

ISSUE

Selected, Edited, and with Issue Framing Material by:
Esther S. Chang, *Soka University of America*



Can Schools Close the Achievement Gap between Students from Different Ethnic and Racial Backgrounds?

YES: Carol Corbett Burris and Kevin G. Welner, from "Closing the Achievement Gap by Detracking," *Phi Delta Kappan* (2005)

NO: William H. Schmidt, Leland S. Cogan, and Curtis C. McKnight, from "Equality of Educational Opportunity: Myth or Reality in U.S. Schooling?" *American Educator* (2010–2011)

Learning Outcomes

After reading this issue, you will be able to:

- Discuss the data regarding racial and ethnic differences in academic achievement in the United States.
- Understand the differences in school experiences of students from different ethnic and racial groups and different economic circumstances.
- Define ability-level tracking and understand its uses and misuses.
- Understand some of the factors that can maintain or close the achievement gap.

ISSUE SUMMARY

YES: Carol Burris and Kevin Welner argue that the achievement gap between whites and African American and Latino students can be closed by "detracking" and having similarly high expectations and similar curricular demands on all students.

NO: William Schmidt and colleagues argue that minority students are exposed to pervasive and persistent inequalities that make school-based reforms unrealistic.

In 2014, the nation will witness the sixtieth anniversary of the U.S. Supreme Court's decision in *Brown v. the Board of Education*, which declared that the segregation of public schools according to race denied African American children the same educational opportunities as white children. Many educators and policymakers, however, do not view this anniversary as an occasion to celebrate, pointing to the continuing gap between the academic achievement of white students, on the one hand, and African American and Hispanic students, on the other hand. Put simply, compared to white students, African American and

Hispanic students, on average, score lower on standardized achievement tests and tests of basic skills in mathematics and science, are more likely to leave school before graduating from high school, and are less likely to attend college.

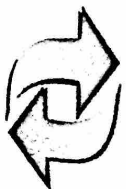
What role do schools play in creating or maintaining this achievement gap? Some critics of public education suggest that schools have created the gap through discriminatory practices and subtle forms of racism perpetrated by teachers, administrators, and support staff, such as having lower expectations for African American and Hispanic students and assigning them to low achieving-track or special education classes at substantially higher

rates than their white peers. These critics also point out that the achievement gap actually widens over the school years, with African American and Hispanic students falling further and further behind their white peers as they move through the elementary to the middle and, eventually, the high school years. Critics suggest that this increasing gap is evidence that schools are causing, or at least contributing to, the problem. Indeed, in keeping with this notion, President George W. Bush's controversial No Child Left Behind policy was based on the assumption that any student can succeed if given appropriate educational opportunities.

Many defenders of public education argue that it is not schools that are to blame for the existence of the achievement gap, but rather the broader social and economic conditions that create a wide array of disparities among different ethnic and racial groups. Years of pervasive societal discrimination, it is argued, have led to high rates of poverty among African American and Hispanic families, and thereby to less adequate material resources in homes, including books and other materials, that support academic growth; more limited access to the health care and nutrition necessary to ensure optimal development; and exposure to a variety of hazardous conditions, from lead in paint used in homes to crime and violence, all of which interfere with learning. These defenders of public

education point out that children who live in poverty begin school less well prepared (e.g., with fewer preliteracy skills, such as the recognition that print encodes language) than their more affluent peers and thus, wider social forces rather than schooling are to blame for the achievement gap. Thus, it is unreasonable, according to these defenders of public schools, to expect that schools can overcome the pervasive social and economic barriers that exist before an African American or Hispanic child begins school and continue in his or her out-of-school hours.

In the first of the following selections, Carol Corbett Burris and Kevin G. Welner argue that the achievement gap between white students and African American and Hispanic students is a consequence of the overrepresentation of minority students in low-achieving track classes. Thus, for Burris and Weiner, the answer is to detrack schools, and they provide a successful example from a suburban school district in New York State. In the second selection, William H. Schmidt, Leland S. Cogan, and Curtis C. McKnight argue that students in economically disadvantaged neighborhoods, which include an overrepresentation of ethnic and racial minorities, are exposed to less-demanding content and thus achieve less. Moreover, Schmidt and colleagues argue that this economic variation in exposure to learning opportunities is pervasive and persistent in the United States.



YES **Carol Corbett Burris and Kevin G. Welner**

Closing the Achievement Gap by Detracking

The most recent Phi Delta Kappa/Gallup Poll of the Public's Attitudes Toward the Public Schools found that 74% of Americans believe that the achievement gap between white students and African American and Hispanic students is primarily due to factors unrelated to the quality of schooling that children receive.¹ This assumption is supported by research dating back four decades to the Coleman Report and its conclusion that schools have little impact on the problem.² But is the pessimism of that report justified? Or is it possible for schools to change their practices and thereby have a strongly positive effect on student achievement? We have found that when all students—those at the bottom as well as the top of the “gap”—have access to first-class learning opportunities, all students' achievement can rise.

