students "concentrating" in vocational education (57 percent) and Washington, after accounting for the practical arts requirement, had the least (16 percent). Girls at Washington were less likely to be vocational concentrators than were boys, however, the size of this difference diminishes significantly once the practical arts requirement is accounted for. At Coolidge and McKinley, there is no significant difference in the fraction of girls and boys who are vocational concentrators.

Table 4.8
Vocational Concentrators, by Sex, Race, and School
(Sample: 10th-12th grade cohort)

	Washington[a]		Coolidge	McKinley
Total	34.2*	15.6*	29.5*	57.1*
By sex				
Male	41.1**	18.9	31.1	56.0
Female	28.4**	12.8	28.1	58.2
By race				
White	43.4**	22.1**	31.5**	--
Black	--	--	26.8**	56.1
Asian	14.3**	5.0**	8.0**	--
Latino	30.0**	2.7**	38.1**	63.1

*Differences between schools are significant at the .01 level.
**Differences within schools are significant at the .01 level.
[a]We reported the participation of Washington students in two ways.

> The first number is the percentage of students who took six or more vocational courses. The second number reports the percentage who took six or more vocational courses beyond the two required semesters. The first number is relatively higher than would be the case without the requirement, and the second is probably lower. However, the effects of the requirement probably differ among various groups of students.

Racial Differences. We found significant differences in the percentage of students who are concentrators by race and ethnicity at Washington and Coolidge. At both schools, Asians are far less likely than other groups of students to be vocational concentrators.[41] At Washington, white students were most likely to concentrate. This contrasts with Coolidge, where Latinos were the most likely to take a concentration of vocational classes. At diverse Coolidge, Latinos were more likely than whites, whites more likely than African Americans, and African Americans more likely than Asians to be vocational concentrators (38 percent, 32 percent, and 27 percent, respectively). The difference in Latino participation between Washington and Coolidge may be explained, in part, by differences in the socioeconomic status of Latinos at the two schools. One clue to the difference for Latinos at the two schools comes from our interviews. Several Washington respondents noted that the school draws from a relatively affluent neighborhood; less than 1 percent of the student body qualifies for Aid to Families with Dependent Children (AFDC). One Washington teacher told us that because of the cost of housing, "Latinos here are not like in East L.A . . . [they] are just like whites."

In contrast, as noted above, Coolidge High School draws from an economically diverse population with a large cohort of Latino immigrants. As we described in Sec. III, we encountered a widely held belief among Coolidge respondents that many of the Latino students at that school have poor basic skills (including severe English language deficiencies), poor motivation, and limited future expectations.[42]

In contrast, there is no significant difference in the fraction of African American and Latino students at McKinley who are vocational concentrators.[43]

Achievement Level Differences. The relationship between achievement test scores and vocational participation is shown in Figs. 4.4 and 4.5. The distribution of 10th grade math and reading achievement scores, measured by the 5th percentile, mean, and 95th percentile, is shown for vocational non-concentrators and concentrators.[44] As our field study would lead us to believe, at all three schools, average math and reading scores are significantly lower for vocational concentrators than for non-concentrators.[45] However, the range of scores as measured by the 5th and 95th percentiles shows that vocational concentrators are not exclusively low-achieving students, nor are vocational non-concentrators only high-achieving students.

Fig. 4.4--Distribution of Math Scores for Vocational Non-Concentrators and Concentrators, by School

Fig. 4.5--Distribution of Reading Scores for Vocational Non-Concentrators and Concentrators, by School

For all three schools, the 5th percentile in math achievement scores is higher for non-concentrators than for concentrators, whereas the 5th percentile in reading scores is very similar for the two groups. At the other end of the achievement spectrum, we find students with high math and reading scores in both the vocational concentrator and non-concentrator groups. Apparently, vocational concentrators, although they have lower math and reading achievement scores on average, are students with a wide range of ability as measured by their 10th grade reading and math scores. Likewise, there are students with low math ability and with the lowest reading ability who do not concentrate in vocational education.

Track Level Differences. In addition to these achievement differences in the rates of participation across different groups of students, there are important differences as well in the type of vocational courses that students in different academic tracks took. Table 4.9 compares the type of vocational courses that vocational concentrators took with those taken by non-concentrators.

Not only did more concentrators take occupational courses at each school than did non-concentrators, as expected, but the difference in the two group's rates of participation in occupational and off-campus courses is statistically significant at all three schools. At Coolidge and McKinley, but not at Washington (probably because of the two-course requirement), there are also significant overall differences in the participation of concentrators and non-concentrators in non-occupational and on-campus vocational courses.

Across nearly all occupational and non-occupational course types, concentrators participated at significantly higher rates than did non-concentrators. The notable exception is non-occupational business courses at Washington and McKinley, where concentrators and non-concentrators subscribed at nearly equal rates.

Table 4.9
Percentage of Students Taking at Least One Vocational Course, by School
(Sample: 10th-12th grade cohort)

	Washington		Coolidge		McKinley	
	Non-Concentrator	Concentrator	Non-Concentrator	Concentrator	Non-Concentrator	Concentrator
Any vocational course	100.0	100.0	85.5	100.0*	98.7	100.0
Occupational	33.2	86.8*	33.6	86.6*	54.0	94.5*
ROC/ROP	11.1	45.6**	23.5	58.9*	42.7	80.0
Business	23.7	46.3*	23.1	47.3*	12.0	31.5*
Industrial arts	1.9	25.7*	2.2	27.7*	20.0	36.0*
Non-occupational	99.6	100.0	82.1	100.0*	96.7	99.5**
Consumer/home ec.	31.3	64.7*	23.9	53.6*	16.7	44.0*
Business	89.7	88.2	50.4	72.3*	95.3	98.0
Work experience	5.7	22.8*	0.8	3.6**	17.3	35.5*
Industrial arts	27.9	52.9*	38.4	78.6*	18.7	49.0*
On-campus	98.9	100.0	83.2	100.0*	96.7	100.0*
Off-campus	16.4	50.0*	24.6	64.3*	44.0	82.0*

*Differences are significant at the .01 level.
**Differences are significant at the .05 level.

Explaining Who Concentrates in Vocational Education

The preceding analyses highlighted several differences within and between the three schools in the rates at which various groups of students were vocational concentrators. In what follows, we investigate the role of a number of student characteristics in the probability of being a vocational concentrator. For example, is the likelihood that a student takes a large number of vocational courses related to his or her academic performance as measured by achievement scores in math and reading? If we control for differences in test scores, are there still differences in the probability of being a vocational concentrator for students of different races and ethnic groups? Do differences exist across schools in the likelihood of being a vocational concentrator once we control for differences in student characteristics?

To address these questions, we conducted a logistic analysis predicting the probability that a student would be a vocational concentrator. Logistic models were estimated separately by school and with students pooled across all three schools. In both cases, the probability of being a vocational concentrator was modeled as a function of the student's gender, race/ethnicity, and achievement scores.[46] In addition, since the sample includes students who entered their respective schools in the 10th grade as well as those who entered in the 9th grade, we included a variable indicating that a student was at his or her respective school for four years. In this way, we control for the possibility that, since the four-year students had one more year to take vocational education, they may be more likely than three-year students to be vocational concentrators. In addition, we included our measure of SES in the model estimated for Coolidge, and an indicator for foreign-born students in the models estimated for Washington and McKinley.[47]

Using the logistic analysis, we present the predicted probability that a student with various characteristics will be a vocational concentrator in Tables 4.10 to 4.12.[48] Table 4.10, for example, shows the estimated probability that a "representative student," characterized by gender and race or ethnicity, will become a vocational concentrator at the three schools. In this case, the "representative student" is one who attended his or her school for four years and has math and reading scores equal to the average for his or her respective school.

Race Matters a Lot. The estimated probabilities in Table 4.10 show that, even after controlling for a student's achievement scores, significant differences remain in the likelihood that students of different racial or ethnic backgrounds will be vocational concentrators at Washington and Coolidge, but not at McKinley. For example, the probability that a representative boy at Coolidge is a vocational concentrator is 8 percent for Asians, 21 percent for African Americans, 28 percent for Latinos, and 38 percent for whites. The low probability estimate for Asian students at Coolidge is highly significant.

Table 4.10
Probability of Becoming a Vocational Concentrator, by Sex, Race, and School
(Sample: 10th-12th grade cohort)

	Washington[a]		Coolidge	McKinley
Male				
White	49.9	21.1	38.1	--
Black	--	--	20.7	54.3
Asian	22.0	4.1	7.9	--

Latino	20.1	2.4	27.6	56.7
Female				
White	30.3	13.2	29.3	--
Black	--	--	15.0	60.3
Asian	11.0	2.4	5.4	--
Latino	9.9	1.4	20.4	62.5

NOTE: Estimated probabilities are based on the school-specific logistic models. The proba-bilities are for students who attended their respective schools for four years. The math and reading scores are held constant at the school-specific means.

[a]We reported the participation of Washing-ton students in two ways. The first number is the percentage of students who took six or more vocational courses. The second number reports the percentage who took six or more vocational courses beyond the two required semesters. The first number is relatively higher than would be the case without the requirement, and the second is probably lower. However, the effects of the requirement probably differ among various groups of students.

In contrast, "representative" Asian and Latino students at Washington are about equally likely to be vocational concentrators, but comparable white students have a much higher estimated probability of being a concentrator. This pattern occurs with and without adjusting for Washington's practical arts requirement.[49]

Gender Differences Are Not Strong. The differences for boys and girls shown in Table 4.10 are not as striking. Although the estimated probabilities for girls are less than for boys at Washington and Coolidge, and the reverse at McKinley, the differences are statistically significant only at Washington, when there is no adjustment for the practical arts requirement. In all other cases, the likelihood of being a vocational concentrator is not associated with a student's gender.

The estimated probabilities in Table 4.10 also allow comparisons between the three schools for students with similar characteristics. When we make no adjustment for Washington's requirement, the same ranking applies for six of the eight different groups of students in Table 4.10: McKinley students have the highest probability of becoming a vocational concentrators and Coolidge students have the lowest probability. The two exceptions are Latino boys and girls, who have a higher probability of being vocational concentrators at Coolidge than at Washington.[50] Again, this may be explained by the greater social-class differences between the cohort of Latino students at Washington and those at Coolidge. If we adjust for the requirement at Washington, the ranking between Washington and Coolidge reverses. Thus, the higher probabilities for students at Washington can be explained by the existence of the requirement at Washington and the absence of one at Coolidge.

As Test Scores Rise the Probability of "Concentrating" Declines. The previous comparisons were for students of different gender and races, holding student achievement measures constant within schools. Tables 4.11 and 4.12 present the estimated probabilities for boys by race or ethnicity when test scores vary.[51] First, Table 4.11 compares the probability of being a vocational concentrator for students with test scores at the same relative point in the test score distribution within each school, namely, the 25th percentile, the 50th percentile (median), and the 75th percentile. Table 4.12 compares students across schools with the same absolute test scores, specifically, with national percentile scores equal to 30, 50, and 80.

Both tables show the same overall pattern: Students with higher test scores are less likely to be vocational concentrators. Table 4.11 shows that the probability of a white male at Coolidge being a vocational concentrator decreases from 58 percent to 19 percent as his test scores increase from the bottom fourth of the class (25th percentile) to the top fourth (75th percentile). The negative relationship between test scores and the probability of being a vocational concentrator is highly significant and holds for both math and reading scores at all three schools.[52] Note, however, that the probability of being a vocational concentrator for students at the top fourth of their class or with test scores at the 75th percentile is still greater than zero. Thus, student ability as measured by achievement scores is a good predictor of the likelihood of taking a substantial number of vocational courses, but vocational concentrators are not exclusively students with low ability.

The same within-school differences between students of different races and ethnic groups that we observed in Table 4.10 appear when we compare students at each of these ranks. Again, white students at Washington have a higher probability than comparable achievers at the school who are Asian or Latino. Asian students at Coolidge stand out with a very low estimated probability relative to their comparably achieving schoolmates from different racial and ethnic groups. In contrast, however, the probabilities are similar for African American and Latino students at McKinley.

Table 4.11
Probability of Being a Vocational Concentrator,
by Percentile Score and School
(Sample: 10th-12th grade cohort)

	Washington[a]		Coolidge	McKinley
White male				
25th percentile	62.0	31.1	57.7	--
50th percentile	49.9	21.1	38.1	--
75th percentile	33.1	11.3	19.1	--
Black male				
25th percentile	--	--	36.7	66.3
50th percentile	--	--	20.7	54.3
75th percentile	--	--	9.1	42.0
Asian male				
25th percentile	31.6	6.7	15.9	--
50th percentile	22.0	4.1	7.9	--
75th percentile	12.3	2.0	3.2	--
Latino male				
25th percentile	29.2	3.9	45.8	68.4
50th percentile	20.1	2.4	27.6	56.7
75th percentile	11.1	1.1	12.7	44.4

NOTE: Estimated probabilities based on the school-specific logistic models. The probabilities are evaluated at the same point in the math and reading score distributions (i.e., lowest quartile, median, highest quartile) for each school.

[a]We reported the participation of Washington students in two ways. The first number is the percentage of students who took six or more vocational courses. The second number reports the percentage who took six or more vocational courses beyond the two required semesters. The first number is relatively higher than would be the case without the requirement, and the second is probably lower. However, the effects of the requirement probably differ among various groups of students.

Even more interesting differences appear when we compare across the three schools. Again, McKinley students, regardless of their relative standing at their school, always have a much higher probability of being a concentrator than students at the same point in the test score distribution at the other schools. For example, a Latino male at McKinley with math and reading scores in the 75th percentile will be a vocational concentrator with 44 percent probability, but the probabilities are only 13 percent and 11 percent for his counterparts with the same relative test score standing at Coolidge and Washington (without adjusting for the practical arts requirement). These large differences occur as well for students at the low end of the distribution; the probabilities for a Latino male with test scores in the 25th percentile range from 68 percent at McKinley to 29 percent at Washington (without the adjustment).

This pattern is partly explained by the higher average achievement at Coolidge and Washington than at McKinley: Students at the top quarter of their class at McKinley are likely to be much lower achieving than their counterparts at Coolidge and Washington. Likewise, students who ranked in the bottom quarter of their class at Washington or Coolidge would be much higher achieving than students with that relative standing at McKinley. Thus, for students with the same standing in their class, the higher overall probability of being a vocational concentrator at McKinley is likely to be somewhat balanced by their lower levels of achievement.

Table 4.12
Probability of Being a Vocational Concentrator, by Percentile Score and School
(Sample: 10th-12th grade cohort)

	Washington[a]		Coolidge	McKinley
White male				
30th percentile	78.1	51.8	70.3	--
50th percentile	65.1	34.9	48.5	--
80th percentile	41.3	15.8	19.0	--
Black male				
30th percentile	--	--	50.2	64.0
50th percentile	--	--	28.5	48.8
80th percentile	--	--	9.1	27.1

Asian male				
30th percentile	50.3	14.6	24.8	--
50th percentile	34.6	7.9	11.6	--
80th percentile	16.7	2.9	3.2	--
Latino male				
30th percentile	47.4	8.8	59.5	66.2
50th percentile	32.0	4.6	36.8	51.2
80th percentile	15.1	1.7	12.7	29.1

NOTE: Estimated probabilities based on the school-specific logistic models. The probabilities are evaluated at the same point in the math and reading score distributions (i.e., percentile scores equal to 30, 50, and 80).

[a] We reported the participation of Washington students in two ways. The first number is the percentage of students who took six or more vocational courses. The second number reports the percentage who took six or more vocational courses beyond the two required semesters. The first number is relatively higher than would be the case without the requirement, and the second is probably lower. However, the effects of the requirement probably differ among various groups of students.

Table 4.12 explores this explanation more precisely by comparing the probabilities of being a vocational concentrator for students with test scores in the same *national* percentile ranking. The between-school comparisons show the importance of the variation in student achievement across the three schools. Although students at McKinley still have higher probabilities when their test scores equal 30, 50, or 80 than students with the same scores at the other two schools, the differences are not as large as those found in Table 4.11. A Latino male at McKinley with test scores equal to 80 will be a vocational concentrator with 29 percent probability, compared to 15 percent at Washington without the adjustment, 13 percent at Coolidge, and less than 2 percent at Washington when the required courses are discounted.[53] Students with very low test scores exhibit similar patterns. If a Latino male has test scores equal to 30, he will be a vocational concentrator with a 66 percent probability at McKinley, 60 percent at Coolidge, 47 percent at Washington without the adjustment and 9 percent when the required courses are discounted.

It is important to note that achievement alone does not come close to explaining all of the race-linked coursetaking differences between the three schools. Whites with comparable achievement are more likely to take a concentration of vocational courses at Washington than at Coolidge, with the biggest differences among high-achieving whites, but once the required courses are subtracted their chances are greater at Coolidge. African Americans at McKinley are far more likely to concentrate than are their equal scoring peers at Coolidge, with the size of the differences in their prospects at the two schools increasing as their test scores go up. We can speculate from our data, although the practical arts requirement at Washington makes it difficult, that schools become more vocationally oriented overall as their populations of minority and low-income students increase. (This speculation is consistent with the national data cited in Sec. I.) As a consequence, we would expect to see more students take large numbers of vocational courses at low-income, minority schools, regardless of their test scores.

Other Factors: SES and Country of Birth. Factors other than race, gender, and test scores may also play a role in determining the likelihood that a student concentrates in vocational education. In particular, a student's socioeconomic status (SES) and country of birth may affect his or her coursetaking behavior. Data limitations precluded us from examining the role of these two variables at each of the three schools. However, using the SES data for Coolidge and the data on country of birth for Washington and McKinley, we can examine the importance of these factors individually at these schools.

Table D.3 contains the estimates, including SES in the logistic model, for predicting the probability that a student at Coolidge is a vocational concentrator. The results show that low-SES students are more likely than middle- or high-SES students of the same racial groups or with comparable test scores to be vocational concentrators. Middle-SES students are more likely to be vocational concentrators than to high-SES students, but the difference is not statistically significant. These findings mesh with what our respondents at Coolidge told us about differences among racial groups and the probabilities of vocational concentration at Coolidge that we described above. African American students were portrayed as a middle-class group and considerably more affluent than the Latino group as a whole and than many of the whites. In addition, since the SES data were based on counselors' assessments of a student's family income, the data were reported as missing when the counselor did not know the student well enough to make an estimate. This happened for about 10 percent of the sample. Consequently, an indicator that SES was missing was included in the logistic model. The resulting positive and significant coefficient indicates that these students were also more likely than high-SES students to be vocational concentrators. Thus, students from families with lower income or students for whom counselors are not able to evaluate their family's income appear to be more likely to take a large number of vocational courses.

Using the information on country of birth, the logistic models for Washington and McKinley were estimated with an indicator that a student was foreign-born. The estimates in Table D.3 for Washington, with and without the adjustment for the practical arts requirement, and for McKinley show that there is no significant relationship between the probability that a student is a vocational concentrator and being born in a foreign country.

CONCLUSIONS

Our data on vocational coursetaking at the three schools are consistent with national patterns: Although most students take some vocational education, low-income students and disadvantaged minority students take more courses, and particularly more occupationally oriented courses, than do whites and middle-class minority students. These differences appear both between and within schools. For example, African American boys at McKinley were more than twice as likely (and girls four times as likely) as their African American peers at Coolidge to concentrate in vocational education. And the least advantaged group within our socioeconomically diverse school (Latinos at Coolidge) was far more likely to take a concentration of vocational courses. Moreover, the least advantaged students (both between and within schools) were more likely to take courses related to the trades, and more advantaged students leaned toward courses in business.

One explanation for these patterns may be that schools permit students at all points of the achievement continuum to choose whether or not to take large numbers of vocational courses, and that low-SES and minority students, even those planning on college, place more value on attaining trade-specific skills than do more advantaged students, and gravitate toward these courses. Certainly, this was the perception of some of the school faculty. Moreover, such an explanation would be consistent with the fact that achievement criteria do not fully explain vocational coursetaking, since we find vocational concentrators across a very wide range of achievement at all three schools.

A second explanation is also supported by our field study--that schools match students to those courses where they are seen as most likely to succeed, given their motivation and prior achievement. This explanation is consistent with the view expressed by many at the schools--that course placements should "accommodate" students' abilities and motivation.

To the extent that vocational education is seen as more appropriate for lower- than for higher-achieving students, each school seemed to use meritocratic criteria for sorting students into courses to some degree. Within all three schools, concentrated vocational education coursetaking was largely, but not entirely, reserved for the least academically able students in the school, as measured by their scores on standardized achievement tests. On average, as achievement scores decreased, the likelihood of taking a concentration of vocational courses increased. The clustering of low-income and minority students in vocational programs, then, is a function of racial and ethnic group differences in average achievement test scores.