Because African American and Hispanic students are consistently overrepresented in low-track classes, the effects of tracking greatly concern educators who are interested in closing the achievement gap.³ Detracking reforms are grounded in the established ideas that higher achievement follows from a more rigorous curriculum and that low-track classes with unchallenging curricula result in lower student achievement.⁴ Yet, notwithstanding the wide acceptance of these ideas, we lack concrete case studies of mature detracking reforms and their effects. This article responds to that shortage, describing how the school district in which Carol Burris serves as a high school principal was able to close the gap by offering its high-track curriculum to all students, in detracked classes.

Tracking and the Achievement Gap

Despite overwhelming research demonstrating the ineffectiveness of low-track classes and of tracking in general, schools continue the practice.⁵ Earlier studies have argued that this persistence stems from the fact that tracking is grounded in values, beliefs, and politics as much as it is in technical, structural, or organizational needs.⁶ Further, despite inconsistent

research findings,⁷ many parents and educators assume that the practice benefits high achievers. This is partly because parents of high achievers fear that detracking and heterogeneous grouping will result in a “watered-down” curriculum and lowered learning standards for their children.

And so, despite the evidence that low-track classes cause harm, they continue to exist. Worse still, the negative achievement effects of such classes fall disproportionately on minority students, since, as noted above, African American and Hispanic students are overrepresented in low-track classes and underrepresented in high-track classes, even after controlling for prior measured achievement.⁸ Socioeconomic status (SES) has been found to affect track assignment as well.⁹ A highly proficient student from a low socioeconomic background has only a 50-50 chance of being placed in a high-track class.¹⁰

Researchers who study the relationship between tracking, race/ethnicity, and academic performance suggest different strategies for closing the achievement gap. Some believe that the solution is to encourage more minority students to take high-track classes.¹¹ Others believe that if all students are given the enriched curriculum that high-achieving students receive, achievement will rise.¹² They believe that no students—whatever their race, SES, or prior achievement—should be placed in classes that have a watered-down or remedial academic curriculum and that the tracking system should be dismantled entirely.¹³ In this article, we provide evidence for the success of this latter approach. By dismantling tracking and providing the high-track curriculum to all, we can succeed in closing the achievement gap on important measures of learning.

Providing “High-Track” Curriculum to All Students

The Rockville Centre School District is a diverse suburban school district located on Long Island. In the late 1990s, it embarked on a multiyear detracking reform that increased

learning expectations for all students. The district began replacing its tracked classes with heterogeneously grouped classes in which the curriculum formerly reserved for the district's high-track students was taught.

This reform began as a response to an ambitious goal set by the district's superintendent, William Johnson, and the Rockville Centre Board of Education in 1993: *By the year 2000, 75% of all graduates will earn a New York State Regents diploma.* At that time, the district and state rates of earning Regents diplomas were 58% and 38% respectively.

To qualify for a New York State Regents diploma, students must pass, at a minimum, eight end-of-course Regents examinations, including two in mathematics, two in laboratory sciences, two in social studies, one in English language arts, and one in a foreign language. Rockville Centre's goal reflected the superintendent's strong belief in the external evaluation of student learning as well as the district's commitment to academic rigor.

Regents exams are linked with coursework; therefore, the district gradually eliminated low-track courses. The high school eased the transition by offering students instructional support classes and carefully monitoring the progress of struggling students.

While the overall number of Regents diplomas increased, a disturbing profile of students who were not earning the diploma emerged. These students were more likely to be African American or Hispanic, to receive free or reduced-price lunch, or to have a learning disability. At the district's high school, 20% of all students were African American or Hispanic, 13% received free and reduced-price lunch, and 10% were special education students. If these graduates were to earn the Regents diploma, systemic change would need to take place to close the gaps for each of these groups.

Accelerated Mathematics in Heterogeneous Classes

On closer inspection of the data, educators noticed that the second math Regents exam presented a stumbling block to earning the diploma. While high-track students enrolled in trigonometry and advanced algebra in the 10th grade, low-track students did not even begin first-year algebra until grade 10.

In order to provide all students with ample opportunity to pass the needed courses and to study calculus prior to graduation, Superintendent Johnson decided that all students would study the accelerated math curriculum formerly reserved for the district's highest achievers. Under the leadership of the assistant principal, Delia Garrity,

middle school math teachers revised and condensed the curriculum. The new curriculum was taught to all students in heterogeneously grouped classes. To support struggling learners, the school initiated support classes called math workshops and provided after-school help four afternoons a week.

The results were remarkable. Over 90% of incoming freshmen entered the high school having passed the first Regents math examination. The achievement gap dramatically narrowed. Between the years of 1995 and 1997, only 23% of regular education African American or Hispanic students had passed this algebra-based Regents exam before entering high school. After universally accelerating all students in heterogeneously grouped classes, the percentage more than tripled—up to 75%. The percentage of white or Asian American regular education students who passed the exam also greatly increased—from 54% to 98%.

Detracking the High School

The district approached universal acceleration with caution. Some special education students, while included in the accelerated classes, were graded using alternative assessments. This 1998 cohort of special education students would not take the first ("Sequential I") Regents math exam until they had completed ninth grade. (We use year of entry into ninth grade to determine cohort. So the 1998 cohort began ninth grade in the fall of 1998.) On entering high school, these students with special needs were placed in a double-period, low-track, "Sequential I" ninth-grade math class, along with low-achieving new entrants. Consistent with the recommendations of researchers who have defended tracking,¹⁴ this class was rich in resources (a math teacher, special education inclusion teacher, and teaching assistant). Yet the low-track culture of the class remained uncondusive to learning. Students were disruptive, and teachers spent considerable class time addressing behavior management issues. All students were acutely aware that the class carried the "low-track" label.