The darker side of this second explanation, however, is the picture that many faculty at the school painted of vocational education, particularly trade-oriented courses: a "dumping ground" where schools place students who are not expected to be successful in academic programs. Among vocational offerings, only business courses appear to escape this image. At all three of our schools, business courses stand out as being equally subscribed to by college-bound and non-college-bound students, and by concentrators and non-concentrators. This explanation is particularly troublesome, given the perceptions of many faculty that students' membership in various racial or "cultural" groups affects their suitability for academic courses. In particular, the perception that Latino students bring with them disadvantages such as mobile or unsupportive families and low academic motivation suggests that minority and low-income students may be more often the object of low faculty expectations. It is possible that some of this reasoning lies behind the fact that students at our disadvantaged minority school were most likely to be concentrators in vocational education, even those whose enrollment in college-preparatory programs indicated that they intended to go to college, and even those with test scores equivalent to white and middle-class non-concentrators at the other schools.

Patterns between and within the schools argue against choice, achievement screening, or racial stereotyping as a single explanation for vocational coursetaking. First, there are proportionately more vocational course "slots" at low-income, minority McKinley than at the other schools, so that even students in the the top 25 percent of their class have a greater probability of concentrating in vocational courses there than their counterparts at the more advantaged schools. More important, differences in the number of slots do not correspond neatly to differences in overall achievement levels at the schools. Although the lower-achieving school had the greatest vocational participation, and the higher-achieving school had the least (beyond required "practical" courses that included advanced computer courses), these differences were not proportionate. The result was that equally high-achieving students at the disadvantaged, minority school were considerably more likely to take a concentration of vocational courses than were their peers at the two more advantaged schools.

Second, race, ethnicity, and social class, independent of achievement, are related to the variation in vocational participation *within schools as well as between them*. Students with comparable achievement but different background characteristics had considerably different probabilities of taking large numbers of vocational courses at the two least vocational schools--those enrolling significant percentages of white students. At Coolidge, the racially and socioeconomically diverse school, the probability of concentrating was highest for whites, followed by Latinos and African Americans, and the lowest for Asians. But across these groups at Coolidge, low-income students were significantly more likely to be vocational concentrators than were middle- or upper-income students. At more homogeneously affluent Washington, whites were more likely than Asians to concentrate in vocational programs.

Thus, schools with larger concentrations of minorities and low-income students seemed to be *disproportionately* vocational, with the result that students of all backgrounds attending those schools were more likely to be vocational concentrators than their peers with comparable achievement scores who attended schools with larger numbers of white and middle-class students. And within schools as well, race and social class seem to influence vocational course participation over and above achievement. These factors suggest that decisions about how much vocational education to offer at a school and decisions about which students should take these courses are influenced by more than test scores. It is likely that students' own choices and the choices made for them by counselors and teachers play an important role as well.

V. WHO TAKES COLLEGE-PREP? FINDINGS FROM STUDENT TRANSCRIPTS

In this section, we describe the participation of Coolidge, Washington, and McKinley students in academic courses that prepare them for college. Here we focus on mathematics and English, since these courses signal whether a student is college-bound. As in the previous section, we find patterns of placement and coursetaking that differ across the three schools and for different groups of students within them. Here, too, we find a general pattern--one of less than perfect matches among students' prior academic performance and their placement in college-bound or non-college-bound classes. Some, but not all, of this variation relates to race and social class.

THE BIG PICTURE: A SIMILAR OVERALL PATTERN OF ENGLISH AND MATH COURSETAKING

The combined course offerings in English, mathematics, social studies, and science represented the same fraction (about 58 percent) of the total course offerings at each of the three schools in the Fall of 1988.[54] The three schools offer a similar array of mathematics courses, ranging from basic math to calculus.[55]

In contrast, the English course offerings vary substantially between McKinley, which has no English courses beyond the general, integrated English courses at each grade level, and Coolidge and Washington, which each have a variety of more specialized English electives. Despite these differences in the course offerings, all three schools require four years of English, one year beyond the state requirements. However, Coolidge and Washington require only two years of mathematics, the state requirement, and McKinley requires three.

The average number of mathematics courses taken by the students at the three schools was quite similar. Table 5.1 shows the average number of mathematics and English credits taken by students at each school, and the average share of students' total credits that were taken in mathematics and English.[56] Despite the different math requirements at each school, students took an average of 33 credits in mathematics, representing about 14 percent of their total credits. Thus, even though students at Coolidge and Washington were required to take only two years of math (the equivalent of 20 credits), the average student took over three years of math by the time he or she completed high school.

Although the three schools had the same English requirements, there are significant differences in the total amount of English credits taken and the share of total credits in English. Students at McKinley took an average of 37 English credits, slightly less than four years (40 credits), representing 16 percent of their total credits.

Table 5.1
Mathematics and English Coursetaking, by School
(Sample: 10th-12th grade cohort)

	Washington	Coolidge	McKinley
Mathematics			
Mean no. of credits	33.7	32.3	33.0
% total credits	13.6**	13.8**	14.4**
English			
Mean no. of credits	44.5*	42.7*	37.0*[a]
% total credits	18.2*	18.3*	16.2*
Sample size	398	380	350

*Differences between schools are significant at the .01 level.
**Differences between schools are significant at the .05 level.
[a] Note that the mean number of credits in English at McKinley is below the 40 credits required for graduation. The mean reflects the fact that a rather large percentage of McKinley's seniors fail to graduate.

In contrast, students at Coolidge and Washington took an average of five to seven more credits, representing a larger fraction of their total credits (about 18 percent). Thus, a number of students at these two schools were taking more than the required four years. Despite the strong emphasis on academic coursetaking at McKinley reported during our interviews at the school, students there took fewer English courses than their counterparts at Coolidge and Washington.

TRACKING STUDENTS: WHERE DO THEY FALL?

Even when the overall amount of English and mathematics coursetaking is fairly similar among schools, there are potential differences in students' experiences in terms of the "ability level" or "track" that they are placed in (see, for example, Oakes, 1985; Oakes et al., 1990). Despite differences in the number of levels of courses in various subjects at the three schools, each school grouped students by ability, for example, by classifying courses generally as college-prep and non-college-prep, and more specifically as honors or AP courses within the college-prep category.[57]

To examine students' track placements in mathematics and English, we classified each school's courses into five track or level designations for English: ESL, low, mixed, high, and honors; and four track designations for math: low, medium, high, and honors.[58] Individual English courses were classified on the basis of the "track" or level explicit or implicit in the schools' printed course descriptions and student handbooks, and additional information provided by counselors and teachers in our interviews with them. These track or level classifications, based upon the specific system used in each school, allow comparisons across schools in the structure of the course offerings. However, because of differences in the degree to which students are separated by ability across the three schools, these classifications proved most useful for comparing the lower and higher tracks.[59]

The track designations for math are based on responses from school personnel to our questions concerning the ability levels of students who take various courses and their likely postsecondary destinations. These tracks or levels are also based on the sequencing and timing of courses, rather than simply on the requisite level of ability within a particular course. Thus, the academic or high mathematics track entails taking algebra 1 in 9th grade, geometry in 10th grade, algebra 2 in 11th grade, and trigonometry/math analysis in 12th grade. Students classified in the more advanced or honors math track take the same sequence starting with algebra 1 in 8th grade, and finishing with calculus in 12th grade.[60] Alternatively, students in the "average" or medium track begin with pre-algebra courses in 9th grade, follow with algebra 1 in 10th grade or later, and take algebra 2 in 12th grade at the earliest, if at all. Students in the low track initially take basic or remedial math courses and do not advance beyond pre-algebra courses in later years.

We used this classification scheme to examine English and math coursetaking behavior in two ways. Initially, we examined the distribution of students across the tracks at several points during their high school career. Tables 5.2 and 5.3 show student track placement by school and grade in math and English for the first semester in grades 10, 11, and 12.[61] As seen in Table 5.2, 90 to 95 percent of students in 10th grade at all three schools were taking some mathematics. Students at McKinley were concentrated in the low and medium tracks, whereas the majority of students at Coolidge and Washington were in the medium and high tracks. The highest participation in the honors tracks was at Washington with 18 percent, the lowest at McKinley with 6 percent.

Over time, participation in the honors track in math is relatively constant at Washington and McKinley, but it dropped precipitously at Coolidge by the 12th grade. At McKinley, there was movement throughout the three years out of the low track and into the medium track.

Table 5.2
Percentage of Students Taking Mathematics, by Track and School
(Sample: 10th-12th grade cohort)

	Washington	Coolidge	McKinley
10th grade[a]			
Low	13.1	12.4	40.3
Medium	37.2	38.7	34.0
High	27.6	25.5	15.1
Honors	17.6	12.6	6.3
Not taking	4.5	10.8	4.3
11th grade[a]			
Low	9.3	21.8	26.3

Medium	30.4	32.9	44.9
High	23.6	21.1	19.7
Honors	20.9	11.1	6.3
Not taking	15.8	13.2	2.9
12th grade[a]			
Low	3.8	8.7	7.1
Medium	16.6	28.7	49.7
High	15.3	15.5	12.6
Honors	15.5	0.5	4.9
Not taking	49.0	46.6	25.7

[a]Based on track during first semester of the grade. If more than one math course is taken, the highest track level is recorded.

This probably represents efforts at McKinley to have all students take a college-prep curriculum, even if it takes longer for them to get there. Our data provide some evidence that these efforts pay off, as these students were more likely to be exposed to more advanced math classes. In contrast, the movement at the other two schools was out of all tracks and into non-participation. By 12th grade, almost half of the students at Coolidge and Washington were no longer taking a math course, whereas only one fourth of those at McKinley were in the same category.

Similarly, almost all students were taking an English course in 10th grade (93 to 97 percent). The four-year English requirement at the three schools meant that the overall participation rate remained relatively constant over time.

Yet there was a great deal of fluctuation across tracks and schools over time. Some of this fluctuation may reflect the idiosyncrasies of the tracking system at each school. For example, our Washington respondents told us that English classes at that school are largely untracked in 9th and 10th grade; most students not in ESL or honors English take English 1 and English 2 during those years. Consequently, in Table 5.3 we find that nearly 70 percent of Washington 10th graders are in the medium track. In the junior year, however, Washington students had more English alternatives. Non-college-bound students were gen-erally placed in English 3 or in one or two other "watered down" electives, whereas high achievers can select from a variety of faster-paced courses.[62]

Table 5.3
Percentage of Students Taking English, by Track and School
(Sample: 10th-2th grade cohort)

	Washington	Coolidge	McKinley
10th grade[a]			
ESL	5.8	4.7	4.9
Low	6.3	13.7	39.7
Medium	69.8	56.3	0.0
High	2.0	20.8	39.4
Honors	13.3	0.0	9.1
Not taking	2.8	5.0	6.9

11th grade[a]			
ESL	4.0	1.1	2.6
Low	15.8	11.8	41.7
Medium	30.2	57.9	0.0
High	34.4	14.7	45.1
Honors	10.8	10.8	8.3
Not taking	4.8	3.7	2.3
12th grade[a]			
ESL	1.5	0.0	0.6
Low	4.3	7.1	40.3
Medium	38.2	35.3	0.0
High	42.2	51.3	50.9
Honors	7.5	0.0	4.9
Not taking	6.3	6.3	3.0

[a]Based on track during first semester of the grade. If more than one English course is taken, the highest track level is recorded.

Table 5.3 displays this increased stratification for 11th and 12th graders.[63]

THE COLLEGE-PREP TRACK: WHO GAINS ACCESS?

Given our interest in various groups of students' access to and participation in college-preparatory and vocational curriculum, we examined the characteristics of students who were in the high or honors English and math track at a particular point in time. In this way, we could more closely identify those factors associated with students' placements within a school and the differences in those factors across the three schools. For math, we defined the college-prep group as those students who took algebra 2 in their junior year or earlier.[64] Students in college-prep English were those taking a college-prep or honors/AP level English course in the 11th grade. Again, we have selected this point in the math and English curriculum to signal those students who were likely to be college-bound. Consequently, we refer to these students as taking "college-prep" math or English.

Tables 5.4 and 5.5 show the participation in college-prep math and English for all students and for different groups of students at each school. Participation in college-prep math in the 11th grade ranged from 22 percent of the students at McKinley to 45 percent of Washington students, more than a twofold difference. Coolidge lies between the two schools with 33 percent of the 11th grade students in our sample in college-prep math. These differences are consistent with the differences perceived by school personnel at the three schools about stu-dents' abilities and their post-high school aspirations. Thus, Washington may offer more college-prep math to meet the perceived needs and the demands of students and their parents for a more academic curriculum.

Table 5.4
Percentage of Students Taking College-Prep Math,

by Sex, Race, and School
(Sample: 10th-12th grade cohort)

	Washington	Coolidge	McKinley
Total	45.0*	33.2*	22.0*
By sex			
Male	48.9	31.6	18.5
Female	41.7	34.5	20.3
By race			
White	33.2**	37.5**	--
Black	--	29.3**	22.9
Asian	78.6**	72.0**	--
Latino	15.0**	8.6**	19.5
By vocational participation			
Took < 6 courses	56.5**	45.5**	32.7**
Took 6 or more courses	22.8**	3.6**	14.0**

*Differences between schools are significant at the .01 level.
**Differences within schools are significant at the .01 level.

Table 5.5
Percentage of Students Taking College-Prep English, by Sex, Race, and School
(Sample: 10th-12th grade cohort)

	Washington	Coolidge	McKinley
Total	50.8*	44.5*	53.1*
By sex			
Male	43.9***	37.3**	44.1**
Female	56.4***	50.7**	61.5**
By race			
White	47.7	53.8**	--
Black	--	39.0**	56.7
Asian	58.9	62.0**	--
Latino	45.0	21.9**	41.7
By vocational participation			
Took < 6 courses	57.6**	57.5**	70.0**
Took 6 or more courses	37.5**	13.4**	40.5**

*Differences between schools are significant at the .01 level.
**Differences within schools are significant at the .01 level.
***Differences within schools are significant at the .05 level.

Participation in college-prep English was higher than in college-prep math at all three schools, with almost half of all students taking college-prep English in the 11th grade. This higher rate of participation was probably due to the higher English requirement. The comparable rate of participation in college-prep English across all three schools contrasts with the substantial differences observed for college-prep math.[65] When we disaggregate the data on these two tables by student characteristics, however, several interesting patterns emerge.

Table 5.4 shows that there is no statistically significant difference in participation in college-prep math by girls and boys within each school. However, significant differences exist at both Coolidge and Washington in participation rates by race or ethnicity. Most notably, the participation rate for Asian students was over 70 percent at the two schools; Latino students participated at a much lower rate than average. In contrast, African American and Latino students at McKinley participated at the same rate in college-prep math. The existence of differences by race or ethnicity at Coolidge and Washington, but not at McKinley, is consistent with the data presented in Sec. II showing significantly higher mathematics test scores for Asian students at Coolidge and Washington, but no differences for African American and Latino students at McKinley. Thus, differences in group rates of participation may be related to differences in mathematics interest and academic achievement. This relationship will be explored below.

Girls at all three schools participated at a higher rate than boys in college-prep English. The differences displayed in Table 5.5 are striking; more than 10 percentage points separate participation rates for girls and boys at each school. There are also clear differences in the participation of students from different racial and ethnic groups in college-prep English. At Coolidge, the pattern is similar to that for math participation; Asians participated at the highest rate and Latinos at the lowest. The same pattern holds for Washington and McKinley, although the differences in participation rates by race or ethnicity are not significant at these two schools (despite the fact that reading scores at the two schools do differ by race or ethnicity, as discussed in Sec. II).

Tables 5.4 and 5.5 also demonstrate a dichotomy at the three schools between students taking college-prep math and English and those taking a large number of vocational courses (six or more). At each school students who were classified as vocational concentrators were far less likely than non-concentrators to be enrolled in college-prep math and English. For example, only 4 percent of vocational concentrators at Coolidge took college-prep math, whereas non-concentrators were more than ten times as likely to be in the college-bound track. A similar sharp difference exists as well for college-prep English. This division is consistent with the perception by teachers at Coolidge that students taking vocational courses are less likely to be in the "fast" track academic courses. Because of Washington's practical arts requirement, the contrast between participation in college-prep courses is not as stark there as at Coolidge, yet a large and statistically significant higher rate of participation still exists between vocational non-concentrators and concentrators. This same differential pattern of participation characterizes students at McKinley as well. However, although the difference between concentrators and non-concentrators at McKinley is nonetheless significant, the size of the difference in the participation rates of these groups is smaller than at Coolidge, perhaps reflecting the high overall rate of vocational coursetaking by McKinley students.[66]

Figures 5.1 and 5.2 show the relationship between student academic achievement as measured by 10th grade scores and placement in college-prep math and English.[67] For takers and nontakers of college-prep math, Fig. 5.1 shows the mean 10th grade math achievement score and the range of scores as measured by the 5th and 95th percentiles. The distribution of 10th grade reading scores is shown in Fig. 5.2 for college-prep English takers and nontakers. The pattern is similar for all three schools: students who participated in college-prep English or math had significantly higher average test scores than students who did not take those college-prep courses.[68]

Yet, these figures also indicate that access to college-prep math was more restricted at Coolidge and Washington than at McKinley. Figure 5.1 shows that the scores of students taking college-prep math at Coolidge and Washington were concentrated within a narrow range compared with the scores of nontakers. College-prep math students at McKinley displayed a broader range of scores.

Fig. 5.1--Distribution of Math Scores for Takers and Nontakers of College-Prep Math, by School

Fig. 5.2--Distribution of Reading Scores for Takers and Nontakers of College-Prep English, by School

In contrast, access to college-prep English appeared to be more open to students with a wider range of achievement scores at all three schools. Test scores in the 5th percentile for students in college-prep English were in the 20-30 national percentile range.

These tables reveal that, as with vocational coursetaking, college-prep coursetaking did not correspond neatly with achievement. Perhaps most significant, some students at all three schools who had scores high enough to participate in college-prep math and English failed to do so. Figures 5.1 and 5.2 indicate that Coolidge and Washington students who did not take college-prep math or college-prep English had a wide range of scores, with test scores in the 95th percentile reaching the 80-90 national percentile range. The scores of some McKinley college-prep students overlapped with those of non-college-prep students in the middle range of scores. In general, these figures indicate that students in and out of the college-bound track may have been divided according to criteria that extend beyond achievement alone.

WHICH CHARACTERISTICS PREDICT COLLEGE-PREP PARTICIPATION?

The preceding analysis of student placement demonstrates differences across and within schools in the characteristics of students found in the college-bound track. However, the previous comparisons, based on a single demographic or achievement measure, do not allow investigation of other factors that may simultaneously affect track placement. For example, we saw that Asian students were more likely to participate in college-prep math than were students from other ethnic groups. Is this pattern of participation a function of their higher achievement test scores relative to those of students from other ethnic backgrounds? Or did Asian students more frequently participate in college-prep math because they or their parents were more persistent than other groups about enrolling in those courses? Or did the assumptions that school personnel make about the abilities of different groups of students influence their decisions regarding student course placement? In other words, do racial or ethnic differences explain student placement once we control for student ability? And do differences in track placement across schools remain once we account for differences in student characteristics?

To examine the relationship between placement in college-prep courses and a number of individual characteristics, we performed separate logistic analyses to predict the probability that a student would be in college-prep math or English. These analyses are similar to those we presented in the previous section on vocational coursetaking. We estimated logistic models separately by school and with students pooled across all three schools. In both cases, we modeled student placement as a function of gender, race/ethnicity, and achievement scores.[69] In addition, for the models estimated separately by school, we included SES in the model for Coolidge and an indicator for foreign-born students in the model for Washington and McKinley.

The details and results of the logistic analysis are presented in Appendix D. The findings are summarized in Tables 5.6 through 5.11, which show the predicted probability that a student with various characteristics would be in the college-prep math track and college-prep English track.[70]

Table 5.6 shows the probability that a student from each of the three schools described by gender and race/ethnicity would take college-prep math. These estimated probabilities assume that the "representative student" had math and reading achievement scores equal to the average for his/her respective school.

Gender Matters in English Placement, But Not in Math

A comparison of the probabilities in Tables 5.6 and 5.7 confirms the results of Tables 5.4 and 5.5--that a student's gender did not play a role in mathematics placement but was important in English placement. Within each school, after controlling for differences among students in their achievement scores, there were no substantial differences in participation in college-prep math for boys and girls.

Table 5.6
Probability of Taking College-Prep Math, by Sex, Race, and School
(Sample: 10th-12th grade cohort)

	Washington	Coolidge	McKinley
Male			
White	17.0	11.6	--
Black	--	21.2	8.9
Asian	46.2	62.2	--
Latino	13.6	5.3	10.8
Female			
White	14.8	13.6	--
Black	--	24.4	12.1
Asian	42.2	66.3	--
Latino	11.7	6.2	14.6

NOTE: Estimated probabilities are based on the school-specific logistic models in Table D.4 predicting the probability of taking Algebra 2 in the 11th grade or earlier. Math and reading scores are held constant at the school-specific means.

Table 5.7
Probability of Taking College-Prep English, by Sex, Race, and School
(Sample: 10th-12th grade cohort)

	Washington	Coolidge	McKinley
Male			
White	40.5	41.2	--
Black	--	36.2	55.3
Asian	49.1	53.9	--
Latino	49.4	25.2	45.4
Female			
White	55.6	61.7	--
Black	--	56.6	69.7
Asian	64.0	72.9	--
Latino	64.3	43.7	60.7

NOTE: Estimated probabilities are based on the school-specific logistic model in Table D.5 predicting the probability of taking college-prep English in the 11th grade. Math and reading scores are held constant at the school-specific means.

The reverse is true for college-prep English, where girls were significantly more likely to participate than boys.[71]

Race Matters in Math Placement, Less So in English

The results also show that, even after controlling for test scores, a student's race/ethnicity was often still important in determining the probability of participating in college-prep math and English. Again we find that Asian students at Coolidge and Washington had higher probabilities than white, African American, or Latino students with the same achievement scores of participating in college-prep math. For example, *Asian girls and boys at Coolidge were more than ten times as likely as their Latino classmates with the same math and reading scores to be enrolled in college-prep math.* In contrast, there is no difference in placement probabilities for African American and Latino students at all-minority McKinley High.

A student's race or ethnicity was a less important determinant of placement in college-prep English at Washington and McKinley. At these schools, the coefficient estimates on the indicators for race are not significant (Table D.5). Thus, even though the estimated probabilities in Table 5.7 are slightly lower for whites than for Asians and Latinos at Washington, and slightly lower for Latinos than for African Americans at McKinley, these differences are not statistically significant. However, a student's race/ethnicity was important for placement in college-prep English at Coolidge, our most racially diverse school. As in math, Asian students at Coolidge were most likely and Latino students were least likely to participate in college-prep English, even when their achievement levels were comparable. Falling in the middle, whites were less likely to participate than African Americans with the same scores.

In addition to highlighting important differences within schools in the placement probabilities for students with different status characteristics but similar achievement, Tables 5.6 and 5.7 show significant differences between the three schools, as well. The average Latino male and female, the only groups common to all three schools, had the lowest probability of placement in college-prep math or English at Coolidge. Asian students did best in terms of college-prep placement in both subjects at Coolidge. The average white student at Washington was more likely to secure a college-prep placement in math, but less likely in English, than his or her counterpart at Coolidge. The reverse was true for the average African American student at McKinley compared to Coolidge.[72] These comparisons show that, even after controlling for other student characteristics, including achievement scores, differences remain across the three schools for different racial and ethnic groups in the probability of being in the college-bound track, with traditionally disadvantaged minorities the least likely to occupy a slot in the college-prep track at the most diverse school.

Opportunities for Access to the College-Prep Track Vary by School

In addition to comparing the probability of taking college-prep courses across students with different racial and ethnic characteristics, we also used the logistics model to compare the extent to which achievement test scores predict college-prep placement.

Table 5.8
Probability of Taking College-Prep Math,
by Percentile Score and School
(Sample: 10th-12th grade cohort)

	Washington	Coolidge	McKinley
White male			
25th percentile	2.6	1.6	--
50th percentile	17.0	11.6	--
75th percentile	81.5	62.5	--
Black male			
25th percentile	--	3.3	1.9
50th percentile	--	21.2	8.9
75th percentile	--	77.4	32.5
Asian male			
25th percentile	10.0	17.0	--
50th percentile	46.2	62.2	--
75th percentile	94.9	95.4	--
Latino male			
25th percentile	2.0	0.7	2.3
50th percentile	13.6	5.3	10.8
75th percentile	77.1	41.4	37.4

NOTE: Estimated probabilities are based on the school-specific logistic model in Table D.4 predicting the probability of taking Algebra 2 in the 11th grade or earlier. The probabilities are evaluated at the same point in the math and reading score distributions (i.e., lowest quartile, median, highest quartile) for each school.

Tables 5.8 and 5.9 show the probabilities of taking college-prep math and English for students at the same relative points in the test score distribution at each school, specifically the 25th percentile, the 50th percentile (or median), and the 75th percentile. We made these comparisons for boys of different race/ethnicity groups.[73] This comparison indicates how a student's relative standing in his school affected his opportunities, compared to both his peers and his counterparts at one of the other schools.

As expected, within each school, a student's probability of taking college-prep math or college-prep English increased as his test scores increased from the 25th to the 75th percentile--the reverse of the pattern we observed with vocational coursetaking.[74] Again, the same differences within schools in placement for different race/ethnic groups are apparent. At every point in the test score distribution at Coolidge and Washington, Asian boys were most likely and Latino boys were least likely to be taking college-prep math and college-prep English. Yet at McKinley there is no significant difference for African American and Latino boys.

Table 5.9
Probability of Taking College-Prep English,
by Percentile Score and School
(Sample: 10th-12th grade cohort)

	Washington	Coolidge	McKinley
White male			
25th percentile	25.7	23.2	--
50th percentile	40.5	41.2	--
75th percentile	62.7	65.9	--
Black male			
25th percentile	--	19.6	22.0
50th percentile	--	36.2	55.3
75th percentile	--	61.0	83.2
Asian male			
25th percentile	32.9	33.5	--
50th percentile	49.1	53.9	--
75th percentile	70.4	76.4	--
Latino male			
25th percentile	33.2	12.7	15.9
50th percentile	49.4	25.2	45.4
75th percentile	70.7	48.3	76.9

NOTE: Estimated probabilities are based on the school-specific logistic model in Table D.5 predicting the probability of taking college-prep English in the 11th grade. The probabilities are evaluated at the same point in the math and reading score distributions (i.e., lowest quartile, median, highest quartile) for each school.

The findings we have presented in the preceding pages lend some support to the conclusions from our interviews and observations that the schools provided academic opportunities based on their perceptions of the abilities of their students. Moreover, data from our logistics analysis indicate that those perceptions were shaped not only by students' achievement test scores but also by race or ethnicity. Therefore, a student in the top fourth of his class was most likely to participate in college-prep math at Washington, the school with the highest average test scores, and least likely at McKinley, the school with the lowest average scores. Yet, within schools, students with the same test scores, but who were from different racial or ethnic groups, did not appear to have the same access to college-prep math. Asian students were more likely than were white, African American, or Latino students with the same test scores to be placed in college-prep math at Coolidge and Washington.

Another way to examine the effect of achievement scores on placement is to compare placement probabilities within and across schools for students with similar absolute test scores as measured by their national percentile ranking, as we did in Sec. III for vocational coursetaking. Tables 5.10 and 5.11 show the estimated probabilities of taking college-prep math and English for boys in different race or ethnic groups with national percentile scores equal to 30, 50, and 80. The within-school differences are similar to those reflected in Tables 5.6 through 5.9, as discussed above. The more interesting comparison is for students at the different schools.

A student with a given absolute achievement score had a different probability of being in the college-prep track depending upon whether he or she was at Coolidge, Washington, or McKinley.

Table 5.10

Probability That Students with Standardized Achievement Scores at the 30th, 50th, and 80th Percentiles Will Take College-Prep Math, by School (Sample: 10th-12th grade cohort)

	Washington	Coolidge	McKinley
White male			
Percentile score = 30	0.0	0.3	--
Percentile score = 50	0.9	3.6	--
Percentile score = 80	41.2	60.6	--
Black male			
Percentile score = 30	--	0.6	2.6
Percentile score = 50	--	7.1	16.6
Percentile score = 80	--	75.9	80.3
Asian male			
Percentile score = 30	0.2	3.8	--

Percentile score = 50	3.5	31.9	--
Percentile score = 80	74.6	95.0	--
Latino male			
Percentile score = 30	0.0	0.1	3.2
Percentile score = 50	0.7	1.6	19.9
Percentile score = 80	34.8	39.4	83.5

NOTE: Estimated probabilities are based on the school-specific logistic model in Table D.4 predicting the probability of taking Algebra 2 in the 11th grade or earlier. The probabilities are evaluated at the same point in the math and reading score distributions (i.e., percentile scores equal to 30, 50, and 80).

For example, Tables 5.10 and 5.11 indicate that a Latino student at McKinley with achievement scores falling in the 80th percentile nationally had a probability of participating in college-prep math equal to 84 percent. A Latino student with the same scores at Coolidge or Washington had a 35 to 39 percent probability of participating. This distribution, with the highest probabilities of taking college-prep math at McKinley and the lowest at Washington, holds for all races at each test score level, as tabulated in Table 5.10. This pattern also applies to placement in college-prep English for all students except Latinos, who were more likely to be in those classes at Washington than at Coolidge. Again, the differences in teachers' and counselors' perceptions of Latinos at Washington and Coolidge provide a clue about this pattern. As noted in Secs. III and IV, Washington seemed to regard its Latino students as "just like whites," whereas the Coolidge staff reported their Latino group to have fewer home advantages, more academic deficiencies, and limited futures.

This pattern of between-school probabilities suggests several possible interpretations. If we form an imaginary queue of students from highest to lowest ability, our data indicate that a higher percentage of students at Washington than at McKinley would take college-prep math. However, a student with above-average ability (for example, with percentile scores equal to 80) would have had less than a 50-50 chance of entering the college-prep track at Washington but would almost certainly have been in the college-prep track at McKinley.

Table 5.11
Probability That Students with Standardized Achievement Scores at the 30th, 50th, and 80th Percentiles Will Take College-Prep English, by School
(Sample: 10th-12th grade cohort)

	Washington	Coolidge	McKinley
White male			
Percentile score = 30	13.7	14.5	--
Percentile score = 50	26.1	31.0	--
Percentile score = 80	54.0	66.0	--
Black male			
Percentile score = 30	--	12.0	30.7

Percentile score = 50	--	26.6	71.2
Percentile score = 80	--	61.1	97.0
Asian male			
Percentile score = 30	18.3	22.0	--
Percentile score = 50	33.4	42.8	--
Percentile score = 80	62.5	76.4	--
Latino male			
Percentile score = 30	18.5	7.5	23.0
Percentile score = 50	33.6	17.8	62.4
Percentile score = 80	62.8	48.3	95.6

NOTE: Estimated probabilities are based on the school-specific logistic model in Table D.5 predicting the probability of taking college-prep English in the 11th grade. The probabilities are evaluated at the same point in the math and reading score distributions (i.e., percentile scores equal to 30, 50, and 80).

One interpretation is that this student would have been "crowded out" of the college-prep track at Washington by the large number of students with higher ability and "crowded into" the college-prep track at McKinley by virtue of the fact that he or she was one of the top students. Alternatively, the student at Washington with above-average ability may have been less motivated or encouraged than his or her counterpart at McKinley, perhaps because of a large cohort of high-achieving peers, to participate in the college-bound track. Finally, the interview data from McKinley indicate that because that school encourages students to at-tend college, its college-prep track may simply have been broader and substantively different from those at the other two schools.

The Role of SES and Country of Birth

Student demographic characteristics such as race, sex, and achievement measures are not the only possible candidates to explain placement in college-prep math. However, as noted in Sec. IV, our data were not complete enough to allow us to estimate the effect of student characteristics such as SES and country of birth on track placement for all three schools. However, when we estimate the logistic model separately by school, it is possible to include SES as a predictor in the model for Coolidge, and an indicator for foreign-born students in the models for Washington and McKinley. The results, tabulated in Table D.4, show that, holding student gender, race, and achievement scores constant, low-SES and middle-SES students were less likely to be placed in college-prep math than high-SES students. This negative relationship is strongest for the low-SES students. Thus, students from poorer families at Coolidge faced a disadvantage relative to equally talented students from more prosperous families.

A student born abroad may face language difficulties that preclude placement in the high track. However, although foreign-born students were less likely than native-born students with comparable achievement levels to be enrolled in high-track English, at Washington there was no significant effect upon mathematics placement of being born outside of the United States. In contrast, foreign-born students at McKinley were *more* likely than U.S.-born students to be found in the college-prep mathematics track.

CONCLUSIONS

The analyses of our student transcript data for patterns and probabilities of academic track placement that we presented in this section largely conform to the complex picture we drew of the curriculum decisionmaking process from our field work. Differences in access to college-preparatory coursework appear to have been driven by a number of factors both between and within schools. In our analysis of academic coursetaking patterns in this section, we again find a pattern of race- and social-class-related differences that are not entirely explained by achievement. Individuals' enrollment in college or non-college courses--as in vocational education--appears to have been influenced by judgments made about the race and social class groups to which they belong. These judgments also seem to affect the overall number of positions that schools provided in various tracks--with the fewest positions available at schools serving substantial numbers of low-income and African American and Latino students. They also seem to have affected the relative chances to enroll in college preparatory courses of students from different groups within the same school. However, these patterns are complicated by the uneven distribution of achievement among schools. Lower-achieving schools provided fewer opportunities to take college-preparatory classes overall, a circumstance that decreased students' opportunities overall. At the same time, these schools' achievement criteria for entry into these classes were lower than at other schools, a circumstance that had the effect of increasing minority students' opportunities.

Perhaps because schools with lower average levels of achievement want to offer a full range of academic programs--from remedial to honors--these schools give lower-achieving students greater opportunities to participate in higher-level courses than they would have at schools where the average achievement levels are higher. What results is a complex structure of differentiated opportunities both between and within schools. Moreover, the overlap in achievement among students in college-prep and non-college-prep programs is so great that factors other than prior achievement, race, and social class clearly play a role in student coursetaking.

In the section that follows we place our findings about vocational and academic coursetaking in the context of our earlier findings from our interviews and observations and suggest a conceptual framework for better understanding the culture of curriculum differentiation at comprehensive high schools--the dynamics of curriculum decisions, student placements, and the role of vocational education.

VI. AN ECLECTIC EXPLANATION OF MATCHING STUDENTS TO CURRICULUM

The analyses in this report sought to shed light on the complex and dynamic processes that high schools use to match students with various courses. Specifically, we hoped that our close look at three large high schools might provide a better understanding of the effect on curriculum offerings and students' assignments of educators' judgments about students' capacity and motivation, students' and parents' preferences, and the constraints and opportunities generated by schools' own cultures and their larger social and policy context. We were especially interested in how these factors might contribute to the racial, ethnic, and social-class patterns of curriculum participation so consistently found in national studies--patterns showing that immigrant low-income, and non-Asian minorities are more likely than their more advantaged peers to take low-level academic courses and vocational education. And, we were interested in what these patterns and practices might portend for reforms that are attempting to integrate academic and vocational studies at the high school level.

Our work was guided by a number of theories that have been proffered to explain this matchmaking process--theories attending to human capital development, those focusing on institutional constraints embedded in the ideological and structural regularities of schooling, and those grounded in ideas of cultural and economic reproduction. We also kept in mind recent work suggesting that the matching process is more serendipitous than such theories would suggest, as a result of the untidiness and unpredictability of educational policy and practice.

In this final section, we bring together the findings from the two phases of our study--the field work and the transcript analyses. Placing our findings about vocational and academic coursetaking in the context of the findings from our interviews and observations, we blend existing theories into an eclectic framework for better understanding the culture of high school curriculum differentiation--i.e., the values, traditions, and structures that underlie curriculum offerings and student assignments. This framework suggests a number of constraints that face policymakers and educators who are attempting to improve the quality and status of vocational education in comprehensive high schools.

AN ECLECTIC EXPLANATION

Our observations and interviews in our case study high schools supported a picture of curriculum and student assignment decisions that combines as well as elaborates elements from a number of theoretical perspectives. As we detailed in Sec. III, educators often articulated "human capital" considerations as they described their course offerings and student assignment practices. At the same time, structural and ideological considerations (e.g., state policies emphasizing academics and the tradition of offering a comprehensive program) also affected what courses schools thought they should offer and how they placed students in them. Finally, students' race and social class proved to influence faculties' decisions about what courses to offer and students' assignments, partly as a result of educators' judgments about particular groups and partly stemming from parent or student pressure. However, we conclude that the schools' course offerings and patterns of student assignments were not simply the result of rational planning about what the school should offer or what individual students need, either in terms of human capital development, predetermined structural arrangements, or social stratification. Some of what happened seemed to result from the vagaries of everyday life in schools--juggling resources, staffing, and schedules and responding to pressures from outside. It is important to note, however, the effect of this mix of well-considered decisions and ad hoc responses was not the same at all schools, nor for all students within any one school. Our transcript analyses supported this eclectic view.

Setting our qualitative work next to the analysis of student transcripts, we can elaborate this eclectic explanation of school decisions regarding curriculum offerings and student assignments. Our elaborated perspective consists of eight propositions that we set forth below.

Proposition 1: Schools View Students' Abilities, Motivation, and Aspirations As Fixed

High school faculties make assumptions about the abilities, aspirations, and educational "needs" of their incoming students. As described in Sec. III, each school had a quite elaborate procedure for gathering relevant information on which to base these judgments--e.g., obtaining achievement test scores and recommendations about students' abilities and motivations from their junior high school teachers. Information about a student's past record is viewed as important, since it is assumed that students' prior achievement is a good indicator of what they can be expected to learn in the future and that the motivation they have demonstrated in the past is also likely to continue.

Although making these judgments may seem a sensible and rational process for schools to undertake, it is important to note that these judgments lead to crucial decisions about what courses incoming students can choose to take and opinions about what track or ability level seems most appropriate for them. They also drive students' assignments through high schools, since choices made as a result of the well-rationalized and articulated student placement policies when students enter high school are seldom revised in subsequent placement decisions. What makes these initial judgments so powerful is the widespread belief that a student's educational prospects are virtually set by the time he or she gets to high school. Motivation and ability are considered by many in schools to be fixed attributes that educators cannot modify. This theme echoed in the words of administrators, teachers, and counselors in all three of our schools. Some told us directly that they felt that it was "all over" by high school. Others told us indirectly, in their inability to recall examples of students who had made notable shifts in their achievement or motivation.

Proposition 2: High Schools Seek to Accommodate, Not Alter, Student Characteristics

Probably as a consequence of the pervasive belief that students' abilities and motivations are unlikely to change much as a result of their experiences in high school, schools make curriculum decisions that are designed to accommodate students' abilities and dispositions, not to alter them. As our field work indicates, in most cases this approach reflects a sincere wish to provide all students with courses in which they can be successful and maximize their potential. This is most evident when educators talk about providing courses where low-ability students will not fail or feel pressure to drop out of school.

The variation in overall course offerings among schools--i.e., the number, type, and ability levels of academic and vocational classes offered--stems, in part, from this effort to accommodate the abilities and needs of the student body as a whole. Educators' perceptions about what their student bodies need vary from school to school. Course offerings at a particular school, however, appear to be fairly stable from year to year. This happens, in part, because of resource and staffing constraints (see below) but also because schools use their judgments about the abilities of past cohorts of students to make predictions about the likely characteristics of those students who will attend in the future. The judgments schools make about the abilities and motivations that characterize students in their community influence decisions about how the curriculum should be structured. This is particularly noticeable when schools reconsider the appropriateness of their curriculum as their community changes.

However, educators are mindful of the fact that their schools enroll students with a range of abilities and motivation, even if the community is seen as generally high, average, or low in achievement and/or motivation. Schools accommodate these individual differences by providing an array of academic and vocational courses and offering academic classes at different ability levels. The student assignment process, then, is the mechanism by which students are matched with courses that seem appropriate for them. At this point, however, parent and student preferences also come into play. Students are usually free to choose their elective courses, and they are often permitted to opt for academic courses at lower ability levels than what the school might see as the best match. Usually, schools are willing to accommodate parents who express a strong preference for enrolling their child in more difficult courses than those prior teachers or the guidance counselor might recommend. However, in these cases, schools often protect themselves from liability for the failure that they anticipate by asking parents to sign a waiver. Such practices reveal the strength of the schools' confidence in their judgments and assignment practices.

Proposition 3: Academically Able Students Reap the Benefits of Curriculum Accommodation

As schools tailor their curriculum to their perceptions of what their students need, students attending schools with lots of high-achieving classmates reap the curricular benefits of high expectations. The curricular differences among our three schools reflect patterns found in national data. The curriculum at high-achieving Washington High offered the most developed vocational programs, more advanced placement academic classes, and an extensive and interesting array of college-preparatory courses. The latter is reflected both in the printed description of the curriculum and in the number of college-preparatory "slots" found in our transcript analyses. Access to a well-developed regional vocational center enhanced Washington students' vocational opportunities far beyond what could be supported by the school's relatively low vocational enrollment.

Opportunities at Coolidge, our school where students' incoming abilities were somewhat lower, were neither as rich nor as extensive as those at Washington. In the vocational domain, the school listed an array of vocational offerings. However, stringent academic graduation requirements prevent many of these courses, especially the advanced sections, from being offered. The offerings in the regional occupational program to which Coolidge was attached are somewhat more limited than at the center serving the other two schools.

Curriculum offerings were least developed at McKinley, our school where incoming 9th graders had achievement scores below the national average. McKinley provided the fewest positions in college-preparatory classes, and the comments of teachers and counselors indicated that few of these classes were academically challenging. Additionally, even though McKinley was connected to the same regional vocational school as Washington, and thereby had access to its rich array of offerings, McKinley's policies constrained its students from taking advantage of the wide range of courses offered there. For example, McKinley required the greatest number of academic courses for graduation, which made freeing up the three-hour blocks required by the regional center a near impossibility for students. Additionally, the chaotic atmosphere on campus prompted administrators to discourage students from leaving for any reason, even to attend the regional center. Despite these curricular constraints, the greatest vocational coursetaking took place at McKinley.