District and school leaders decided that this low-track class failed its purpose, and the district boldly moved forward with several new reforms the following year. All special education students in the 1999 cohort took the exam in the eighth grade. The entire 1999 cohort also studied science in heterogeneous classes throughout middle school, and it became the first cohort to be heterogeneously grouped in ninth-grade English and social studies classes.

Ninth-grade teachers were pleased with the results. The tone, activities, and discussions in the heterogeneously grouped classes were academic, focused, and enriched.

Science teachers reported that the heterogeneously grouped middle school science program prepared students well for ninth-grade biology.

Detracking at the high school level continued, paralleling the introduction of revised New York State curricula. Students in the 2000 cohort studied the state's new biology curriculum, "The Living Environment," in heterogeneously grouped classes. This combination of new curriculum and heterogeneous grouping resulted in a dramatic increase in the passing rate on the first science Regents exam, especially for minority students who were previously overrepresented in the low-track biology class. After just one year of heterogeneous grouping, the passing rate for African American and Hispanic students increased from 48% to 77%, while the passing rate for white and Asian American students increased from 85% to 94%.

The following September, the 2001 cohort became the first class to be heterogeneously grouped in *all subjects* in the ninth grade. The state's new multiyear "Math A" curriculum was taught to this cohort in heterogeneously grouped classes in both the eighth and ninth grades.

In 2003, some 10th-grade classes detracked. Students in the 2002 cohort became the first to study a heterogeneously grouped pre-International Baccalaureate (IB) 10th-grade curriculum in English and social studies. To help all students meet the demands of an advanced curriculum, the district provides every-other-day support classes in math, science, and English language arts. These classes are linked to the curriculum and allow teachers to pre- and post-teach topics to students needing additional reinforcement.

Closing the Gap on Other Measures That Matter

New York's statewide achievement gap in the earning of Regents diplomas has persisted. In 2000, only 19.3% of all African American or Hispanic 12th-graders and 58.7% of all white or Asian American 12th-graders graduated with Regents diplomas. By 2003, while the percentage of students in both groups earning the Regents diploma increased (26.4% of African American or Hispanic students, 66.3% of white or Asian American students), the gap did not close.

In contrast, Rockville Centre has seen both an increase in students' rates of earning Regents diplomas and a decrease in the gap between groups. . . . For those students who began South Side High School in 1996 (the graduating class of 2000), 32% of all African American or Hispanic and 88% of all white or Asian American graduates

earned Regents diplomas. By the time the cohort of 1999 graduated in 2003, the gap had closed dramatically—82% of all African American or Hispanic and 97% of all white or Asian American graduates earned Regents diplomas. In fact, . . . for this 1999 cohort (the first to experience detracking in all middle school and most ninth-grade subjects), the Regents diploma rate for the district's minority students surpassed New York State's rate for white or Asian American students.

In order to ensure that the narrowing of the gap was not attributable to a changing population, we used binary logistic regression analyses to compare the probability of earning a Regents diploma before and after detracking. In addition to membership in a detracked cohort, the model included socioeconomic and special education status as covariates. Those students who were members of the 1996 and 1997 cohorts were compared with members of the 1998–2000 cohorts. We found that membership in a cohort subsequent to the detracking of middle school math was a significant contributor to earning a Regents diploma. . . . In addition, low-SES students and special education students in the 2001 cohort also showed sharp improvement.

These same three cohorts (1998–2000) showed significant increases in the probability of minority students' studying advanced math courses. Controlling for prior achievement and SES, minority students' enrollment in trigonometry, precalculus, and Advanced Placement calculus all grew.¹⁵ And as more students from those cohorts studied AP calculus, the enrollment gap decreased from 38% to 18% in five years, and the AP calculus scores significantly increased. . . .

Finally, detracking in the 10th grade, combined with teaching all students the pre-IB curriculum, appears to be closing the gap in the study of the IB curriculum. This year 50% of all minority students will study IB English and "History of the Americas" in the 11th grade. In the fall of 2003, only 31% chose to do so.



Achievement follows from opportunities—opportunities that tracking denies. The results of detracking in Rockville Centre are clear and compelling. When all students were taught the high-track curriculum, achievement rose for all groups of students—majority, minority, special education, low-SES, and high-SES. This evidence can now be added to the larger body of tracking research that has convinced the Carnegie Council for Adolescent Development, the

National Governors' Association, and most recently the National Research Council to call for the reduction or elimination of tracking.¹⁶ The Rockville Centre reform confirms common sense: closing the "curriculum gap" is an effective way to close the "achievement gap."