Within the three schools, counselors worked with students to ensure the best fit between them and their courses. And, as one would expect, at all three schools a student's probability of taking college-prep courses (those courses that lead to the greatest post-high school opportunities) increased as his or her relative standing in the school's test score distribution increased. For example, a student at the 75th percentile was more likely than one at the 50th percentile to be in college-prep math, and a student at the 50th percentile was much more likely than one at the 25th percentile to be in a college-prep math course.

Moreover, within schools vocational education is largely the purview of low-achieving students. Although most students took some vocational courses, our analysis of college-prep math and English participation revealed significant differences between students taking six or more vocational courses (vocational concentrators) and non-concentrators in their participation in college-prep courses. At most schools, concentrators were less than half as likely to participate in college-prep math or English as non-concentrators. And further analyses showed that, generally speaking, college-prep students at all schools participate less frequently in vocational courses and particularly in occupational courses where this difference in group participation is significant.

The term "dumping ground" is harsh, but that is the word our respondents used over and over again to explain an important function of vocational classes at their schools. At Coolidge and McKinley particularly, no one claimed that the vocational program (the on-campus courses, in particular) provided a coherent training program. Rather, business classes were viewed as a good place for college-bound students to gain some general skills, and the trade-related courses (woods and auto, primarily) were seen as classes where low achievers and misbehaving students might have a positive school experience.

Much of this thinking seems rational and sensible, but it is critical to see this process as part of a larger set of assumptions that schools base students' curriculum opportunities on judgments of their ability and motivation; that schools see ability and motivation as unlikely to be altered by their high school experiences; and that those students who have demonstrated high achievement and motivation in the past are those students who are provided with the richest curriculum opportunities at their schools and those that lead to the greatest opportunities after graduation.

Proposition 4: Race, Ethnicity, and Social Class "Signal" Ability and Motivation and the Curriculum Accommodations to Them

In all three of our schools, judgments about ability and motivation and the academic and vocational opportunities most appropriate to accommodate them broke down fairly consistently by race, ethnicity, and social class. At the school level, the middle-class white and Asian students at Washington were judged to represent a high-achieving, highly motivated community. The school responded by offering the richest curriculum in both the academic and vocational domains. The mixed population at Coolidge was perceived as representative of a community growing increasingly diverse in achievement and motivation. The school curriculum paralleled this judgment, offering a college-oriented curriculum but one with fewer advanced courses than at Washington. Coolidge's vocational program was also less extensive than Washington's, and the school offered fewer sequences of related vocational courses. However, the school did offer a wide range of business courses that were seen as appropriate for the large proportion of students with average levels of achievement who probably would not go to college. And, all Latino and African American McKinley saw itself as an institution determined to do the best it could for students from low-achieving and, in the case of Latinos, less-motivated communities. This was the school with the weakest curriculum, with the fewest college-preparatory classes, and the narrowest range of vocational offerings, even as the school enrolled the largest percentage of students in vocational classes.

Both Washington and Coolidge illustrate some of the dynamics of these links between community demographics and perceptions of students' abilities, motivations, and needs. As described in Sec. III, as their school populations changed, so too did perceptions of the appropriate content and rigor of the courses these schools offered. Of course, these schools were probably responding, in part, to community demand. At Washington, at least, the influx of Asian students brought with it pressure to offer more math, science, and computer science classes and to pull back on the "practical arts" requirement.

Faculty perceptions of the abilities of students who were members of various racial, ethnic, and social class groups corresponded fairly consistently to average *group* differences in performance on standardized tests, as evidenced in our transcript analyses. But, our interviews revealed that generalizations about group tendencies were often extended to all students with particular status characteristics. In our conversations with them, faculty justified their views of group differences with explanations about how different cultures either enhanced or impeded students' prospects for academic success. For example, Asians were uniformly considered likely to succeed, because of a combination of high motivation, family support, and a cultural value for learning. In contrast, Latino students were thought to be handicapped by an absence of family support, little value for postsecondary schooling, and a disinterest in working hard at school.

Within the schools, faculty reported racial or social-class differences in students' track placement--perceptions largely borne out by our transcript analyses. For example, our transcript analyses of participation rates in college-prep math (defined as students taking Algebra 2 by 11th grade) demonstrate significant differences in coursetaking by race/ethnicity. Participation rates in college-prep math were almost twice as high for Asians as for whites at Washington and Coolidge. Latino students participated at a much lower rate at these two schools. At McKinley, no significant differences were found in the college-track participation rates for African Americans and Latinos, the two dominant groups. However, across our schools, African American and Latino students took more vocational education than white and Asian students.

Although these patterns parallel group differences in prior achievement, judgments made about students who belong to different groups sometimes influenced individual course assignments, even when their past achievements may have merited different decisions. We saw evidence of the latter in our transcript analyses showing the enhanced probabilities of Asians enrolling in college-preparatory programs and the diminished chances of Latinos enrolling either in college-preparatory programs or in a concentrated vocational curriculum, even when their scores on achievement tests were comparable. For example, Asian males at the 75th percentile in the test score distribution had about a 95 percent probability of taking college-prep math at both Washington and Coolidge, whereas a white male with the same standing in the test score distribution had only an 81 percent probability of taking college-prep math at Washington and an even lower probability (62 percent) at Coolidge. Again, at both schools, Latino males were least likely to be in college-prep math at each point in the score distribution. These results show that even after controlling for test scores, a student's race/ethnicity was often important in determining his or her probability of participating in college-prep math and English courses. This result did not hold at McKinley, where, for both subjects, African American and Latino males have similar probabilities of being in college-prep courses.

However, despite the fact that the vocational program at McKinley was the least coherent or well developed among our three schools, McKinley students were most likely to be concentrators in vocational education--even those enrolled in college-preparatory programs and those with equivalent achievement test scores. For example, African American boys at McKinley were more than twice as likely (and girls four times as likely) as their African American peers at Coolidge to concentrate in vocational education. And, even those students in the top 25 percent of their class had a greater probability of concentrating in vocational courses there than their counterparts at the more advantaged schools. If McKinley is representative, it may be that schools with larger concentrations of minorities and low-income students are *disproportionately* vocational--in size, not quality. The result is that students of all backgrounds attending those schools were more likely to be vocational concentrators than their peers with comparable achievement scores who attended schools with larger numbers of white and middle-class students.

Some Coolidge staff made explicit reference to racial discrepancies in students' assignments. One teacher, for example, felt that Asians were routinely placed too high, whereas African Americans and Latinos were placed too low. A few Coolidge teachers noted that their predominantly middle-class African American students could be found across all academic levels, although they were less likely to be in the fast track or honors courses. These somewhat conflicting perceptions are given further complexity by our transcript findings that with achievement levels held constant, African American students who completed 12th grade were *somewhat more likely than whites* to be enrolled in college-preparatory programs.

Despite the clear links between students' status characteristics and curriculum offerings at the school level and student placements, only one of our respondents reported instances where a student's placement was based on race, ethnicity, or socioeconomic status. Rather, educators credited student placement to a combination of student choice (Latino girls' preference for cosmetology, for example), motivation, and ability, although many recognized indirect effects of student background characteristics. Thus, they tended to justify existing differences in student placement as resulting from a self-selection and a fair competition for the available slots in the college-prep track. In keeping with a human capital perspective, faculties treated the opportunity structure as open with individual placements dependent on student effort, ability, and prior achievement. Disproportionate racial, ethnic, or social-class representation in track placement (given equal achievement) was attributed to differences in students' choices; these choices may be culturally determined, but if so, they are beyond the ken of the educational system. Most insisted on the fairness of placement practices, even in the face of evidence that race and social class affect placements over and above test scores and other indicators of students' potential.

However, many of our respondents also voiced considerable ambivalence about ability grouping and tracking. Although most believed that tracking was necessary to accommodate student differences, many also regretted the racial and social-class separation that resulted. Yet, few at the schools expressed any confidence that the needs of either the high- or low-achieving students could be met without tracking.

The juxtaposition of these widespread views of the fairness and openness of the placement process and the considerable regret about the racial segregation it can create cautions against a simplistic view of schools as deterministic sorting agencies. Schools do not mechanistically sort students into college-prep or vocational programs and into high or low academic courses in ways that blatantly discriminate against low-income and non-Asian minority students and reproduce the economic and social order. Tracking may contribute to this end, but students and their parents may also play an active role in producing it. As noted above, students exercise choices about their elective courses, and they are often permitted to enroll in "easier" courses. It may be that low-income and Latino students, in particular, are simply less confident about their ability to manage difficult courses. Or they, along with their African American peers, may see vocational courses as providing them a safety net from joblessness, should college or post-high school training not be possible. They are far less likely than their more advantaged white and Asian peers to have the economic resources to sustain education beyond high school. Thus, these students may have played an active role in enrolling in non-college-track classes and vocational courses that promise to give them job-related skills.

Nevertheless, our interviews suggest that the schools seemed to accept these choices and only rarely pressed low-income and minority students to stretch beyond their own or others' low expectations. These findings suggest that race, ethnicity, and social class do, as Rosenbaum suggests, "signal" ability. Once signaled, the judgment about ability triggers assignments, insofar as the school's curriculum structure will allow an "appropriate" placement to be made.

Proposition 5: Curriculum Adaptations to Students' Needs Are Constrained by Structural and Ideological Regularities in the School Culture

So far, our explanation has focused on how school responses to students' characteristics shape both the curriculum offerings at a school and individual students' assignments to those courses. However, we also found that longstanding beliefs about how the high school curriculum should be structured and recent policies mandating increased academic requirements for high school graduation and pressing schools to offer more college-preparatory courses affected the structure of the curriculum at the schools. By influencing the type and number of courses that the schools offered, these pressures also affected students' assignments. Additionally, the belief, detailed above, that students' abilities and motivation are set by the time they reach high school influenced the structure of the tracking systems at the schools. In particular, structural obstacles to upward track mobility mirrored the view that students would not learn enough to manage more difficult classes. As we describe below, these "ideological" positions lead to structural regularities at schools that affect the matches between students and courses.

Despite the differences among their student bodies, the curriculum offerings and tracking systems at our three schools were more alike than different. This similarity was driven, primarily, by a belief shared by all of the schools that each high school should provide a comprehensive set of offerings to accommodate a very diverse student body--academic courses that range from remedial to advanced placement and a comprehensive set of vocational offerings that range from introductory, avocational industrial arts classes and business courses that teach generic skills appropriate for students of all abilities to sequences of occupationally specific courses that prepare non-college-bound students for work. Each school attempted to offer such a range.

Further, in recent years the curriculum at all three schools has become even more similar as a result of new state policies emphasizing academics and college preparation. During the past two decades, the state had enacted recommended curriculum frameworks, graduation requirements, proficiency examinations, university admission requirements, and accountability systems that embody assumptions that all students need considerable academic preparation and that schools should press as many students as possible toward rigorous academic courses. Such policies not only provided a formal statement of what educational practices should meet these needs, they also limited schools' flexibility in making curriculum decisions to address perceived individual differences.

For example, increased state graduation and university admissions requirements had a powerful influence on the structure of course offerings at all three schools, pressing all three schools toward more academic and fewer vocational offerings. However, the effect of these factors varied, in part, with the degree to which the assumptions of state policies matched the assumptions of those at the schools. For example, Washington traditionally emphasized college preparation and made few changes in response to state graduation requirements, but these requirements resulted in an increasingly narrow and rigid curriculum. Coolidge and McKinley, on the other hand, have not weathered some of the same influences as well. As at Washington, increased graduation requirements combined with a strong academic tradition have narrowed the curriculum focus at Coolidge. Although Coolidge has maintained its academic focus, many perceive this focus to be poorly suited to the needs of the current student population. And, the extensive social problems faced by many of McKinley's students are seen as severely limiting that school's ability to promote achievement and college attendance, despite its attempts to maintain an academic, college-preparatory curriculum and image.

Because our schools were subject to state policies emphasizing academics, each offered a full-fledged college-prep program regardless of the needs and abilities of their students. In fact, as noted in Sec. III, the percentage of courses offered in each area was remarkably consistent across schools. Reports from our respondents further substantiated this academic emphasis and underscored the structural rather than individual factors supporting it.

However, these structural constraints did not completely limit the schools' discretion in their course offerings or standardize the curriculum across the three schools. Despite similarities in the overall percentage of academic courses offered and the state's emphasis on college preparation, our transcript analyses revealed significant differences between schools in the total percentage of students participating in college-prep math and English. The school with the highest average test scores, Washington, had the most students participating in college-prep math, and the school with the lowest average test scores, McKinley, had the fewest students participating. Similar results were obtained when participation in college-prep English was examined. More Washington students than Coolidge students participated in college-prep English, and Washington had higher average achievement scores in English than Coolidge.[75] These participation results contradict a purely structuralist hypothesis, as they support the view that individual and group factors--such as perceptions of students' ability--also play an important part in determining curriculum offerings.

However, one effect of this structural constraint on local schools' ability to make placements that they believed would accommodate lower-achieving and less-motivated students' needs was that students of equal ability had the best chance of being placed in a college-prep course at a school with lower average achievement levels than they had at a school with higher average achievement levels. These findings are consistent with structuralist theories (Hallinan, 1987; Sorensen, 1987) and some previous research (Garet and DeLany, 1988) indicating that schools treat a fairly fixed fraction of their students as college-bound.

Such structural constraints worked in favor of the coursetaking opportunities of low-income African American and Latino students at McKinley. Even though McKinley had fewer "slots" in the college-prep curriculum overall, the achievement scores required for a non-Asian minority student to qualify for a slot were considerably lower than at either Washington or Coolidge. Thus, structural constraints worked to counterbalance beliefs about accommodation that might have otherwise led to even fewer college-prep opportunities for the minority students at McKinley.

However, even though these analyses support the notion that structural factors affect course offerings and placement decisions over and above those indicated by student factors alone, the number of courses in a particular school also corresponds to widely held beliefs about the ability levels of the student body. This complex set of findings directs us toward Rosenbaum's (1986) tournament model of high school tracking, a model that can help explain the interaction of efforts to accommodate differences in ability and structural forces.

Rosenbaum argues that structural factors dominate over individual attributes, but he also describes the cumulative way that structures and individual characteristics affect selection decisions as students make their way through secondary schools. First, status characteristics and past attainments "signal" ability, and these are used to select students into curriculum paths. But, the structure of the grouping system is such that once students miss out on a high track placement, they are rarely, if ever, considered again--thus, the metaphor of a "tournament." At each point in the schooling process where student assignments are made, students are classified as winners or losers; winners proceed to compete for the next level, whereas losers are declared less able and denied the opportunity to compete for the highest-status outcomes. Thus, the model implies stability in classifications with a winnowing down of high-status contenders and unidirectional mobility. Any loss sets a "ceiling" on ability for an individual and leads to downward mobility. High-status assignment requires consecutive wins, and any win sets a "floor" on ability.

Our case study data also lend support to the tournament model. We learned that placements were relatively stable, with middle-school performance exerting a strong influence on initial track placement. As noted in Sec. III, few respondents could provide examples of upward mobility. Instances of improvement were rare. When track switching occurred, movement from a higher to lower track was much more common, but stability in curriculum placement was most pronounced. In addition to individual judgments about ability such structural factors as prerequisites, course sequences, and formal policies regulating course offerings constrained opportunities and set ceilings on student attainments.

Proposition 6: Declining Resources and Demographic Shifts Also Constrain Curriculum Offerings and Student Assignments

Throughout our study, we found considerable evidence supporting a rational, if complex, explanation of curriculum offerings and student assignments--i.e., an interaction of efforts to accommodate students' differences in ability and motivations, structural constraints on these efforts, and the role of race and social class in signaling ability and motivation. Schools appear to engage in a rational process of designing curriculum offerings and placing students in courses that balances their efforts to accommodate with the constraints they face from structures imposed by policy (e.g., increased academic requirements imposed by the state) or tradition (e.g., a "tournament" approach to tracking).

However, like Garet and DeLany (1988), we found other factors that intercede and affect what schools actually do. Such factors as declining enrollments and demographic shifts can lead to fewer resources (as well as to the perception that existing resources are a poor match with what students currently need). These, in turn, affect staff expertise, counselor load, and scheduling. Such contingencies often affect schools in unpredictable ways and interfere with their best efforts to make and carry out rational decisions.

We saw the effects of limited staff expertise most evident in the schools' vocational offerings. Declining enrollments had made impossible the hiring of new teachers in any but required academic subjects, and vocational retirees were not replaced. As a result, the vocational offerings were at the mercy of the teachers remaining at the school. At none of the schools did this lead to a coherent set of vocational offerings. Such vagaries in staff expertise contributed to the considerable lack of fidelity we found between the curriculum as offered and as envisioned in the minds of educators. For example, vocational education teachers at all three schools told us that recent budgetary and programmatic cuts had resulted in the elimination of most advanced vocational courses. Some teachers told us that as a result, students who could take only introductory courses in, for example, auto shop or industrial drawing would *not* acquire training sufficient to move directly into a job in those fields. Most McKinley students in our sample did not apply to two- or four-year institutions, and very few applied to technical schools. Given their relatively poor academic achievement and their relatively high rate of participation in a vocational curriculum that may no longer serve as a training ground for the workforce, McKinley's students appear to face a clouded future.

The enormous increases in counselors' student loads illustrate the effects of across-the-board staffing shortages. At each school, counselors had to provide advice and make placement decisions about hundreds of students. At none of the schools was it possible for them to carry out this function with more than the most superficial attention to each student. This constraint contributed to a considerable "slippage" between the rational model of student assignments that persisted in the minds of the school faculties and the results of the actual process evidenced by students' transcripts.

Finally, we also became aware of the enormous logistical difficulties inherent in the attempt to create a master schedule that offers all of the required courses at a number of track levels and enables the appropriate placement of hundreds of high school students into those courses. At each school, we were told that some student assignments and tracking resulted from constraints in the scheduling process, such as cohorts of low-level students winding up in the same (non-tracked) elective classes. These glitches in the placement system were viewed as unintentional and regrettable, but unavoidable.

Proposition 7: Irregularities in the Distribution of Curriculum Opportunities Often Work to the Advantage of the Most Advantaged Students

Although constraints interfered with the schools' ability to carry out decisions in the ways they would have liked, not all schools and students were affected in the same way. Some schools (like our advantaged Washington) appeared to be more resilient to external forces--perhaps because of community stability or the school's firm and consistent administrative style. Others (like McKinley) seem constantly rocked by changing internal policies, limited staff, and inadequate resources.

Within schools, external and internal constraints affected students on different curriculum paths differently. Those in the highest-status academic curriculum appeared to have the best defined and most carefully sequenced programs available and the most stable placement patterns. Those at the very bottom seemed to have access to few coherent programs (especially in their vocational options), but they appeared to experience considerable stability in their placements (especially in their low-level academic courses). School constraints appeared to provide those students in the middle with neither the coherent programs experienced by those at the top nor such stable placements as those found at either the top or the bottom. These students' placements seemed to receive less time and careful planning--either by students or their counselors. However, when individual placements were made by happenstance, the effect seemed to be lesser rather than greater opportunity. For example, when a counselor needed to fill an empty slot in a student's schedule, unless the student was outstanding or assertive, the placement was far more likely to be in vocational education than in a rigorous academic class. This means that the scheduling process was less likely to optimize the educational program of each student by "stretching" him or her academically and vocationally.

Moreover, we found some combined between- and within-school factors that further enhanced the advantages of academically advantaged students. Although course placements were quite stable in all three schools, in the more smoothly functioning and academic schools (Washington and Coolidge) high-achieving students appeared to be more willing and able to "push the system" to get the schedule and curriculum choices they wanted. The schools seemed to accommodate these students' choices or their parents' preferences. Low-achieving students and many midrange students appeared less willing to challenge their curriculum placements. If they or their parents did, they often met resistance and skepticism about their ability to handle more advanced, academic work. In the less-smooth-running school (McKinley), mobility among classes appeared to be be less frequent overall. The changes we noted at McKinley were changes downward as a consequence of poor performance or because a student reported to a counselor that a placement in a difficult course was a mistake. As a consequence, more advantaged students at more advantaged schools appeared to have considerably more opportunities to exercise their "choices" than did other students.

In sum, then, our analyses do not support a simplistic view of curriculum offerings and student assignment either as neutral, achievement-based processes of building human capital or as deterministic processes of consigning students to a curriculum that will reproduce social and economic inequalities linked with race and social class. Both our field work and our transcript analyses reveal far too much sloppiness in the patterns of offerings and assignments than either explanation would require. Nor, however, did we find that apparent "mismatches" between students and curriculum could be adequately explained by structural constraints or "open admissions" policies where curriculum decisions were determined by students' choices. What we conclude, then, is that curriculum offerings and student assignments result from a mix of efforts to match talent with opportunities, cultural assumptions about the effects of race and class on school success, structural characteristics of high schools, and political maneuvering by efficacious students and their parents. Our explanation, then, suggests a complex dynamic in large diverse high schools that bundles together achievement, choice, race, and class--a dynamic that has important commonalities across schools but that does not operate identically at all schools or for all students within schools. However, both the regularities and irregularities in this dynamic seem to consistently work to the advantage of the most advantaged students, providing them with the greatest access to the curriculum most likely to enhance their educational outcomes and their life chances beyond school.

IMPLICATIONS FOR REFORMING VOCATIONAL EDUCATION

The findings we have reported in the previous sections make clear that efforts to reform high school vocational education cannot be understood apart from their role and status relative to the rest of the comprehensive high school curriculum. Similarly, efforts to better serve clients in both academic learning and workforce preparation must also consider the larger context in which these programs exist and compete for resources and status.

The Context of High School Vocational Education

Perhaps most striking as we explored curriculum at the three high schools was the fact that vocational education commanded very little of our attention. Neither our examination of the curriculum and coursetaking decisions nor our queries about salient curriculum issues yielded much about vocational education. Rather, academic concerns dominated each of our schools. We scrutinized each piece of printed material the schools provided and approached each of our interviews with an eye to uncovering as much as we could about the nature of schools' vocational programs and the students who participate in them. Simply put, there was little to be found. Vocational education was nearly invisible in each of our three quite different high schools; staff reported that few courses were offered on campus, few students took advantage of specialized area vocational programs available to them, and little attention was given to students' vocational course choices. Consequently, although issues of curriculum differentiation and placement were uppermost in the minds of those who worked in our schools, issues about vocational education per se did not loom large.

The combination of a press for academic courses from the state with the overall shrinkage in school resources seems to have led at best to the neglect of vocational programs and vocational students, and at worst to disdain for programs, teachers, and students. In either case, vocational programs are unlikely to receive school-level support or resources for program or staff development, or to be perceived or presented as offering exciting curriculum challenges to any but the least-motivated and least-skilled students. At the same time, these programs are likely to be the first casualties of resource constraints or changes in curricular polices. Even at McKinley--the most "vocational" of our schools and, judging by their academic achievement scores, the school that contained the most students who need to be job-ready when they leave high school--vocational programs took a back seat in the minds of school adults. "Everyone at this school should be aiming for college" was the prevailing theme in the counseling and administrative offices. This expression of high expectations for low-income and minority students is laudable. In fact, the school was unable to marshal the effort and resources to enable more than a very few students to realize this goal.

Ironically, the only school that seemed to judge vocational education as something more than fall-back courses for students not able enough or motivated enough to prepare for college was Washington, with its practical arts requirement for graduation. The contrast between Washington and McKinley is somewhat baffling, given Washington's relatively high achievement and college attendance rates. Perhaps Washington's confidence about the quality of its academic programs and its students' academic success was such that it had the latitude to move away from a single-minded academic focus and stress the importance of a comprehensive set of high school experiences and an interest in developing "well rounded"
students. Even so, parents and students at Washington were not entirely persuaded by Washington's policy. Community pressure had the effect of subverting the intent of the practical arts requirement when it secured permission for students to substitute advanced, math-oriented computer science courses for vocational courses--an option exercised by a number of highly able students.

We noted in Sec. IV that, consistent with national findings, nearly all students at our three schools took some vocational education in high school. However, other data from our schools suggest that just because most students subscribe to vocational courses does not mean that vocational courses are valued equally to academic courses, nor that time constraints alone explain the differential amounts of vocational coursetaking by college-bound and non-college-bound students. Because schools explicitly identify vocational education as more appropriate for lower-than for higher-achieving students, it is not surprising that at all three schools concentrated vocational education coursetaking was largely, but not entirely, reserved for the least academically able students in the school. However, even when we account for achievement differences, low-income students and disadvantaged minority students take more courses, and particularly more occupationally oriented courses, than do whites and middle-class minority students. These differences appear both within and between schools. Our least-advantaged group within our socioeconomically diverse school (Latinos at Coolidge) was far more likely to take a concentration of vocational courses. And, across the schools, the least-advantaged students were more likely to take courses related to the trades, whereas more-advantaged students leaned toward courses in business. In fact, among vocational offerings, only business courses appear to escape identification with the lowest-income or African American and Latino students.

As this section has elaborated, schools seem to muddle through their curriculum and placement decisions, juggling their efforts to adapt the curriculum to their students' abilities and motivation with constraints imposed by structural and ideological regularities. In the midst of the decisionmaking muddle, efficacious, advantaged students can often push the system to exercise greater choice in the courses they take and the track levels to which they are assigned. Unlike their high-status peers, less-advantaged or less-aggressive students or their parents are unlikely to be able to capitalize on this wiggle room in the curriculum decisionmaking process. And, the negative perceptions about vocational programs and students, combined with the absence of an aggressive counseling system for non-college-bound students, appear to act synergistically to drain the little remaining vitality and cohesion from existing vocational offerings and to relegate those students who concentrate in vocational education to the lowest positions in the academic curriculum as well.

The Prospects for Reforms That Integrate Academic and Vocational Education

What, then, are the prospects for improving vocational education and improving both the academic and vocational preparation of students identified as "vocational?" They are not good, perhaps impossible, unless changes are undertaken as part of a larger effort to reconstruct the curriculum and coursetaking patterns at high schools generally. Currently, some reforms are under way that aim to do just that. Many of the efforts falling under the rubric "integrated academic and vocational education" intend to move beyond the infusion of more academic content into vocational classes and attempt to reconstruct the high school curriculum in ways that break down the distinctions between the two domains. This, however, is not a plan to make vocational education "better" but to develop a new curriculum that blurs the distinction between academic and vocational studies. Proposals for integrated curricula propose teaching the abstract concepts of the academic curriculum in the context of hands-on, problem-solving pedagogy characteristic of vocational classes. The hope is that the curriculum that now seems beyond the reach of many students in its abstract form may, in fact, be considered attainable if taught in a more concrete context, where students engage in activities that allow them to connect and apply what they learn in the classroom to its context outside the classroom. And, not inconsequential, some hope that the large number of college-prep kids who are fairly good at mastering abstractions for the test, and then quickly forgetting them, might come to understand the meaning of what they have learned, and perhaps even be able to remember and apply it later on.

These "strong" versions of academic and vocational integration are based on two hypotheses: first, that this kind of integration is likely to be essential if the nation is to educate a labor force capable of solving problems and making analytical judgments in the workplace; and second, that an integration of academic and vocational studies can benefit both those high school students who go directly into work or postsecondary occupational training and those postponing their entry into the workforce until after finishing college.

The idea of integrating academic and vocational studies and shifting to more general concepts of vocational education is not new. Reform ideas date back at least to the manual training movement of the 1880s and have reappeared in virtually every examination of vocational education since then. Late nineteenth century advocates, for example, claimed that manual training would complement academic studies in a balanced education. Their argument stressed that students should learn mechanical processes rather than prepare for particular trades, and that they should master general principles rather than specific skills. They argued that processes requiring skill with the hands would simultaneously present problems for the mind. Dewey and the Progressives later made a similar claim: If students worked with wood, metal, paper, and soil (or, by extension, textiles and foods), they could achieve alternative and important "ways of knowing" (Oakes, 1986).

Obstacles in the School Culture

However, until recently there have never been serious attempts to understand what integrating academic and vocational education might mean in practice. And until recently there has been little more than the "good idea" to support such reforms. Now we are beginning to see how various lines of research and analysis bolster the idea of integration--research on the changing nature of work and the needs of future workers; research on how people learn in and out of school; and research such as that reported here on the problems created by a high school curriculum split into two artificial halves--the academic and the vocational.

However, when we look carefully at what went on in the three schools in our study, we can identify some formidable obstacles to blurring the boundaries between the academic and vocational sides of the curriculum and to breaking down the boundaries between college-bound and non-college-bound students. These obstacles reside in the culture of the school. They are found in deeply held and widely shared beliefs about students' intellectual capacities and longstanding structures and traditions that dictate what high schools "ought to be like."

One obstacle stems from the widespread belief that schools judge students to be quite different in their abilities, motivation, and aspirations, and that by the time students reach senior high school, these characteristics can not be changed much. Perhaps most pervasive is the view that some students simply are neither motivated nor able to learn rigorous academic ideas. These beliefs work against efforts toward integrating academic and vocational studies and the suggestion that, under very different conditions, schools can teach all students essential academic concepts.

A second obstacle is that nearly every high school acts on its beliefs about students' differences by creating a split curriculum designed to accommodate students' various dispositions toward school work, not to alter them. Schools develop separate programs that divide those students who are thought to be well-suited for a college-prep curriculum from students who are not. High schools generally pride themselves on having a differentiated curriculum that meets the range of abilities of their students. This traditional pattern creates an obstacle to integration, since it is not only the curriculum that must change, but the institutional structure that supports it.

A third obstacle stems from the fact that this split curriculum of high schools does not have separate but equal sides. Higher status goes to the college-prep courses, teachers, and students, and lower status to general academic and vocational programs, teachers, and students. At best, high school vocational education is characterized by benign neglect of both its programs and students, and at worst by disdain for programs, teachers, and students. These programs are likely to be the first casualties of resource constraints or changes in curriculum policies, and, with the possible exception of business courses, they are often used as a safe haven for students with serious academic or behavioral problems. To put it quite harshly, this unequal status creates obstacles to blending the curriculum, since many on the academic side worry that vocational content, teachers, and students might taint their courses. And, many vocational programs are so strapped for resources that they can not even offer access to high technology to entice academic concentrators.

Also, the procedures used to make the best match between students and courses are not only strongly influenced by students' prior performance in school and on standardized tests but also by judgments about the ability and motivations of different racial, ethnic, and social-class groups. As a result, schools serving low-income, minority students tend to be more vocational (and have low-level basic skills), whereas schools serving more affluent students (particularly whites and Asians) tend to have larger college-prep programs. This creates a further obstacle, since efforts to blend academic and vocational studies may also have to confront stereotypes about what students from different racial and social class groups are like and what they need.

A Note of Optimism

At the same time that our study reveals considerable obstacles to the integration of academic and vocational education, it also provides support for such reforms. First, and perhaps most important, our study makes clear that reform is sorely needed--given the often dysfunctional nature of the split curriculum and the low status of vocational programs and students.

A second note of optimism from our study can be found in the fact that, even though tracking practices are deeply entrenched, many high school faculty would welcome reform, if they could be persuaded it is possible. Many of the faculty at the three schools felt considerable discomfort about how the tracked curriculum and assignment practices promoted race- and class-related differences in course placements. A number of others expressed considerable ambivalence about the limits that tracking practices place on the opportunities of students who are not in the college track, whatever their race or social class. Others felt the unfairness of a system where affluent, "squeaky wheel" students and parents can often get placed on higher tracks, even if they do not "belong" there based on their past school performance.

A third source of optimism lies in the fact that even educators who believe that a split, tracked curriculum is necessary are aware of the frustrating breakdowns in the system. Limited resources and staff and scheduling constraints often make it impossible to place students accurately. Moreover, parent and student politicking often overloads upper-track classes with underprepared students, and teachers' inclinations to move "bright" kids with behavior problems out of the college track saddles the vocational and general classes with a combination of kids with learning problems and those who are disruptive. The result is that many classes--both college-preparatory and vocational--are extraordinarily heterogeneous groups. Yet, the fact that schools are tracked supports an unrealistic illusion that all of the students in a class are at about the same "level." Consequently, teachers (especially on the academic side of things) face a frustrating curriculum that expects all the students in the class to be ready and able to learn the same things on the same schedule in the same way. Reforms attempting to blend the college-prep and vocational curriculum might just provide a welcome way out. This approach just may enable high school faculties to entertain the possibility that, under those conditions, all (or nearly all) students (even though they are different from one another) can learn the essential concepts of the college-prep curriculum.

The Need for Research and Curriculum Development

However, neither researchers nor practitioners have made much progress toward understanding what it really means to develop and implement a fully integrated academic and vocational curriculum in schools--the kind of work that is necessary to provide assistance to schools that are likely to undertake these activities in the near future. Some studies have identified the types of integrated programs currently operating in schools (Grubb, 1991), and others have evaluated existing programs to learn more about what they are accomplishing (Mitchell, Russell, and Benson, 1988). However, many of the extant curricula that are the subject of these investigations fall far short of being integrated curricula in which academic and vocational topics, pedagogical approaches, teachers, and students have been merged fully, or in which principles of cognitive science have guided the development of the instructional content and processes.

What we think is needed is experimentation and research that provide a clearer understanding of the actual processes of developing and implementing this more mature version of integrated curricula. Such projects might focus, for example, on curriculum development--e.g., by creating and then studying the process of bringing together academic and vocational teachers, cognitive psychologists, and curriculum specialists to design programs. Other work might consider implementation of such curricula--e.g., by examining schools where teachers and administrators are attempting to introduce, develop, and sustain the concept of integration. Although both of these lines of work would of necessity focus on specific curricula, teachers, and schools, their major contribution should be those generic features of developing and implementing integrated curricula that one could reasonably expect to arise in a variety of subjects and schools.

Our recommendation that schools press forward to experiment with and evaluate the possibilities of a "strong" version of integrated academic and vocational education does not emerge directly from the findings of this study. However, reconstruction of the high school curriculum seems a promising approach to overcoming the unfriendly disposition toward vocational education and the unwarranted assumptions about vocational students. A secondary school with a curriculum split into "academic" and "vocational" halves seems to be fundamental to current educational troubles--not only in vocational education but in educational quality and equity more generally. As long as this split is maintained, vocational educators will be consigned in large part to acting out the belief that some children, often those who are poor and minority, are unable to learn the things most valued by schools and society.

The Need for More "Good" Schools

Finally, we must acknowledge that the problems presented in this report stem, in large part, from the uneven distribution of good schools as well as from an uneven distribution of opportunities within schools. Consequently, the integration of academic and vocational studies promises to improve the quality of schooling if it is done as an effort by school systems to increase the overall supply of challenging courses and to reconceptualize vocational education as imparting the knowledge and skills required by the higher-performing sectors of the labor market. The problems identified here can be solved only by a serious effort to increase the supply of good schools and to use the placement process within schools to expand, not limit, students' academic and vocational opportunities.

Appendix A
ADDITIONAL CHARACTERISTICS OF THE CLASS

OF 1988

Table A.1
Student Socioeconomic Status, Coolidge High School, by Race/Ethnicity
(Sample: 10th-12th grade cohort)

	Low SES	Middle SES	High SES
All students	14.5	68.1	17.4
By race			
White	7.3	69.1	23.6
Black	16.7	69.4	13.9
Asian	24.4	67.8	7.8
Latino	18.8	64.6	16.7

NOTE: Sample excludes students with missing SES data; therefore, the distribution reported in the first row differs slightly from the SES distributions reported in Table 2.2.

Table A.2
Achievement Measures at All Schools, by Race/Ethnicity
(Sample: 10th-12th grade cohort)

	White		Black		Asian		Latino	
Washington								
Mean percentile scores								
Math, grade 10	67.1*	(241)	--	--	88.4*	(103)	44.2*	(16)
Reading, grade 10	63.6**	(246)	--	--	56.0**	(103)	49.1**	(18)
SAT mean score, math	498.6*	(109)	--	--	601.1*	(94)	516.7*	(3)
SAT mean score, verbal	444.7	(109)	--	--	412.3	(94)	463.3	(3)
Percentage who met state university requirements	38.7*		--	--	80.0*		11.8*	
Percentage of 12th graders who graduated	90.5*		--	--	100.0*		80.0*	
Sample size	263				112		20	
Coolidge								
Mean percentile scores								

Math, grade 10	67.2*	(159)	53.1*	(35)	76.9*	(40)	48.4*	(86)
Reading, grade 10	61.6*	(160)	53.1*	(34)	61.8*	(40)	39.7*	(88)
SAT mean score, math	475.9*	(91)	410.0*	(25)	527.5*	(40)	419.3*	(28)
SAT mean score, verbal	444.6*	(91)	385.2*	(25)	427.3*		366.4*	(28)
Percentage who met state university requirements	37.9*		37.5*		60.0*		13.3*	
Percentage of 12th graders who graduated	94.5		90.2		96.0		89.5	
Sample size	181		41		50		105	
			McKinley					
Mean percentile scores								
Math, grade 10	--	--	43.9	(237)	--	--	45.8	(73)
Reading, grade 10	--	--	42.1*	(238)	--	--	33.9*	(75)
SAT mean score, math	--	--	352.2	(96)	--	--	339.3	(15)
SAT mean score, verbal	--	--	330.3	(96)			300.0	(15)
Percentage who met state university requirements	--	--	--		--	--	--	
Percentage of 12th graders who graduated	--	--	90.5*		--	--	73.8*	
Sample size			253				84	

NOTE: When sample sizes are smaller than the full sample because of missing data, the sample sizes are shown in parentheses.

*Differences are significant at the .01 level.

**Differences are significant at the .05 level.

Table A.3
Achievement Measures at Two Schools, by Birthplace
(Sample: 10th-12th grade cohort)

	U.S.-Born		Foreign-Born	
	Washington			
Mean percentile scores				
Math, grade 10	67.5*	(269)	86.4*	(93)
Reading, grade 10	65.0*	(273)	49.4*	(96)
SAT mean score, math	507.4*	(125)	602.3*	(83)
SAT mean score, verbal	453.5	(125)	394.0	(83)
Percentage who met state university requirements	38.9*		71.6**	

Percentage of 12th graders who graduated	91.1**		97.2**	
Sample size	291		106	
	McKinley			
Mean percentile scores				
Math, grade 10	45.1	(229)	45.8	(64)
Reading, grade 10	42.9*	(231)	65	(33)
SAT mean score, math	354.0	(94)	346.1	(18)
SAT mean score, verbal	332.9	(94)	299.4	(18)
Percentage who met state university requirements	--		--	
Percentage of 12th graders who graduated	89.5**		79.5**	
Sample size	247		73	

NOTE: When sample sizes are smaller than the full sample because of missing data, the sample sizes are shown in parentheses.

*Differences are significant at the .01 level.

**Differences are significant at the .05 level.

[a]Excludes one student at Washington and 30 students at McKinley with unknown birthplace.

Table A.4
Achievement Measures for Asian Students,
Washington High School, by Birthplace
(Sample: 10th-12th grade cohort)

	U.S.-Born		Foreign-Born	
Mean percentile scores				
Math, grade 10	88.4	(24)	88.4	(79)
Reading, grade 10	78.7*	(24)	49.1*	(79)
SAT mean score, math	564.4	(18)	609.7	(76)
SAT mean score, verbal	493.3*	(18)	393.2*	(76)
Percentage who met state university requirements	88.9		78.7	
Percentage of 12th graders who graduated	100.0		100.0	
Sample size	24		88	

NOTE: When sample sizes are smaller than the full sample because

of missing data, the sample sizes are shown in parentheses.
*Differences are significant at the .01 level.
**Differences are significant at the .05 level.

Appendix B
VOCATIONAL COURSE CATEGORIES

This list, including both general course categories (e.g., cooking) as well as course titles, displays how we categorized the vocational courses offered at Coolidge, Washington, and McKinley High Schools for the analysis of vocational participation presented in Sec. IV. Although we divided courses into those that are not occupationally specific and those that are, this breakdown is somewhat artificial for two reasons.

First, many of our case study respondents told us that none of the vocational courses offered at our three schools, with the possible exception of some of the courses offered through each school's regional occupational program, are truly job-specific either in terms of course content or rigor. Budget cuts in recent years at each school have forced the elimination of many of the advanced vocational courses, leaving only the introductory (and less-job-related) courses. During interviews with vocational (and academic) teachers at each school we asked, "What are the most important things you want students who take this class to leave with?" None of the vocational teachers volunteered that they expected students to leave their class with skills readily transferable to the job market. In fact, upon probing, most of the vocational teachers with whom we spoke admitted that their classes--either because of outdated technology or limited course content--would *not* prepare students to move directly into a job in that field (Selvin et al., 1990). For this reason, then, our "occupation-specific" courses should really be thought of as "occupation-specific, sort of."

Second, we hesitated to categorize a number of courses as occupation-specific that teach skills once considered applicable solely to business but now more generally necessary. For instance, many students who take introductory typing, computer literacy, or a number of other such courses do so less to prepare for a career in business than because these skills have become necessary in a wide variety of occupational as well as non-occupational settings. As a result, we grouped a number of these general or introductory business courses into a non-occupational "business" category. Similarly, because we have good reason to believe that work experience is, for most kids, less preparation for a specific occupation than a means to pocket money and course credits, we have likewise classified it as a non-occupational vocational course.