Notes

1. Lowell C. Rose and Alec M. Gallup, "The 36th Annual Phi Delta Kappa/Gallup Poll of the Public's Attitudes Toward the Public Schools," *Phi Delta Kappan*, September 2004, p. 49.
2. James Coleman et al., *Equality of Educational Opportunity* (Washington, D.C.: U.S. Government Printing Office, 1966).
3. Kevin G. Welner, *Legal Rights, Local Wrongs: When Community Control Collides with Educational Equity* (Albany: SUNY Press, 2001).
4. Clifford Adelman, *Answers in the Tool Box: Academic Intensity, Attendance Patterns, and Bachelor's Degree Attainment* (Washington, D.C.: Office of Educational Research, U.S. Department of Education, 1999); . . . Henry Levin, *Accelerated Schools for At-Risk Students* (New Brunswick, N.J.: Rutgers University, Center for Policy Research in Education, Report No. 142, 1988); Mano Singham, "The Achievement Gap: Myths and Realities," *Phi Delta Kappan*, April 2003, pp. 586-91; and Jay P. Heubert and Robert M. Hauser, *High Stakes: Testing for Tracking, Promotion, and Graduation* (Washington, D.C.: National Research Council, 1999).
5. Jeannie Oakes, Adam Gamoran, and Reba Page, "Curriculum Differentiation: Opportunities, Outcomes, and Meanings," in Philip Jackson, ed., *Handbook of Research on Curriculum* (New York: Macmillan, 1992), pp. 570-608.
6. Welner, op. cit.
7. Frederick Mosteller, Richard Light, and Jason Sachs, "Sustained Inquiry in Education: Lessons from Skill Grouping and Class Size," *Harvard Educational Review*, vol. 66, 1996, pp. 797-843; Robert Slavin, "Achievement Effects of Ability Grouping in Secondary Schools: A Best-Evidence Synthesis," *Review of Educational Research*, vol. 60, 1990, pp. 471-500; and James Kulik, *An Analysis of the Research on Ability Grouping: Historical and Contemporary Perspectives* (Storrs, Conn.: National Research Center on the Gifted and Talented, University of Connecticut, 1992).
8. Roslyn Mickelson, "Subverting Swann: First- and Second-Generation Segregation in Chesapeake Mecklenburg Schools," *American Educational Research Journal*, vol. 38, 2001, pp. 215-52; Robert Slavin and Jomills Braddock II, "Ability Grouping: On the Wrong Track," *College Board Research Report*, Summer 1993, pp. 11-17; and Welner, op. cit.
9. Samuel Lucas, *Tracking Inequality: Stratification and Mobility in American High Schools* (New York: Teachers College Press, 1999).
10. Beth E. Vanfossen, James D. Jones, and Z. Spade, "Curriculum Tracking and Status Maintenance," *Sociology of Education*, vol. 60, 1987, pp. 104-22.
11. John Ogbu, *Black American Students in an Affluent Suburb* (Mahwah, N.J.: Erlbaum, 2003).
12. Levin, op. cit.; and Slavin and Braddock, op. cit.
13. Jeannie Oakes and Amy Stuart Wells, "Detacking for High Student Achievement," *Educational Leadership*, March 1998, pp. 38-41; Susan Yonezawa, Amy Stuart Wells, and Lisa Sema, "Choosing Tracks: 'Freedom of Choice' in Detracking Schools," *American Educational Research Journal*, vol. 39, 2002, pp. 37-67.
14. Maureen Hallinan, "Tracking: From Theory to Practice," *Sociology of Education*, vol. 67, 1994, pp. 79-91; and Tom Loveless, *The Tracking Myth: State Reform Meets School Policy* (Washington, D.C.: Brookings Institution Press, 1999).
15. Carol Corbett Burris, Jay P. Heubert, and Henry M. Levin, "Math Acceleration for All," *Educational Leadership*, February 2004, pp. 68-71.
16. Carnegie Council on Adolescent Development, *Turning Points: Preparing American Youth for the 21st Century* (New York: Carnegie Corporation, 1989); *Ability Grouping and Tracking: Current Issues and Concerns* (Washington, D.C.: National Governors Association, 1993); and National Research Council, *Engaging Schools: Fostering High School Students' Motivation to Learn* (Washington, D.C.: National Academies Press, 2004).

CAROL CORBETT BURRIS is the principal of South Side High School in Rockville Centre, New York.

KEVIN G. WELNER is a professor and director of the National Education Policy Center at the University of Colorado Boulder.

**William H. Schmidt, Leland S. Cogan,
and Curtis C. McKnight**

 **NO**

Equality of Educational Opportunity: Myth or Reality in U.S. Schooling?

Public schooling is often regarded as “the great equalizer” in American society. For more than 100 years, so the story goes, children all across the country have had an equal opportunity to master the three Rs: reading, writing, and arithmetic. As a result, any student willing to work hard has the chance to go as far as his or her talent allows, regardless of family origin or socioeconomic status.

This assumption regarding opportunity and emphasis on individual talent and effort seems to be a natural offshoot of the rugged individualism and self-reliance that are so much a part of the fabled American character. We have long celebrated our cowboys, entrepreneurs, and standout athletes—but we have also long ignored those who have not succeeded. When success is individual, so is failure. It must result from a lack of effort, talent, motivation, application, or perseverance, not a lack of opportunity. Right?

Not according to our research. Defining educational equality in the most basic, foundational way imaginable—equal coverage of core academic content—we’ve found that America’s schools are far from being the equalizers we, as a nation, want them to be.