I. Non-Occupation-Specific/General or Introductory Courses
  A. Consumer/home
    __ Clothing/needlecrafts/textiles
    __ Foods/cooking
    __ Interior decorating
    __ Contemporary living
    __ Child care and development
    __ Family psychology
    __ Economics for living

__ Survival for singles
__ Child development
__ Parenting
__ Other home economics

B. Introductory business/typing courses and "other" business courses
__ Typing 1
__ Computer literacy
__ Business correspondence
__ Introduction to business
__ Personal typing
__ Consumer education
__ Other (business law, business English)

C. Work experience

D. Non-regional occupational industrial arts and drafting
__ Auto mechanics/transportation
__ Woodshop
__ Metal shop/machine (machine shop, welding, shop production, art metal)
__ Drafting
__ Mechanical drawing
__ Computer-assisted design
__ Architectural drawing and drafting
__ Other (technical math, video, computer repair)

E. Miscellaneous non-occupational

II. Occupation-Specific Courses

A All-regional occupational courses

B. Vocational child care

C. HIP

D. Business
__ Business machines
__ Simulated office
__ JOBS
__ Shorthand
__ Computer applications
__ Word processing
__ Record keeping
__ Office management
__ Accounting

E. Industrial arts and drafting
__ We defined students who took a *second year* of one of the industrial arts and drafting courses listed under section course(s).

F. Miscellaneous occupational courses
__ Commerce (selling experience, bank teller, etc.)
__ Personal services (cosmetology)
__ Health care (nurse's aide, dental assistant)

__ Electronics/electrical (amateur radio theory and operations)
__ Construction
__ Agriculture

Table B.1

Math Track
(Based on Course Code)

Grade	Low	Medium	High	Honors
9th	Basic/ remedial/ review General Business Consumer	Pre-algebra Ext. algebra 1 Ext. algebra 2	Algebra 1	Geometry Algebra 2 Trig/math analysis Calculus/adv. math Computer science/ programming[a]
10th	Basic/ remedial/ review General Business Consumer Pre-algebra	Ext. algebra 1 Ext. algebra 2 Algebra 1	Geometry	Algebra 2 Trig/math analysis Calculus/adv. math Computer science/ programming[a]
11th	Basic/ remedial/ review General Business Consumer Pre-algebra Ext. algebra 1	Ext. algebra 2 Algebra 1 Geometry	Algebra 2	Trig/math analysis Calculus/adv. math Computer science/ programming[a]
12th	Basic/ remedial/ review General Business Consumer Pre-algebra Ext. algebra 1	Ext. algebra 2 Algebra 1 Algebra 2 Geometry	Trig/math analysis	Calculus/adv. math Computer science/ programming[a]

[a]At Washington this course was considered to be an honors track course; at McKinley it was considered to be a college-prep (non-honors) course.

Table B.2

English Track
(Based on Level Code)

School	ESL 0	Low 1	Mixed 2	High 3	Honors 4
Coolidge	ESL	Special ed. Low/remedial	Low/regular[a] Regular Non-college/ college-prep[a]	College-prep	Honors/AP
Washington	ESL	Special ed. Low/remedial Low/regular*	Non-college/ college-prep[a]	College-prep	Honors/AP
McKinley	ESL	Special ed. Low/remedial Low/regular[a]		College-prep	Honors/AP

[a]These are combination courses that grouped students from more than one level.

Appendix C
SUPPLEMENTARY TABLES ON VOCATIONAL PARTICIPATION

Table C.1

Percentage of Sudents Taking
Vocational Courses, by School
(Sample: 10th-12th grade cohort)

Courses	Washington	Coolidge	McKinley
None	0.0	10.3	0.6
1-2	23.4	24.7	8.6
3-4	27.6	24.2	21.7
5-6	24.9	21.1	22.3

7-8	15.1	12.9	21.1
9+	9.1	6.8	25.7

NOTE: The differences in the distributions between schools are significant at the .01 level.

Table C.2

Percentage of Students Taking Vocational Courses, by Credits Taken and School (Sample: 10th-12th grade cohort)

Credits	Washington	Coolidge	McKinley
None	0.3	10.3	0.9
1-10	22.4	26.1	9.4
11-20	26.9	25.0	17.4
21-30	19.9	19.0	18.9
31-40	15.1	13.7	18.3
41+	15.6	6.1	35.1

NOTE: Distributions between schools are significantly different at the .01 level.

Fig. C.1--Distribution of Vocational Credits Taken, by School

Table C.3

Percentage of Students Taking Vocational Courses, by Gender and School (Sample: 10th-12th grade cohort)

	Washington		Coolidge		McKinley	
Courses	Male	Female	Male	Female	Male	Female
None	0.0	0.0	12.4	8.4	1.2	0.0
1-2	19.4	26.6	22.6	26.6	10.7	6.6
3-4	23.9	30.7	21.5	26.6	19.1	24.2

5-6	27.2	22.9	22.0	20.2	22.6	22.0
7-8	17.2	13.3	13.6	12.3	20.8	21.4
9+	12.2	6.4	7.9	5.9	25.6	25.8

Fig. C.2--Distribution of Vocational Credits Taken, by School (Less 10 Required Credits for Each Washington Student)

Fig. C.3--Distribution of Occupational Credits Taken, by School

Table C.4

Percentage of Students Taking Vocational Courses, by Race/Ethnicity and School (Sample: 10th-12th grade cohort)

	Washington*			Coolidge				McKinley	
Courses	Wte	Lat	Asn	Wte	Blk	Lat	Asn	Blk	Lat
None	0.0	0.0	0.0	12.5	12.2	4.8	12.0	0.7	0.0
1-2	16.9	20.0	39.3	27.2	31.7	11.4	38.0	9.2	7.1
3-4	26.3	30.0	30.4	19.0	22.0	29.5	34.0	22.2	20.2
5-6	24.4	30.0	25.0	21.7	19.5	25.7	10.0	22.6	21.4
7-8	19.2	20.2	4.5	14.1	7.3	16.1	6.0	22.2	17.9
9+	13.2	0.0	0.9	5.4	7.3	12.4	0.0	23.3	33.3

NOTE: Because of small sample sizes, black students were excluded from the Washington sample and Asian students from the McKinley sample for the computation of the test statistics.

*Differences in the distributions within schools are significant at the .01 level.

Table C.5

Distribution of Achievement Scores, by Math Enrollment and School

	Washington		Coolidge		McKinley	
	Other	College-	Other	College-	Other	College-

	Math	Prep Math	Math	Prep Math	Math	Prep Math
Math score - 8th grade						
5th percentile	18.2	70.2	12.6	61.3	--	--
Mean	57.8	90.0	57.1	87.0	--	--
95th percentile	94.0	99.0	93.0	98.0	--	--
Math score - 10th grade						
5th percentile	9.0	74.0	7.0	61.7	10.0	37.3
Mean	54.5	92.1	49.2	84.9	38.5	65.9
95th percentile	91.0	99.0	85.0	99.0	71.0	92.5
Reading score - 8th grade						
5th percentile	16.3	18.5	8.7	47.5	--	--
Mean	59.2	78.3	50.5	79.0	--	--
95th percentile	97.0	99.0	91.0	99.0	--	--
Reading score - 10th grade						
5th percentile	7.0	12.7	4.0	41.4	4.0	32.6
Mean	52.2	70.7	43.6	75.6	33.6	62.5
95th percentile	93.1	99.0	85.0	99.0	73.0	92.0

NOTE: All within-school differences in mean achievement scores between students not taking and taking college-prep math are significant at the .01 level.

Table C.6

Distribution of Achievement Scores, by English Enrollment and School

	Washington		Coolidge		McKinley	
	Other English	College-Prep English	Other English	College-Prep English	Other English	College-Prep English
Math score - 8th grade						
5th percentile	14.4	39.0	11.9	46.9	--	--
Mean	60.7	79.1	57.1	79.6	--	--
95th percentile	97.0	99.0	96.0	98.0	--	--
Math score - 10th grade						
5th percentile	9.0	31.0	5.3	35.1	6.2	25.0
Mean	62.3	81.3	49.2	75.0	32.7	54.5

95th percentile	99.0	99.0	89.0	99.0	69.4	89.0
Reading score - 8th grade						
5th percentile	8.3	30.0	6.9	32.0	--	--
Mean	59.4	73.0	49.8	72.7	--	--
95th percentile	97.0	99.0	95.1	99.0	--	--
Reading score - 10th grade						
5th percentile	5.0	27.0	3.3	20.0	4.0	15.0
Mean	50.5	70.4	42.5	67.9	25.0	52.7
95th percentile	94.2	99.0	88.7	98.0	58.3	88.0

NOTE: All within-school differences in mean achievement scores between students not taking and taking college-prep English are significant at the .01 level.

Table C.7

Distribution of Achievement Scores for Vocational Non-Concentrators and Concentrators, by School

	Number of Vocational Courses							
	Washington				Coolidge		McKinley	
	Without Adj.		With Adj.					
	Non-Con.	Con.	<5	>5	<5	>5	<5	>5
Math score - 8th grade								
5th percentile	29.7	13.3	27.6	10.5	19.0	11.6	--	--
Mean	78.5	56.6	75.7	48.4	73.3	55.5	--	--
95th percentile	99.0	96.3	99.0	93.1	97.0	94.0	--	--
Math score - 10th grade								
5th percentile	27.8	5.6	21.0	2.5	19.4	5.0	16.2	7.3
Mean	79.1	57.5	76.3	48.7	68.9	44.6	51.4	39.7
95th percentile	99.0	95.6	99.0	93.3	99.0	93.0	89.0	71.0
Reading score - 8th grade								
5th percentile	20.7	13.6	18.1	18.3	13.0	4.8	--	--
Mean	72.2	56.9	70.4	51.1	66.6	46.9	--	--
95th percentile	99.0	93.6	99.0	87.8	98.0	91.0	--	--
Reading score - 10th grade								
5th percentile	8.0	8.8	8.8	6.1	8.7	4.0	4.2	5.3
Mean	64.8	52.7	63.0	49.0	61.1	39.3	47.1	34.8
95th percentile	99.0	92.9	99.0	87.2	98.0	78.8	91.0	73.0

NOTE: All within-school differences in mean achievement scores between students not taking and taking six or more vocational courses are significant at the .01 level.

Appendix D
METHODS AND RESULTS FROM THE LOGISTIC ANALYSES

This appendix describes the data and empirical methods used in the logistic analyses discussed in Secs. IV and V. In Sec. IV, we presented results based on a logistic analysis that predicted the probability that a student would be a vocational concentrator. Section V contained results based on logistic analyses that predicted the probability that a student would be in the college-prep math track and the college-prep English track in the 11th grade. The predicted probabilities in those two sections were based on the results of the logistic regressions that are presented in Tables D.3 to D.5.

Logistic models are used to analyze dependent variables that have a binary outcome, i.e., the outcome that we want to explain takes on only two values. In the case of the coursetaking behavior that we are modeling, we observe that the student participates or does not participate in the particular coursetaking behavior we are interested in. The logistic model is specified as:

where p_i is the probability that student *i* takes the course we are modeling (e.g., college-prep math) and X_i is a vector of individual characteristics that affect the probability of taking the course. The logistic model thus allows us to determine which independent or explanatory variables, the *X*s, predict the probability that a student does or does not participate in the coursetaking behavior we are modeling. The coefficient estimates, the *ß*s, show the effect of the variable *X* on the logarithm of the odds or "log odds" (the logarithm of the ratio of probability that the outcome is 1 to the probability that the outcome is 0). In a multivariate logistic model, the coefficient estimate on any one independent variable measures the effect of a change in that variable on the log odds, holding all other variables constant.

THE DATA AND SAMPLE

The sample for the logistic analyses is the cohort of students who attended their respective schools in the 10th through 12th grades. The logistic models are estimated for three different dependent variables. The first model predicts the probability that a student will be a vocational concentrator. Vocational concentrators are defined as those students who took six or more vocational courses during high school. Because of the practical arts requirement at Washington, vocational concentrators are alternatively defined at that school as those students who took six or more vocational courses beyond the two-course requirement. The second model predicts the probability that a student will be in the college-prep math track in the 11th grade. As described in Sec. V, students who take Algebra 2 in the 11th grade or earlier are defined as being in the college-prep math track. Finally, the third model predicts the probability that a student will take college-prep English in the 11th grade. Students in the college-prep English track are those who take an English course designated as college-prep or honors/AP.

A common set of independent variables was used for each of the logistic analyses. The definitions of these variables are summarized in Table D.1. An indicator variable for girls (FEMALE) was included to control for differences based on student gender. A statistically significant positive (negative) coefficient on FEMALE indicates that girls are more (less) likely than boys to participate in the coursetaking behavior that is being modeled (e.g., college-prep math).

To control for differences by student race/ethnicity, a series of indicator variables was defined for the four primary race/ethnic groups at the three schools: WHITE, BLACK, ASIAN, and LATINO.[76]

Table D.1

Definitions of Independent Variables Used in the Logistic Analyses

Variable Name	Definition
FOUR_YEAR	= 1 if a four-year student = 0 otherwise
FEMALE	= 1 if student is female = 0 otherwise
WHITE	= 1 if student is white = 0 otherwise
BLACK	= 1 if student is African American = 0 otherwise
ASIAN	= 1 if student is Asian = 0 otherwise
MISS_RACE	= 1 if student race/ethnicity is missing = 0 otherwise
MATH	10th grade math achievement score
MISS_MATH	= 1 if math score is missing = 0 otherwise
READ	10th grade reading achievement score
MISS_READ	= 1 if reading score is missing = 0 otherwise
FOREIGN	= 1 if born outside of the United States = 0 otherwise
MISS_FOR	= 1 if missing country of birth = 0 otherwise
LOWSES	= 1 if family income less than $20,000 = 0 otherwise
MIDSES	= 1 if family income is between $20,000 and $50,000 = 0 otherwise

TOPSES	=	1 if family income is greater than $50,000
	=	0 otherwise
MISS_SES	=	1 if SES information is missing
	=	0 otherwise

We also included an indicator variable in the regressions for McKinley and the pooled sample when race/ethnicity was missing (MISS_RACE).[77] The logistic results in the tables show the coefficient estimates for WHITE, BLACK, and ASIAN. Latino students, the only group common across the three schools, is the omitted group. Consequently, the coefficient estimates on the three race/ethnicity variables measure a difference in the probability of participating in the coursetaking behavior for a student in the particular race/ethnicity group and a Latino student. For example, a positive coefficient on WHITE is interpreted to mean that a white student has a higher probability than a Latino student of participating in the coursetaking behavior that is being modeled.

The effect of student ability on coursetaking behavior is measured by 10th grade reading and math achievement scores, READ and MATH. We had information on 8th grade math and reading achievement scores only for Washington and Coolidge. The regression estimates for those two schools were similar when 8th and 10th grade scores were used to measure ability. To make the results comparable across schools and for estimating the pooled model, we present only the results for models using the 10th grade scores. In addition, the achievement scores were missing for 7 to 15 percent of the sample, depending on the school. Students with missing math or reading scores were assigned the school mean (based on the sample of known data). In addition, an indicator variable, equal to one when the test score was missing, was included in the regressions (MISS_MATH and MISS_READ).

In the model predicting the probability of being a vocational concentrator, an additional independent variable was included. For students who had been at their respective schools for four years, an indicator variable was set equal to one (FOUR_YEAR). Four-year students may be more likely than three-year students to take a large number of vocational courses, since they have had a longer period of "exposure." This variable was included to control for any differences between the two types of students.

Two additional independent variables were available for only a subset of the schools and consequently were included in the models estimated for those schools only. For Coolidge, we had a measure of student SES using a three-point scale. We created three indicator variables, LOWSES, MIDSES, and TOPSES, for students with family incomes of less than $20,000, between $20,000 and $50,000, and greater than $50,000, respectively. A fourth category was created for those students with missing SES information, MISS_SES (about 10 percent of the sample). In the regression results presented in the tables, HIGHSES is the omitted category. Thus, the coefficient estimates for LOWSES, MIDSES, and MISS_SES capture any differences between those three groups and the TOPSES group.

Finally, we had information on country of birth for students at Washington and McKinley. This information was used to create an indicator variable, FOREIGN, for students who were born outside of the United States. In addition, an indicator variable was created for McKinley students when the country of birth was not known, MISS_FOR.

The sample means for the variables used in the logistic analyses are presented separately for each school and for the pooled sample in Table D.2. The percentage of vocational concentrators and the participation rates in college-prep math and college-prep English are the same as those presented in Tables 4.5, 5.4, and 5.5.

Table D.2

Means for Dependent and Independent Variables

(standard errors in parentheses)

	Washington	Coolidge	McKinley	Pooled
Took 6 or more voc. courses[a]	0.34 (0.02)	0.29 (0.02)	0.57 (0.03)	0.40 (0.01)
Took 6 or more voc. courses[b]	0.16 (0.02)	0.29 (0.02)	0.57 (0.03)	0.33 (0.01)
Took college-prep Math	0.45 (0.02)	0.33 (0.02)	0.22 (0.02)	0.34 (0.01)
Took college-prep English	0.51 (0.03)	0.44 (0.03)	0.53 (0.03)	0.49 (0.01)
FOUR_YEAR	0.92 (0.01)	0.85 (0.02)	0.81 (0.02)	0.87 (0.01)
FEMALE	0.55 (0.02)	0.53 (0.03)	0.52 (0.03)	0.53 (0.01)
WHITE	0.66 (0.02)	0.48 (0.03)	-- (0.01)	0.39
BLACK	--	0.11 (0.02)	0.72 (0.02)	0.26 (0.01)
ASIAN	0.28 (0.02)	0.13 (0.02)	-- (0.01)	0.15
MISS_RACE	--	--	0.03 (0.01)	0.01 (0.00)
MATH	72.20 (1.30)	62.03 (1.28)	44.84 (1.11)	60.28 (0.79)
MISS_MATH	0.09 (0.01)	0.15 (0.02)	0.08 (0.01)	0.11 (0.01)
READ	60.84 (1.37)	54.94 (1.33)	40.25 (1.22)	52.46 (0.80)
MISS_READ	0.07 (0.01)	0.15 (0.02)	0.07 (0.01)	0.10 (0.01)
FOREIGN	0.27 (0.02)	-- (0.02)	0.21	--
MISS_FOR	--	--	0.09	-- (0.01)
LOWSES	--	0.13 (0.02)	--	--
MIDSES	--	0.61 (0.03)	--	--

MISS_SES	--	0.10 (0.02)	--	--
No.	398	380	350	1128

[a]Without an adjustment for the practical arts requirement at Washington.
[b]With an adjustment for the practical arts requirement at Washington.

The data on student demographics and test scores are the same as those presented in Tables 2.1, 2.2, and 2.3. The sample sizes for each of the three schools and the pooled sample are shown at the bottom of Table D.2.

The logistic models were estimated separately for each school and pooled across schools. The analyses by school allow for the effect of each independent variable to vary across schools, and for the inclusion of independent variables that are available for only a subset of the schools. The pooled model restricts the coefficients on each of the independent variables to be the same across schools.[78] To allow for between-school differences, the pooled model was estimated with dummy variables for each school, MCKINLEY and WASHINGTON (where COOLIDGE was the omitted category). The school dummy variables capture any difference, holding all other independent variables constant, between students at McKinley and students at Coolidge, and students at Washington and students at Coolidge.

In addition, the pooled model was estimated using two different specifications. In the first, test scores were measured in absolute terms. In the second case, test scores were measured as deviations from the respective school means. The first model assumes that it is a student's absolute ability that predicts coursetaking behavior. Using this model, students with the same test score, e.g., with the percentile score equal to 30, 50, or 80, can be compared. The second model assumes that it is a student's ability relative to the cohort of students at that school that affects coursetaking behavior. In this model, students at the same point in the test score distribution can be compared, e.g., in the 25th, 50th, or 75th percentile of the test score distribution. The distinction between these two models is important, since there are significant differences in the test score distributions between the three schools. The two models differ, however, only in the estimate for the intercept and school dummy variables; all other coefficients remain unchanged. Consequently, Table D.3, which presents the regression results for the pooled model, shows two sets of coefficients for the intercept and school dummy variables depending upon how the test scores are measured.

A LOGISTIC MODEL OF VOCATIONAL CONCENTRATION

Table D.3 presents the results for the logistic model, estimated separately by school, predicting the probability that a student is a vocational concentrator. The table shows the results for Washington with and without the adjustment for the practical arts requirement. The first column of estimates for each school shows the results when the common set of independent variables is included in the model. The estimates in the second column for Washington and McKinley include FOREIGN in the model, whereas the estimates in the second column for Coolidge include the SES variables in the model.

The estimates show that in all cases, four-year students are more likely than three-year students to be vocational concentrators, although the effect is significant at conventional levels ($p < 0.10$) only for students at Coolidge and Washington (when there is no adjustment for the practical arts requirement). The difference between boys and girls is significant only at Washington (without the adjustment) and indicates that girls are less likely than boys to take six or more vocational courses.

Table D.3

Logistic Estimates for Probability of Being a Vocational Concentrator, by School (Standard errors in parentheses)

	Washington							
	Without Adj.[a]		With Adj.[b]		Coolidge		McKinley	
INTERCEPT	-0.07	-0.15	-2.09	-2.09	0.96**	0.41	1.30*	1.55*
	(0.76)	(0.77)	(1.31)	(1.31)	(0.50)	(0.68)	(0.45)	(0.51)
FOUR_YEAR	0.93***	0.97***	0.80	0.80	0.81**	0.80**	0.32	0.33
	(0.53)	(0.53)	(0.80)	(0.80)	(0.38)	(0.39)	(0.29)	(0.30)
FEMALE	-0.83*	-0.80*	-0.56***	-0.56	-0.40	-0.36	0.24	0.24
	(0.25)	(0.25)	(0.31)	(0.31)	(0.26)	(0.27)	(0.23)	(0.23)
WHITE	1.37*	1.36*	2.41**	2.40**	0.48	0.64**	--	--
		(0.54)	(0.54)	(1.06)	(1.06)	(0.30)	(0.31)	
BLACK	--	--	--	--	-0.38	-0.30	-0.10	-0.33
					(0.45)	(0.46)	(0.27)	(0.34)
ASIAN	0.12	-0.25	0.57	0.54	-1.49**	-1.42**	--	--
		(0.62)	(0.71)	(1.23)	(1.31)	(0.60)	(0.61)	
MISS_RACE	--	--	--	--	--	--	0.12	-0.09
							(0.75)	(0.77)
MATH	-0.02*	-0.03*	-0.03*	-0.03*	-0.03*	-0.03*	-0.02**	-0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
MISS_MATH	1.55*	1.52*	1.01***	1.01**	-0.63*	-0.67	-1.02	-1.06
	(0.52)	(0.52)	(0.57)	(0.58)	(0.93)	(0.97)	(1.26)	(1.26)
READ	-0.01	-0.01	-0.01	-0.01	-0.02*	-0.02*	-0.01**	-0.01**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
MISS_READ	-0.11	-0.11	-0.11	-0.11	1.59	1.43	1.71	1.78
	(0.56)	(0.56)	(0.64)	(0.64)	(0.94)	(0.98)	(1.33)	(1.33)
FOREIGN	--	0.50	--	0.03	--	--	--	-0.42
			(0.47)	(0.59)	(0.36)			
MISS_FOR	--	--	--	--	--	--	--	0.06
								(0.42)
LOWSES	--	--	--	--	--	0.93***	--	--
							(0.55)	
MIDSES	--	--	--	--	--	0.22	--	--
							(0.43)	
MISS_SES	--	--	--	--	--	1.12**	--	--
							(0.54)	
-2 Log L	416.3	415.2	273.6	273.6	377.8	369.9	444.0	442.6

X^2	87.0	87.7	67.4	67.4	71.9	78.9	33.0	34.4
No.	398	398	398	398	380	380	350	350

*Significant at the .01 level.
**Significant at the .05 level.
***Significant at the .10 level.
[a]Without an adjustment for the practical arts requirement at Washington.
[b]With an adjustment for the practical arts requirement at Washington.

The coefficients on the race/ethnic group variables show that there are significant differences between some of the race/ethnic groups, even after controlling for differences in student achievement. At Washington, white students have a significantly higher probability than Latino students of being vocational concentrators, whereas Asian students at Coolidge are significantly less likely than their Latino counterparts to be concentrators. At McKinley, the estimates show no differences between black and Latino students. When the model is estimated with other race/ethnic groups as the omitted category (not shown), the results show that there is always a significantly lower probability that an Asian student and a significantly higher probability that a white student will be a vocational concentrator than the other race/ethnic groups at Coolidge, whereas there are no significant differences between blacks and Latinos. At Washington, with and without the adjustment for the practical arts requirement, white students always stand out with a significant and higher probability of being concentrators, whereas Latino and Asian students are not significantly different from one another.[79]

The relationship between achievement scores and the probability of being a vocational concentrator is similar for all three schools. The negative and significant coefficient on the math achievement scores indicates that the likelihood of being a vocational concentrator declines as a student's math achievement score increases. The magnitude of the negative relationship between test scores and vocational coursetaking is not as large for reading scores, although the relationship is significant at Coolidge and McKinley. The positive and significant coefficient on MISS_MATH, the indicator that the math score was missing, indicates that this information was not randomly missing. Instead, students with missing math achievement score data at Washington are more likely than the average student to be concentrators.

The inclusion of the variable FOREIGN in the regressions for Washington and McKinley show that students born outside of the United States are not significantly different from native students. The second set of estimates for Coolidge include the SES variables and show that students with low SES and students with missing SES data are more likely than high-SES students to be vocational concentrators, and that the difference is significant. When the model is estimated with other SES groups as the omitted category (not shown), the results show that low-SES students are also more likely than middle-SES students to be concentrators, and that there is no significant difference between middle- and high-SES students.

The results from the pooled model are shown in the first two columns of Table D.6, below. The two columns show the results without and with the adjustment for the practical arts requirement at Washington. In general, the results for the independent variables are similar to those when the model is estimated separately by school. The interesting results from the pooled regressions are the signs of the school dummy variables, WASHINGTON and MCKINLEY. The first set of intercept terms (constant and school dummy variables) shows the differences between the schools when the model is estimated with test scores measured in absolute terms; the second set of intercept terms shows the differences between the schools when a student's test scores are measured relative to their respective school means.

First, consider the results when there is no adjustment for the practical arts requirement at Washington (the first column of Table D.6). These results show that students at Washington and McKinley, holding constant the level of test scores and all other characteristics, have a significantly higher probability of being vocational concentrators than students at Coolidge (the omitted category). When the model is estimated with Washington as the omitted category, the resulting estimates (not shown) show that students at McKinley are also more likely to be vocational concentrators than students at Washington (the difference is significant at the .10 level).

However, when the test scores are measured relative to the school mean, the coefficient measuring the differences between Washington and Coolidge is reduced and is no longer significant, whereas the coefficient measuring the difference between McKinley and Coolidge is more positive and still significant. Similarly, the coefficient measuring the difference between McKinley and Washington (not shown) also becomes more positive and very significant. These results indicate that, when comparing students with the same absolute test scores at Washington and Coolidge, there is a higher probability that the Washington student will be a concentrator. However, this finding is due to the higher overall mean test scores at Washington. Once students with the same relative standing at the two schools are compared, there is no difference.

The second set of estimates shows the differences between the schools when an adjustment is made for the practical arts requirement at Washington. This adjustment reverses the ranking of Washington and Coolidge, as there is now a significantly lower probability that a Washington student will be a concentrator compared to a Coolidge student. This ranking holds when test scores are measured in absolute terms and is even larger when test scores are measured relative to the school mean. As before, the probability is higher that a McKinley student will be a concentrator compared to a Coolidge student or a Washington student.

A LOGISTIC MODEL OF PARTICIPATION IN COLLEGE-PREP MATH

The results for the logistic model of participation in college-prep math are shown in Table D.4 for the models estimated separately by school and in Table D.6 (third column) for the pooled model. The school-specific models are estimated both with the same set of independent variables and with the addition of the SES variables for Coolidge, and FOREIGN for Washington and McKinley.

At all three schools, holding constant other characteristics and achievement scores, there is no significant difference between boys and girls in the probability of taking college-prep math. At Washington, white students are not significantly different from Latino students, whereas Asian students are significantly more likely to take college-prep math than Latino students (at the 10 percent level of significance). A comparison of white and Asian students (not shown) shows that Asian students are also significantly more likely than white students to take college-prep math (at the 1 percent level of significance). The coefficient estimates on the race/ethnicity variables for Coolidge also show significant differences across the groups. The estimates in Table D.4 show the comparison for each group relative to Latino students, and the coefficients are always positive and significant. When the model is estimated with other race/ethnicity groups as the omitted categories, pairwise comparisons show that Asian students are more likely than every other race/ethnic group to take college-prep math. As was the case for vocational concentration, there is no difference between black and Latino students at McKinley.

The estimates show that there is a strong positive relationship between students' test scores and the probability of taking college-prep math at all three schools (except for the reading score at Washington, which is not significant). As might be expected, the magnitude of the coefficients is always greater for the math score than the reading score.

Table D.4

Logistic Estimates for Probability of Taking College-Prep Math, by School (standard errors in parentheses)

Variable	Washington		Coolidge		McKinley	
INTERCEPT	-12.32*	-12.33*	-10.34*	-9.40*	-6.43	-7.20*
	(1.65)	(1.64)	(1.22)	(1.30)	(0.80)	(0.94)
FEMALE	-0.16	-0.15	0.18	0.20	0.34	0.34
	(0.33)	(0.33)	(0.33)	(0.33)	(0.34)	(0.34)
WHITE	0.27	0.30	0.86***	0.61	--	--
	(0.84)	(0.85)	(0.46)	(0.48)		
BLACK	--	--	1.58*	1.46**	-0.22	0.32
			(0.61)	(0.63)	(0.39)	(0.51)
ASIAN	1.70***	1.44	3.39*	3.43*	--	--
		(0.90)	(0.95)	(0.65)	(0.67)	
MISS_RACE	--	--	--	--	0.47	0.94
					(1.05)	(1.07)
MATH	0.14*	0.14*	0.09*	0.09*	0.06*	0.06*
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
MISS_MATH	0.01	-0.67	-2.55	-2.43	2.00	2.23***
	(0.73)	(0.73)	(3.19)	(3.27)	(1.30)	(1.29)
READ	0.01	0.01	0.03*	0.03*	0.04*	0.04*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
MISS_READ	0.11	0.08	2.34	2.56	-2.37***	-2.63***
	(0.82)	(0.83)	(3.18)	(3.26)	(1.46)	(1.45)
FOREIGN	--	0.48	--	--	--	0.93***
		(0.57)				(0.53)
MISS_FOR	--	--	--	--	--	0.31
						(0.61)
LOWSES	--	--	--	-1.95*	--	--
				(0.78)		
MIDSES	--	--	--	-0.87**	--	--
				(0.43)		
MISS_SES	--	--	--	-1.11***	--	--
				(0.68)		
-2 Log L	249.2	248.4	240.6	232.6	236.4	233.3
X^2	200.2	200.7	173.8	178.8	115.2	116.7

No.	398	398	380	380	350	350

*Significant at the .01 level.
**Significant at the .05 level.
***Significant at the .10 level.

The estimates for Washington and McKinley when FOREIGN is included in the model show that Washington students born outside the United States are not significantly different from those born in the United States. In contrast, foreign-born students at McKinley are more likely to take college-prep math. A student's SES is significant at Coolidge, with low- and middle-SES students less likely than high-SES students to take college-prep math. Pairwise comparisons (not shown) indicate that low- and middle-SES students are not significantly different from one another, and that students with missing SES information are also significantly less likely than high-SES students to take college-prep math.

The estimates from the pooled model, shown in column 3 of Table D.6, allow comparisons across the three schools. Again, the results for the independent variables are similar to the findings when the models are estimated separately by school. A comparison of the school dummy variables shows that, compared to a Coolidge student with the same absolute test score, a Washington student is less likely and a McKinley student is more likely to take college-prep math. When the model is estimated with McKinley as the omitted category (not shown), the results show that McKinley students, for a given absolute test score, are also more likely to take college-prep math than Washington students. Again, these findings are due to the difference in the distributions of the test scores at the three schools. When the model is estimated using a student's relative test scores to predict the probability of taking college-prep math, there is no difference between McKinley, Washington, and Coolidge students. Furthermore, for students with the same relative test score, McKinley students are now less likely than Washington students to take college-prep math.

A LOGISTIC MODEL OF PARTICIPATION IN COLLEGE-PREP ENGLISH

Table D.5 presents the results by school for the logistic model predicting the probability of taking college-prep English. For all three schools, girls are significantly more likely than boys to take college-prep English. A student's race/ethnicity is important only at Coolidge, where white and Asian students are significantly more likely than Latino students to take college-prep English. Pairwise comparisons (not shown) indicate that there are no significant differences between the other groups.

Again, at all three schools there is a significant and positive relationship between a student's test scores and his or her probability of taking college-prep English. It is interesting to note that, unlike the model for college-prep math, the coefficients on the math and reading scores are similar in magnitude at Washington and Coolidge.

The inclusion of the SES variables in the model for Coolidge shows no significant difference in the probability of taking college-prep English for students with different SES levels. Foreign-born students at Washington are less likely to take college-prep English than those born in the United States, and there is no difference between foreign- and U.S.-born students at McKinley.

The probability of taking college-prep English can be compared for students at the three schools based on the pooled model shown in column 4 of Table D.6. A student at Coolidge with a given absolute test score is more likely to take college-prep English than a student at Washington, but less likely than a student at McKinley. A student at McKinley is more likely to take college-prep English than a student at Washington. Again, these pairwise comparisons change when students with the same relative standing are compared. For students at the same point in the test score distribution, Washington students are no different from students at Coolidge. However, McKinley students are still significantly more likely than Coolidge students to take college-prep English.

Table D.5

Logistic Estimates for Probability of Taking College-Prep English, by School (standard errors in parentheses)

Variable	Washington		Coolidge		McKinley	
INTERCEPT	-2.68*	-2.59*	-3.97*	-3.52*	-3.78*	-4.00*
	(0.59)	(0.59)	(0.49)	(0.63)	(0.52)	(0.62)
FEMALE	0.61*	0.58*	0.83*	0.83*	0.62**	0.62**
	(0.23)	(0.23)	(0.26)	(0.26)	(0.28)	(0.28)
WHITE	-0.36	-0.37	0.73**	0.63**	--	--
		(0.49)	(0.49)	(0.32)	(0.32)	
BLACK	--	--	0.52	0.52	0.40	0.61
			(0.46)	(0.46)	(0.33)	(0.42)
ASIAN	-0.01	0.48	1.24*	1.22*	--	--
	(0.55)	(0.62)	(0.45)	(0.46)		
MISS_RACE	--	--	--	--	-0.43	-0.23
					(0.92)	(0.95)
MATH	0.02*	0.02*	0.03*	0.03*	0.03*	0.03*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
MISS_MATH	-0.36	-0.31	-1.93	-1.86	-6.60	-6.55
	(0.49)	(0.49)	(1.45)	(1.49)	(20.91)	(21.05)
READ	0.02*	0.02*	0.02*	0.02*	0.05*	0.06*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
MISS_READ	-0.30	-0.26	0.27	0.38	5.34	5.24
	(0.55)	(0.55)	(1.44)	(1.47)	(20.91)	(21.05)
FOREIGN	--	-0.73***	--	--	--	0.35
				(0.42)	(0.44)	
MISS_FOR	--	--	--	--	--	-0.36
						(0.50)
LOWSES	--	--	--	-0.87	--	--
						(0.56)
MIDSES	--	--	--	-0.26	--	--
						(0.37)

MISS_SES	--	--	--	-0.60	--	--
						(0.53)
-2 Log L	474.3	471.1	383.2	380.1	323.2	321.8
X^2	71.1	73.5	121.9	123.7	132.0	132.6
No.	398	398	380	380	350	350

*Significant at the .01 level.
**Significant at the .05 level.
***Significant at the .10 level.

Table D.6

Logistic Estimates for Probability of Being a Vocational Concentrator and of Taking College-Prep Math and English, Pooled Model (standard errors in parentheses)

Variable	Vocational Concentrator Without Adj.[a]	Vocational Concentrator With Adj.[b]	College-Prep Math	College-Prep English
INTERCEPT[c]	0.43	0.49	-9.28*	-3.96*
	(0.30)	(0.31)	(0.67)	(0.32)
WASHINGTON[c]	0.58*	-0.71*	-0.70*	-0.37**
	(0.19)	(0.21)	(0.24)	(0.19)
MCKINLEY[c]	1.07*	1.06*	1.53*	1.34*
	(0.24)	(0.24)	(0.37)	(0.26)
INTERCEPT[d]	-1.63*	-1.67*	-2.28*	-0.88*
	(0.28)	(0.29)	(0.33)	(0.22)
WASHINGTON[d]	0.28	-1.02*	0.37	0.05
	(0.19)	(0.22)	(0.23)	(0.19)
MCKINLEY[d]	1.63*	1.65*	-0.40	0.50**
	(0.24)	(0.25)	(0.25)	(0.25)
FOUR_YEAR	0.58*	0.56*	--	--
	(0.21)	(0.22)		
FEMALE	-0.26***	-0.14	0.11	0.72*
	(0.14)	(0.15)	(0.19)	(0.14)
WHITE	0.49**	0.56**	0.45	0.45***
	(0.23)	(0.24)	(0.34)	(0.24)
BLACK	-0.10	-0.12	0.44	0.40***
	(0.23)	(0.23)	(0.34)	(0.24)
ASIAN	-1.00*	-1.49*	2.45*	0.84*

	(0.33)	(0.45)	(0.40)	(0.30)
MISS_RACE	-0.10	-0.05	0.86	-0.12
	(0.76)	(0.76)	(1.08)	(0.81)
MATH	-0.02*	-0.02*	0.09*	0.03*
	(0.004)	(0.004)	(0.001)	(0.004)
MISS_MATH	0.60	0.29	-0.01	-0.74
	(0.38)	(0.42)	(0.61)	(0.45)
READ	-0.01*	-0.01*	0.02*	0.03*
	(0.004)	(0.004)	(0.005)	(0.004)
MISS_READ	0.25	0.47	-0.21	-0.45
	(0.41)	(0.43)	(0.64)	(0.47)
-2 Log L	1261.9	1110.7	759.8	1213.6
X^2	228.1	277.8	512.3	309.7
No.	1128	1128	1128	1128

*Significant at the .01 level.
**Significant at the .05 level.
***Significant at the .10 level.
[a]Without an adjustment for the practical arts requirement at Washington.
[b]With an adjustment for the practical arts requirement at Washington.
[c]Based on model where test scores are measured in levels.
[d]Based on model where test scores are measured relative to the school-specific mean.

REFERENCES

Apple, M., *Knowledge and Power,* Routledge, New York, 1982.

Bowles, S., and H. Gintis, *Schooling in Capitalist America,* Basic Books, New York, 1976.

Carnoy, M., and H. M. Levin, *Schooling and Work in the Democratic State,* Stanford University Press, Stanford, California, 1986.

Cicourel, A. V., and J. I. Kitsuse, *The Educational Decisionmakers,* Bobbs-Merrill, Indianapolis, Indiana, 1963.

Clune, W. H., *The Implementation and Effects of High School Graduation Requirements: First Steps Toward Curricular Reform,* University of Wisconsin Center for Research and the Center for Policy Research in Education, Madison, Wisconsin, 1989.

Cohen, D., "Origins," in A. Powell, E. Farrar, and D. Cohen (eds.), *The Shopping Mall High School,* Houghton-Mifflin, Boston, Massachusetts, 1985.

DeLany, B., *The Management of Choice in High Schools,* paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, California, 1988.

Ekstrom, R. B., M. E. Goertz, and D. A. Rock, *Education and American Youth,* The Falmer Press, Philadelphia, Pennsylvania, 1988.

Garet, M. S., and B. DeLany, "Students, Courses, and Stratification," *Sociology of Education 61* , 1988, pp. 61-77.

Giroux, H. A., *Ideology, Culture, and the Process of Schooling,* Temple University Press, Philadelphia, Pennsylvania, 1981.

Goodlad, J. I., *A Place Called School: Prospects for the Future,* McGraw-Hill, New York, 1984.

Grubb, N., *The Cunning Hand, The Cultured Mind: Models for Integrating Vocational and Academic Education,* National Center for Research in Vocational Education, University of California, Berkeley, California, 1991.

Grubb, N., and M. Lazerson, *American Education and Vocationalism: Documents in Vocational Education, 1870-1970,* Teachers College Press, New York, 1974.

Hallinan, M. T., "The Social Organization of Schools: An Overview," in M. T. Hallinan (ed.), *The Social Organization of Schools: New Conceptualizations of the Learning Process,* Plenum, New York, 1987.

Hoachlander, E. G., C. Brown, and J. Tuma, *Measuring High School Curricular Experiences: Implications for Vocational Education,* MPR Associates, Berkeley, California, 1987.

Hoachlander, E. G., and S. Choy, *High School and Beyond: Classification of Secondary Vocational Education Courses and Students,* report prepared for the Center of Education Statistics, U.S. Department of Education, November 1986.

Kantor, H., "Work, Education, and Vocational Reform: The Ideological Origins of Vocational Education, 1890-1920," *American Journal of Education 94* , 1986, pp. 401-426.

Kilgore, S. B., "The Organizational Context of Tracking in Schools," *American Sociological Review 56* , 1991, pp. 189-203.

Kirst, M., *California High School Curriculum Study: Paths Through High School,* Policy Analysis for California Education, Stanford University, Palo Alto, California, 1984.

Mitchell, V., E. Russell, and C. Benson, *Exemplary Urban Career-Oriented Secondary School Programs,* National Center for Research in Vocational Education, University of California, Berkeley, California, 1988.

McDonnell, L. M., L. Burstein, T. H. Ormseth, J. S. Catterall, and D. Moody, *Discovering What Schools Really Teach: Designing Improved Coursework Indicators,* RAND, JR-02, June 1990.

National Assessment of Vocational Education, *Handicapped and Disadvantaged Students: Access to Quality Vocational Education* . U.S. Government Printing Office, Washington, D.C., 1989.

National Center for Education Statistics, *High School and Beyond: An Analysis of Course-Taking Patterns in Secondary Schools as Related to Student Characteristics,* U.S. Department of Education, Washington, D.C., 1985.

Oakes, J., et al., *Multiplying Inequalities: The Effects of Race, Social Class, and Tracking on Opportunities to Learn Mathematics and Science,* RAND, R-3928-NSF, July 1990.