So what? Does it really matter that “the great equalizer” is a myth? To our way of thinking, it does. First, as researchers, we believe it is always important to question our assumptions—and that goes for our national assumptions about equality and individualism as well as our personal assumptions. Second, the more we study schools, the more inequity we see. While other researchers have tackled important issues like disparities in teachers’ qualifications and in classroom resources, we have focused on the basic question of what mathematics topics are taught. We have been disturbed to see that whether a student is even exposed to a topic depends on where he or she lives. Third, we find that those who don’t question basic assumptions draw tragic, unsupportable conclusions. Take, for

example, the controversial book *The Bell Curve*,¹ in which Richard J. Herrnstein and Charles Murray wrongly argued that unequal educational outcomes can *only* be explained by the unfortunate but unavoidable distribution of inherited abilities that relegate some students to the low end of the intelligence distribution. As we will show, unequal educational outcomes are clearly related to unequal educational opportunities.

In this article, we explore the extent to which students in different schools and districts have an equal opportunity to learn mathematics. Specifically, we discuss research on (1) the amount of variability in content coverage in eighth grade across 13 districts (or consortia of districts) and 9 states, and (2) the variation in mathematics courses offered by high schools in 18 districts spread across 2 states. We knew we would find some variability in terms of content coverage and course offerings, so our real question had to do with the nature and extent of the differences and whether they seemed to matter in terms of student achievement. Simply put, sometimes differences yield equivalent results, but sometimes differences make a difference.

In the United States, research like this is necessary because our educational system is not one system, but a disparate set of roughly 15,000 school districts distributed among 50 states and the District of Columbia. While states, with varying degrees of focus, rigor, and coherence,² have developed academic standards, local districts still maintain *de facto* control of their curriculum—some have written their own standards, some have written their own curriculum, some mandate the use of selected textbooks, and some leave all such decisions up to the schools. Even in states that control the range of textbooks that may be adopted by districts, the districts themselves always control (or choose to allow schools to control) which content within those textbooks will be covered or emphasized.

Leaving the choice of content coverage to individual districts and schools (with very few state controls) makes it possible and even *probable* that schools cannot be the equalizers we would like them to be. With roughly 15,000 school systems, American children simply are not likely to have equal educational opportunities as defined at the most basic level of equivalent content coverage. It is therefore highly questionable and even unfair to assume that differences in student achievement and learning are the sole result of differences in individual students' efforts and abilities. To assert that those who do not achieve at prescribed levels fail to do so because they cannot, or do not, take advantage of the opportunities afforded them is, at best, to mistake part of the story for the whole. The whole story also must consider the radically different opportunities provided by different schools, districts, and states, and acknowledge that which opportunities are provided is determined by socioeconomic factors, housing patterns, community structures, parental decisions, and many other factors that have one thing in common—they are all beyond the control of individual students.

In the research literature, the concept we are exploring is called the "opportunity to learn" (OTL). While it has been defined in many ways, to our way of thinking the specific mathematics content is the defining element of an educational opportunity in mathematics. Of course, many things can and do affect how that content is delivered. But our research focuses on equivalent content coverage because this allows a more precise definition of "equal educational opportunity" as it relates to learning. Without equality in content coverage, there can be no equality in opportunity related to that content, no matter the equality of other resources provided. Ultimately, learning specific content is the goal. The mathematics itself is at the heart of the opportunity to learn and thus is a very salient component in examining equality of educational opportunity. In addition, it is a factor that policymakers can address.

In all, our research aims to answer one question: do all the different mathematics content roads fairly and equally lead to the same high-quality educational outcomes? As we will explain below, they do not.

Inequality in Eighth Grade

For our research on eighth-grade mathematics, we examined the extent to which students in different districts and states had the same opportunity to learn specific mathematics topics and how that was related to their academic achievement. To do this, we analyzed a unique set of data from a study that replicated the 1995 Third International

Mathematics and Science Study (TIMSS)—the most extensive multinational comparative study ever attempted. In addition to assessing student achievement in over 40 countries, the 1995 TIMSS collected a great deal of other data, including detailed information on the mathematics curricula and classroom content coverage.

The replica study had many components or substudies. The part we are concerned with here is the TIMSS 1999 Benchmarking Study, which was designed to compare—or benchmark—U.S. states and districts against the countries that participated in the 1999 TIMSS. For the benchmarking study we worked with 13 school districts (or consortia of districts) and 9 states, all of which chose (and paid) to participate as we gathered extensive data on their eighth-grade mathematics content coverage and student achievement. A total of 36,654 students in these states and districts took the 1999 TIMSS test and provided a wide array of demographic and socioeconomic data, including age, gender, racial/ethnic group, whether English was spoken in the home, what education-related possessions were in the home (e.g., computer, dictionary, and number of books), parental education level, number of adults in the home, etc. In addition, the students' 1,861 mathematics teachers filled out a questionnaire on the topics they had covered during the school year.

The mathematics topics listed in the teacher questionnaire were based on the mathematics content framework³ developed for the 1995 TIMSS; it consists of 44 specific mathematics topics (e.g., common fractions, percentages, 3-D geometry, etc.) that cover the full range of K-12 mathematics. On the questionnaire, teachers indicated whether they had taught each topic for 1 to 5 periods, more than 5 periods, or not at all.

Gathering all these data was simply the first step. We didn't just want to know what was being taught in our states and districts; we wanted some sense of how each topic fit into the scope and sequence of mathematics schooling across the grades from an international perspective (hence the benchmarking idea). Using the 1995 TIMSS multinational mathematics curriculum data, we developed an International Grade Placement (IGP) topic index to indicate the grade in which the most countries typically emphasized each topic. We say "emphasized" each topic because we realize that topics are often taught in multiple grades. Nonetheless, we were able to identify the grade in which each topic typically received its greatest instructional focus. Each topic was assigned a value between 1 and 12 indicating an international consensus regarding the grade in which the topic should be emphasized. For example, the first topic, whole numbers, has an IGP value of 1.7. This means that most countries give

whole numbers their greatest instructional focus toward the end of first grade.

Given the hierarchical nature of school mathematics (in which addition must come before multiplication, fractions before exponents, etc.), we think it is reasonable to assume that topics receiving their main instructional focus in later grades in most countries are more difficult than those receiving their main focus in earlier grades. Thus, our IGP topic values provide an indication of some international consensus regarding the rigor and appropriate grade level of each topic.

With this IGP topic index and the teacher questionnaire, we developed a measure of students' opportunity to learn mathematics in each of the 1,861 eighth-grade classrooms we were studying. Our opportunity-to-learn measure took into account which topics were taught, how much time was devoted to each topic, and what the IGP value was for each topic. Using this measure, we assigned each classroom a value between 1 and 12 to indicate the average international grade level of all the topics taught (weighted by instructional time). In effect, our opportunity-to-learn measure assigns an International Grade Placement value to each classroom. Averaging all the IGP values for the classrooms in a district, we can then determine each district's IGP value. And, we can do the same for each state.

A classroom that spent a lot of time on fractions (a fourth-grade topic, according to our IGP topic index), and very little time on algebraic expressions or formulas (seventh-grade topics), might have an IGP classroom value of a little more than 5, indicating a content mix that in most TIMSS countries is taught during the fifth grade. In contrast, a classroom that spent the vast majority of its time on geometry and algebra topics would have a value of about 7 to 8, because almost all time was spent on seventh- and eighth-grade topics.

Students' Opportunity to Learn Mathematics

As we briefly explained in the introduction, school districts have far more influence than states over what content gets taught. So, our discussion focuses on our district-level findings. As for the state-level findings, suffice it to say that we did all the same analyses with our state-level data as with our district-level data, and the findings were very similar. Although variation among states on all opportunity-to-learn indicators was less than that among the districts, this did not alter the pattern or significance of the observed relationships and did not change our conclusions. (The lesser variation at the state level is to be expected as states represent a broader combination of many districts.)

Internationally, the focus of eighth grade for all students in virtually all of the TIMSS countries—except the United States—is algebra and geometry. In our study, not a single district had all of its students focusing mainly on algebra and geometry. This is reflected in the districts' IGP values, which ranged from 6.0 to 6.9. This means that in some districts, eighth-grade teachers (on average) were teaching content typically found at the end of fifth or the beginning of sixth grade internationally, while in other districts, the content came closer to that found at the end of sixth or the beginning of seventh grade. Not only is this a lot of variation in students' opportunity to learn mathematics, it indicates that *all students* were being shortchanged since none of the districts were focusing on eighth-grade (or even seventh-grade) content.

Of course the real question is, does any of this variation in mathematics learning opportunities make any difference in students' achievement? We addressed this issue through a set of analyses that we briefly describe here.

On the basis of decades of findings that students with higher socioeconomic status typically have higher scores on achievement tests,⁴ some researchers and policymakers have hypothesized that socioeconomic status has a *greater* impact on achievement than does schooling itself. Some have even gone so far as to conclude that schooling doesn't really matter. Indeed, among our districts, we found a strong relationship between students' mathematics achievement as measured by their TIMSS scores, and the percentage of students' parents who had a college or university degree (a common indicator of socioeconomic status).

Does this mean that all the differences we found in students' opportunity to learn mathematics are not important? Not at all. As IGP value—and, therefore, a more demanding opportunity to learn mathematics—increased, so did achievement. The relationship between students' opportunity to learn and achievement was every bit as strong as the relationship between their socioeconomic status and achievement.

Nonetheless, we still do not have the whole story. Sadly, in our "land of opportunity," students' socioeconomic status is related not only to their achievement, but also to their opportunity to learn. Across the districts we found a strong relationship between the percentage of students' parents with a college or university degree and the district IGP value. This means that the more parents with a college or university degree in a district, the higher the IGP value and the higher the average mathematics achievement. The estimated increase in opportunity to learn was not trivial: the mathematics content coverage in districts in which around 60 percent of students' parents had a college or university degree was about one-half of a

grade level ahead of districts in which less than 30 percent of students' parents had a college or university degree.

These results have profound policy implications. The realization of the fundamental vision of public schools as the great equalizers rests on the assumption that content coverage is essentially the same for all children. If some are not taught essential mathematics topics in their schooling, why would we believe they will learn mathematics as well as those who are exposed to all essential content? . . .