Oakes, J., "Secondary School Tracking: A Contextual Perspective, *Educational Psychologist 22 ,* 1987, pp. 129-153.

Oakes, J., *Keeping Track: How Schools Structure Inequality,* Yale University Press, New Haven, CT, 1985.

Oakes, J., "Limiting Opportunity: Student Race and Curricular Differences in Secondary Vocational Education," *American Journal of Education 91 ,* 1983, pp. 801-820.

Oakes, J., "Beyond Tinkering: The Reconstruction of Vocational Education," in G. Copa, J. Plihal, and M. Johnson (eds.), *Re-visioning Vocational Education in the Secondary School ,* University of Minnesota, St. Paul, Minnesota, pp. 65-84.

Rehburg, R. A., and E. R. Rosenthal, *Class and Merit in the American High School,* Longman, New York, 1978.

Rosenbaum, J. E., "Institutional Career Structures and the Social Construction of Ability," in J. G. Richardson (ed.), *Handbook of Theory and Research for the Sociology of Education,* Greenwood Press, New York, 1986.

Rosenbaum, J. E., "Track Misperceptions and Frustrated College Plans: An Analysis of the Effects of Tracks and Track Perceptions in the National Longitudinal Survey," *Sociology of Education 53,* 1980, pp. 74-88.

Selvin, M., et al., *Who Gets What and Why: Curriculum Decisionmaking at Three Comprehensive High Schools,* RAND, N-3041-NCRVE/UCB, February 1990.

Sorensen, A. B., "The Organizational Differentiation of Students in Schools as an Opportunity Structure," in M. T. Hallinan (ed.), *The Social Organization of Schools: New Conceptualizations of the Learning Process,* Plenum, New York, 1987.

Stasz, C., D. MacArthur, M. Lewis, and K. Ramsey, *Teaching and Learning Generic Skills for the Workplace,* RAND, R-4004-NCRVE/UCB, 1990.

Sternberg, Robert G., *Beyond IQ: A Triarchic Theory of Human Intelligence,* Cambridge University Press, Boston, Massachusetts, 1984.

Useem, E. L., *Student Selection into Course Sequences in Mathematics: The Impact of Parent Involvement and School Policies,* paper presented at a conference on School Characteristics and Student Outcomes, University of Notre Dame, Indiana, April 1990.

---

[1] We have kept confidential the identity and location of each school and the identity of all individuals with whom we

spoke. The names we have assigned to the three schools are pseudonyms.

[2]Schools in the upper to middle range of academic and social advantage scored even higher on two of these variables. Seventy-five percent had access to area vocational centers, and these schools offered an average of 49 credits in vocational education.

[3]Individual case reports about the three schools are reported in a companion Note, Selvin et al. (1990).

[4]We have kept confidential the identity and location of each school and the identity of all individuals with whom we spoke. The names we have assigned to the three schools are pseudonyms.

[5]Other studies of students' coursetaking patterns have based their samples on the cohort of students enrolled in the freshman class (Garet and Delaney, 1988). Given the limitations of the administrative and recordkeeping procedures at the three schools, it was not possible within our timeframe and budget to collect transcript data for the group of students who entered 9th grade in the fall of 1984.

[6]Some data were not available for all three schools.

[7]A list of students eligible for free or reduced-price lunch was available for students at Washington and Coolidge. But not all students who qualify for a free or reduced lunch take advantage of this benefit, either because they are unaware of it or are self-conscious about doing so. As a result, we felt that using the free or reduced-price lunch list as a marker for students from a "low" socioeconomic background would significantly underestimate that population. Moreover, we had no measure of students at the other end of the SES spectrum.

[8]Because the schools used different achievement tests, we used students' percentile rankings to obtain a comparable measure across schools.

[9]The quality of the data on this variable for all three schools may be less reliable than for other measures coded from student transcripts for the following reasons: Students may have requested that their transcripts be sent to institutions to which they did not ultimately apply for admission. In addition, we cannot be certain that all transcript requests were noted on transcripts. Although school administrators assured us that they were very conscientious about recording this information on each student's transcript, personnel at our schools may have been inconsistent in recording such requests. Such inconsistencies may have been random--that is, some clerks at each school may have been more conscientious than others--or they may have been systematic--clerks at one school were predictably less conscientious than clerks at the other schools. At Washington, information about transcripts sent was frequently missing from the student's file. By the time we began data collection, information from the transcripts of the 1988 senior class at Washington had been computer-entered, and the hard copy transcripts were no longer available at the school site (as was the case for Coolidge and McKinley). However, the portion of each student's transcript where notations were made about transcripts sent to postsecondary institutions was often missing from the electronic file. Our coding scheme, at Washington as well as at the other two schools, distinguished student transcripts from which this information was missing from complete transcripts on which no transcript requests had been noted.

[10]We defined students as vocational concentrators if they took six or more semesters of vocational courses at the case study school. Although we recorded all courses taken by concentrator students, for this report we analyzed only their participation in math, English, and vocational courses.

[11]This sample undoubtedly biases our findings, particularly since students who drop out of school are likely to differ in systematic ways from those who remain. Therefore, our findings apply only to that group of students staying in school until grade 12.

[12]Data were collected for a total of 1,355 students. Because many data were missing, 15 students were dropped from the final senior class sample (3 from Coolidge, 1 from Washington, and 11 from McKinley).

[13]At all three schools, about 95 percent of the senior class was also enrolled in the previous year. At Coolidge and Washington, 85 to 87 percent of the class was enrolled for the previous two years; only 80 percent of McKinley's senior class was present two years earlier. The three schools diverge even more in the stability of their student bodies when examining the fraction of four-year students represented in the senior class. Eighty percent of the senior class entered as freshmen at Washington, compared to only 65 percent for McKinley. This divergence may be due in part to differential rates of enrollment from students who had been in private three-year junior high schools or in schools outside the district. This divergence is compounded by the significant differences in the schools' attrition rates. The principal at Coolidge reported a 25 percent attrition rate between the 9th and 12th grades. Washington reported the lowest rate of attrition--12 percent over the four years--whereas at McKinley, 55 percent of 9th graders leave the school before graduation (Selvin et al., 1990).

[14]We did not analyze the 9th through 12th grade cohort because of the differential reduction in sample size across the three schools, as shown in Table 2.1.

[15]In this table we have presented data for two groups of students at each school: all students who were enrolled during the 12th grade and students who attended 10th through 12th grade in that school. These data indicate that the characteristics of both groups are quite similar. As a result, in subsequent tables we will present data for the 10th through 12th grade sample only.

[16]Eighty-two percent of Asian students at Washington and all Asian students at McKinley are foreign-born. (In the McKinley cohort, however, Asians constitute less than 1 percent of the total 10th-12th grade 1988 senior sample.) Twenty percent of Latino students at Washington and 70 percent of those at McKinley are foreign-born. We were unable to obtain data on country of birth for Coolidge seniors, although data from our field study suggest that a substantial proportion of the school's Latino and Asian students are immigrants.

[17]Table A.1 displays these data.

[18]This may result from the influence of the large foreign-born cohort at McKinley, and particularly at Washington.

[19]Tables A.2, A.3, and A.4 compare the achievement scores of students from different ethnic and racial backgrounds and of native-born and foreign-born students.

[20]However, the three Latino students at Washington who took the SAT test scored higher than did whites on the math portion and higher than Asians and whites on the verbal portion.

[21]Of the top 10 percent of Washington students, 95.5 percent took the 10th grade achievement test, 90.7 percent of Coolidge High's top 10 percent, and 91.2 percent of the top 10 percent of McKinley High students. Of the top 10 percent at Washington, 97.8 percent took the SAT test; 93 percent of the top 10 percent at Coolidge, and 73.5 percent of McKinley students in the top 10 percent.

[22]Washington's high rate of application to four-year colleges, relative to Coolidge and McKinley, is consistent with the fact that more Washington students completed the state university's entrance requirements.

[23]See the description of the comparison schools in Sec. II.

[24]For further detail about the differences in the curriculum and overall climates of the schools, see Selvin et al. (1989).

[25]However, one teacher suggested that Coolidge must have done something right, since test scores have stayed about the same in spite of the population change.

[26]Interestingly, despite the designation of McKinley's academic courses as college-preparatory, several teachers reported that they believed the content of these courses to be very low level.

[27]At Coolidge, 8 percent of the total course sections offered were vocational, 9 percent at Washington, and 15 percent at McKinley. See the discussion of the curriculum offerings at these schools in Sec. I and in Selvin et al. (1990).

[28]In addition to the problem of distance, some regional courses were also offered during early morning or evening hours.

[29]The sample for the analysis presented in this section and in Sec. V is the 10th through 12th grade cohort at Washington, Coolidge, and McKinley. These students were present from their sophomore through senior years. (Of this cohort, 85 percent of the Coolidge students were also enrolled in the 9th grade at that school, 93 percent at Washington, and 81 percent of the McKinley students.) Consequently, as noted in Sec. II, we are focusing on those students who are the least mobile and who have not dropped out of school before their senior year. Because of the differences in attrition and mobility across the three schools that we observed earlier, this analysis is biased toward making the schools and students' coursetaking appear more similar than they actually are.

[30]Washington requires that all students take at least two practical or vocational courses.

[31]See Appendix B for the occupational/non-occupational typology used in this analysis.

[32]The heavier participation in non-occupationally specific courses may also reflect the cutbacks that vocational programs at each school experienced in recent years. Our case study respondents told us that many advanced courses--those most likely to teach specific job skills--were eliminated. Fewer occupational courses relative to non-occupational courses are available at Coolidge, Washington, and McKinley (see Selvin et al., 1990, for additional detail).

[33]See Table C.1. The distribution of vocational credits taken follows a similar pattern. See Fig. C.1 and Table C.2.

[34]Figure C.2 presents the distribution of vocational credits after the subtraction of 10 credits among the total credits taken by each Washington student.

[35]See Appendix B on the development of the typology used in this table and accompanying discussion.

[36]This figure displays the actual number of courses taken by students at each school. The distribution of vocational credits taken in occupational subjects mirrors course distributions. See Fig. C.3.

[37]At Coolidge, these patterns are probably affected by the fact that the school houses the business courses offered through its regional occupational program, and students from two other schools come to Coolidge to take these courses. Consequently, more business courses are offered at Coolidge than might be the case if the school did not provide this regional service. However, the fact that largely middle-class Coolidge would house a regional program in business, rather than in the trades, is, in itself, consistent with our data about Washington and other studies showing a preference for business-oriented vocational education among middle-class students.

[38]Differences in the means are consistent with distributional patterns we observed. See Tables C.3 and C.4.

[39]Alternatively, we could have chosen to analyze those factors that determine the number of vocational courses or credits taken. A regression analysis, similar to the logistic analysis presented below, in which we modeled the factors that determine the number of vocational courses or credits, led to similar conclusions. Because of space limitations, we present only the results from the logistic analysis.

[40]The cutoff at six or more courses is somewhat arbitrary. However, the findings reported in this section are similar when we define the cutoff as five or more courses, or seven or more courses. Essentially, the between-school differences and the within-school differences are not affected by the point in the distribution we use to divide the students into non-concentrators and concentrators.

[41]Table 4.8 also shows that when we subtracted the two required semesters from each Washington student's record, the relative participation of Asians and Latinos shifted. Because of the large discrepancy in the two scores for Latinos and this shift, it is difficult to make conclusions about the proportion of concentrators in this small Latino segment of the student body (5 percent of the total), or how their participation compares to that of Asians.

[42]Note that these perceptions are not borne out by students' achievement test scores. At both schools, Latinos scored considerably lower than did whites. Moreover, Washington and Coolidge Latinos' scores were quite similar (see Table 4.5).

[43]We will examine the vocational and academic coursetaking patterns of these students we have defined as "vocational concentrators" in more detail below and in Sec. V.

[44]We omitted the scores of those students who fell in the top and bottom five percentiles to avoid distorting the range with "outliers"--a single student whose score may differ dramatically in one direction or the other from his or her classmates.

[45]The data for Figs. 4.4 and 4.5, shown in Table C.7 in Appendix C, document that the mean math and reading scores are significantly different for vocational concentrators than for non-concentrators. Table C.7 also shows the mean, 5th percentile, and 95th percentile for 8th grade math and reading scores at Washington and Coolidge. The pattern is similar to that shown in the figures based on 10th grade achievement scores.

[46]Since 8th grade achievement scores were not available for McKinley, we used 10th grade achievement scores in math and reading so that we could make comparisons across the three schools. The results are similar for Washington and Coolidge when 8th grade achievement scores are used instead.

[47]The pooled model included a separate intercept term (or dummy variable) for each school.

[48]The estimated coefficients from the logistic analysis are presented in Appendix D. The results in Tables 4.10 to 4.12 are based on separate logistic models for each school. This allows the effect of student characteristics on the probability of becoming a vocational concentrator to vary by school and is therefore appropriate for within-school comparisons. These results can also be used to make between-school comparisons. Alternatively, a pooled model with dummy variables can be used for between-school comparisons. The estimated probabilities from the pooled model lead to similar conclusions in most cases. Exceptions will be noted in the discussion.

[49]Here, too, differences in Latino participation may be related to the social-class differences between Coolidge and Washington Latinos. In addition, as we discussed above, Washington has a relatively smaller percentage of Latino students than Coolidge or McKinley. Race or ethnicity appear to play a lesser role in vocational coursetaking at McKinley, as there is no significant difference in the probability that representative African American and Latino students will be vocational concentrators. Neither, however, is there any evidence of socioeconomic differences between these two groups at the school.

[50]When the probabilities are estimated using the pooled model, there is a consistent ranking from highest probability to lowest of McKinley-Washington-Coolidge when there is no adjustment for Washington's practical arts requirement, and McKinley-Coolidge-Washington when there is an adjustment. In the first case, the estimated coefficients do not show a significant difference between Washington and Coolidge, whereas the coefficient for McKinley is highly significant. In the second case, the three schools are significantly different from one another on the basis of estimated coefficients on the school dummy variables.

[51]These estimates are shown for boys only. The differences between boys and girls will be the same as those reflected in Table 4.10. In general, girls and boys of the same race or ethnicity with test scores at the same point in the distribution exhibit no significant difference between the estimated probabilities. The exception is Washington, when there is no adjustment for the practical arts requirement.

[52]One exception is Washington, where the estimated coefficient on the reading score is negative but insignificant (see Table D.3).

[53]We suspect that, given these percentages, although more than 2 percent of the Latino students would be likely to take a concentrated vocational program even if Washington had not required students to take two courses, there would still be a larger percentage of Latino concentrators at Coolidge than at Washington.

[54]For a more complete description of the course offerings at each school, see Selvin et al. (1990).

[55]An important caution here, and throughout this and the next section, is that although academic course titles may make the curriculum at the schools appear to be similar, they may mask considerable variation in the actual content and rigor of the courses themselves. For further explication of this issue, see McDonnell et al. (1990).

[56]The results shown in Table 5.1 are similar when the calculations are made for the 9th through 12th grade cohort.

[57]Coolidge, with the most formal "tracking" system of the three schools, contrasts with McKinley, which "detracked" all classes in the Fall of 1988. Washington, with a less-formal tracking system, fell somewhere in between. Note, however, that the "detracking" at McKinley does not affect the cohort of students that we are studying, as they graduated in the Spring of 1988. See Selvin et al. (1990) for descriptions of variations in the tracking systems at the three schools during the 1988-1989 school year.

[58]A detailed description of the track or level designations is found in Appendix B.

[59]For all three schools, differentiating the ESL and the highest-level English classes was straightforward: ESL classes were placed in the ESL category, "college-prep" classes were assigned to the high category, and "honors/AP" classes were designated as honors courses. However, the practice of placing students of low and average ability in mixed-ability courses made it more difficult to identify the two remaining tracks, low and mixed. At Coolidge, with the most extensive tracking system, we classified three levels of courses--"low/regular non-college-prep," "regular non-college-prep," and "non-college-prep/college-prep"--as the mixed/medium track. In contrast, the mixed/medium track at Washington contains only those classes where the schools combined "non-college-prep" and "college-prep" students, and there are no mixed/medium track English courses at McKinley, since all the English classes there were considered either "high" or "low." Finally, the low category includes "special education" and "low/remedial" courses at all three schools, and combined "low/regular non-college-prep" courses at Washington and McKinley only.

[60]In addition, students at Washington and McKinley who take an advanced placement computer science class are also classified as being in the honors track.

[61]The findings are similar when examining the second semester in 10th and 11th grades. For 12th grade at each school, there is an approximate increase of 10 percentage points in the percentage of students not taking a math course in the second semester compared to the first semester. For English, there is a 3 to 10 point increase in non-participation from the first to second semesters. If a student was taking more than one English or math course in a semester where the track level was different, the highest track level was assigned for that semester.

[62]Selvin et al. (1990).

[63]In a similar manner, English track placement distributions at McKinley reflect school-specific curriculum offerings as much as perceptions of student ability. McKinley did not appear to offer medium-level courses; English courses at that school appeared either to be high or low track.

[64]Using this definition, we classified students in the high math track (i.e., taking algebra 2) and honors math track (i.e., taking geometry) as "college-prep" students.

[65]There are no significant differences in participation in college-prep English across the three schools.

[66]See Sec. IV.

[67]The data for Figs. 5.1 and 5.2 are found in Tables C.5 and C.6. The tables also show the mean, 5th, and 95th percentiles for 8th grade achievement scores as well as 10th grade achievement scores. The pattern is similar to that shown in the figures.

[68]Tables C.5 and C.6 document that the means are always significantly different for both math and reading scores (8th and 10th grade) between takers and nontakers of college-prep math and English.

[69]Since 8th grade achievement scores were not available for McKinley, we used 10th grade achievement scores in math and reading so that we could make comparisons across the three schools. Yet the results are similar for Washington and Coolidge when we compare 8th grade achievement scores. Therefore, although 8th grade scores may be a better measure of prior achievement as they are uncontaminated by initial track placement in high school, our use

of 10th grade scores does not bias the results.

[70]The results in Tables 5.6 through 5.11 are based on separate logistic models for each school. This method of analysis allows for differential effects of student characteristics within schools and therefore is appropriate for within-school comparisons. These results can also be used to make between-school comparisons. Alternatively, a pooled model with dummy variables can be used for between-school comparisons. The estimated probabilities from the pooled model lead to similar conclusions in most cases; exceptions will be noted in the discussion.

[71]This finding follows from the coefficient estimates reported in Appendix D which show that the coefficient on the variable measuring gender is never significantly different from zero in both the school-specific and pooled logistic models predicting the probability of being in college-prep math. In contrast, the coefficient on gender is always significant in the models predicting the probability of being in college-prep English.

[72]When the pooled model is used to calculate the probabilities, there is a constant ranking across the three schools for each race/ethnicity group. This occurs because the pooled model, as estimated, restricts the effect of race/ethnicity to be the same across the three schools. For college-prep math, the probabilities are highest for the average student at Washington and lowest for the average McKinley student. However, the estimated coefficients on the school-specific indicators are not significant. For placement in college-prep English, there is a positive and significantly higher probability for the average McKinley student than one at Coolidge or Washington. The pooled model was also estimated with interaction terms for race and school (see the discussion in Appendix D for details).

[73]Comparison of the same analysis for girls with our findings for boys of the same race/ethnic groups produces the same pattern exhibited in Tables 5.6 and 5.7. At each point in the within-school test score distribution, there is no difference in placement probabilities for college-prep math, but girls have higher probabilities of being in college-prep English.

[74]This finding follows from the coefficient estimates in Tables D.4 and D.5, which show a positive and significant relationship between the probability of being in college-prep math or English and math and reading achievement scores.

[75]McKinley, deviating from this pattern, had the highest participation in college-prep English courses, despite its lowest average test scores. As noted above, this result may be an artifact of the tracking designations at McKinley. Unlike the other two schools, McKinley had no middle-level tracks. All students were assigned either to an ESL, low, high (college-preparatory), or honors/AP English track.

[76]Coolidge is the only school with sufficient representation of the four race/ethnic groups to allow estimation of separate effects for each group. At Washington, there is only one black student in the sample, and there are no white students and only three Asian students in the McKinley sample. Consequently, these students are included in the omitted group, BLACK is omitted from the regressions for Washington, and WHITE and ASIAN are omitted in the regressions for McKinley. In addition, there are three students at Coolidge and one student at McKinley who are classified as "other" race/ethnicity. They are also included in the omitted group in the regressions.

[77]Information about a student's race/ethnicity was missing for about 3 percent of the McKinley sample.

[78]The pooled model was also estimated allowing some of the coefficients, such as those on the race/ethnicity variables, to vary by school.

[79]By estimating the models for Washington and Coolidge with different race/ethnic groups as the omitted category, pairwise comparisons of the significance of the differences between all of the different race/ethnic groups can be made. This is not an issue for McKinley, which has only two groups.

The National Centers for Career and Technical Education are funded by the Office of Vocational and Adult Education, U.S. Department of Education. Please e-mail us your comments and suggestions.