Finding that socioeconomic status and opportunity to learn are both independently related to achievement is not surprising; these relationships have been studied previously in various ways with various types of data—both national and international, but not at the district level. In fact, we found such relationships when we analyzed the international TIMSS data.⁵ However, what is unique to the United States is the strong estimated relationship between socioeconomic status and opportunity to learn. When high-quality national or regional standards (and/or curricula are in place, as they typically are in other countries, that linkage is essentially minimized if not eliminated.⁶

As a result of its strong correlation between socioeconomic status and opportunity to learn, *the United States has a particularly strong relationship between socioeconomic status and achievement*. Using the 1995 TIMSS data, we found that the correlation between socioeconomic status and achievement was stronger in the United States than in 32 (out of 40) other countries. This raises the issue of equality, given that the lower the income-level composition of a district, the more likely it is that content coverage will be less demanding and that the average mathematics achievement of eighth-graders will be lower. Most other countries have clear, detailed national or regional academic standards and/or curricula that define content coverage and therefore minimize the influence of socioeconomic status on opportunity to learn.⁷

The implication of our conceptual model is that by adopting focused, rigorous, coherent, and common content-coverage frameworks, the United States could minimize the impact of socioeconomic status on content coverage—a goal toward which virtually all our international economic peers are making progress.

Hopefully, the recently developed Common Core State Standards (see www.corestandards.org) will help the United States offer students greater equity in their opportunity to learn. But for now, a burning question remains: which is more important to student learning, socioeconomic status or opportunity to learn? An easy question to pose, but not a simple one to answer due to the complex nature of our U.S. education system. To disentangle these relationships, we analyzed the relationship between

socioeconomic status, IGP value, and achievement at the classroom and district levels.

At the classroom level, controlling for socioeconomic status and students' prior achievement, the IGP value was statistically significantly related to achievement (actually, residual gain in achievement), as were our measures of socioeconomic status. For a one grade-level increase in IGP value, the increase in mean achievement at the classroom level was .15 of a standard deviation. That's like a student in the 50th percentile moving to the 56th percentile.

The impact of district-level opportunity to learn on student achievement (controlling for student- and classroom-level variables) was approximately one-third of a standard deviation. So, our best estimate indicates that an increase of one grade-level in IGP value at the district level would move a student from the 50th percentile to roughly the 65th percentile on mathematics achievement. Thus, the answer to our question is that student achievement is significantly related to socioeconomic status, but, *having controlled for this at all three levels (student, classroom, and district), both classroom- and district-level opportunity to learn is also significantly related to student achievement*. Variation in students' opportunity to learn comes from both the classroom and the district. This is both good and bad news. It is good news because opportunity to learn is something districts and teachers can change. The bad news is that districts seem to persist in providing less rigorous content to students with lower socioeconomic status.

The bottom line is that equality of educational opportunity, where opportunity is defined in terms of content coverage, does not exist within or across districts. Just as problematic is our initial finding: for these districts, the typical content covered in these eighth-grade classrooms is considered sixth-grade content internationally. *Other TIMSS countries are typically two grade levels ahead of the United States in terms of the rigor of their curricula*. Fortunately, our research suggests that the achievement of U.S. students would likely increase substantially if we would make our mathematics content more demanding.

Up to this point, we've dealt with the consequences of content variation at the middle school (eighth-grade) level. Do these differences in opportunity to learn persist once students move to high school? We address this in the next section.

Inequality in High School

As part of a research and development project called Promoting Rigorous Outcomes in Mathematics and Science Education (PROM/SE), we have worked with nearly 60 school districts in two states, Michigan and Ohio

(because the work is ongoing, we will not identify the districts). To explore the extent to which high school students have an equal opportunity to learn mathematics, we examined the transcripts of 14,000 seniors in 30 high schools in 18 of our PROM/SE districts. As we explain below, we found a shocking number of mathematics courses and dramatic differences in students' course taking.

Much of the variation we found is the result of the pervasive use of high school tracking (i.e., offering different levels of the same course, such as Basic Algebra, Algebra, and Honors Algebra). While tracking today is typically not as rigid as it used to be (with students in the college, general, or vocational track for all their courses), it still has an impact on students' opportunity to learn.

Most schools and districts in the United States track students because they believe it optimizes students' achievement. Advocates of tracking argue that this type of curricular differentiation facilitates teaching and learning, as it matches students' current knowledge and ability levels to the most suitable curriculum. Tracking theory contends that some students would struggle immensely in a high-level curriculum, while a low-level curriculum would confine others.

Most research on secondary school mathematics tracking, however, has found that it tends to adversely impact students in low-level courses compared with their peers in high-level courses. Students in low-tracked mathematics courses are less likely to expect to go to college, less likely to actually attend college (even after controlling for students' postsecondary expectations), and have lower self-images.⁸ Perhaps most salient, though, is that many studies have found that mathematics tracking tends to exacerbate achievement inequalities between high- and low-tracked students.⁹

In order for multiple mathematics tracks to exist, the school must offer multiple mathematics courses. A school that offers four mathematics courses—one corresponding to each grade level—and requires all of its students to take these courses, only offers one possible sequence of courses and thus one track. However, this is highly uncommon. Schools typically offer more than four mathematics courses—often many more—and allow students to choose from numerous possible sequences of courses. These sequences can, and often do, vary by the number of courses taken, the order in which courses are taken, and the types of courses taken.

To find out just how much variability there was in our 30 high schools and 18 districts, we began by counting the number of distinct mathematics courses offered. We treated each new course title as a different course, even in cases like "Formal Geometry" and "Geometry," or

"Applied Algebra" and "Algebra I." Previous research has shown that the covered content in two courses with a similar title can vary wildly.¹⁰ We therefore find it more prudent to assume that if schools choose to give courses different titles, then it is most likely that the content is different, at least to some extent.

In all, we found 270 different mathematics course titles, including 39 focused on mathematics below algebra, 11 on beginning algebra, 9 on geometry, and 9 on advanced algebra. . . .

Of course, what really matters is not all 270 courses, but which courses are offered in each of the 18 districts. We focus on the district rather than the school because the district sets curriculum policies. Of course, high schools in the same district may not offer the exact same number or types of mathematics courses, but we found the variation among schools in the same district to be quite small. In contrast, we found that the number of mathematics courses offered by each district varied considerably. If a district were to offer only one course for each mathematics content category (e.g., beginning algebra, geometry, precalculus, etc.), then there would be fewer than 10 courses offered. Looking across our 18 districts, the number of courses ranges from a low of 10 to a high of 58, with most districts offering close to 30 mathematics courses.

All these courses means that students in each school can arrange the type, number, and order of their courses, and thus vary their exposure to mathematics, in numerous ways. For example, two students in the same school may take substantively different sequences of courses—such as Basic Math, then Algebra, then Geometry; versus Geometry, then Advanced Algebra, then Precalculus—and take different versions of these courses—such as Elementary Geometry versus Honors Geometry.

We have, until this point, focused on the total number of courses offered, seeing large variation in both the number and the types of courses. The variation in actual courses taken, however, is not as large as it could be. Many students take similar courses. About 40 percent of the students in our study took Algebra I, Geometry, and Algebra II. Nevertheless, variation in course taking remains significant.

One particular way that students' mathematics course taking varies is in the number of courses they take. We examined the number of mathematics courses taken by each of the 14,000 seniors in our 18 districts. We were dismayed to find that in half the districts, anywhere from 10 to 27 percent of students took just one mathematics course in high school. (In the other districts, anywhere from 0 to 7 percent took just one course.) At the other extreme, in four districts the vast majority of students

took four or more mathematics courses. Across districts, variation was common. Most districts had students who took anywhere from one to four or more courses.

Although we began this study well aware that high school students have options in selecting their mathematics courses, we were startled by the differences across districts. Students may attend high school in the same district, but as they graduate there is little commonality in the type or amount of mathematics to which they have been exposed. We do not believe all high school students should take the same courses, but we do believe there should be a high degree of overlap across programs for most students. We certainly do not see any reason for 270 mathematics courses, or for 25 percent of students in one district to take just one mathematics course while more than 90 percent of students in another district take more than four courses.

Most nations endorse the idea that, as public policy, all their children should have equal educational opportunities. For the vast majority of 1995 TIMSS countries, intended mathematics content coverage was indeed the same for all their students through what we would call middle school. Even in countries that appear to be creating different tracks, the reality is that basic content is covered by all, with advanced students studying the same topics more deeply.¹¹ The associated differences among student performance on the TIMSS achievement test were thus far more a matter of individual student ability and effort, combined with differences in teacher quality, than a matter of public policy that supported or even encouraged regional or local differences in students' opportunity to learn.

Sadly, this is not the case in the United States. Not only do we have great variability across districts in eighth grade and high school, but by international standards, our eighth-grade students are exposed to sixth-grade mathematics content. Differences in mathematics achievement are *not* simply the result of differences in student ability and effort, but also matters of chance or social factors such as poverty and housing patterns that influence where a student happens to attend school. There's just no escaping that less opportunity to learn challenging mathematics corresponds to lower achievement.

Though we wish it weren't so, the United States *cannot* be considered a country of educational equality, providing equal educational opportunities to *all* students. This lack of equality in content coverage is not merely an issue for the poor or minorities. Rather, any student in the United States can be disadvantaged simply because of where he or she attends school. In school mathematics at least, the playing field for students is not level. For all students—the

lucky few and the unlucky many—educational opportunity depends on factors that cannot be wholly overcome by student ability and effort.

As a nation, we must act to correct these inequities. The solution is not as easy as simply making sweeping changes in course content, but improvement is possible. Although the research we presented here is limited to eighth grade and high school, we suspect changes would need to be made from preschool through high school in mathematics content coverage, textbooks, teacher training, and professional development. Without such changes, the inequality in opportunity to learn mathematics will continue to epitomize the worst sort of playing field: how it tilts depends on where one stands.

References

1. Richard J. Herrnstein and Charles Murray, *The Bell Curve: Intelligence and Class Structure in American Life* (New York: Free Press, 1994).
2. William H. Schmidt, "What's Missing from Math Standards? Focus, Rigor, and Coherence," *American Educator* 32, no. 1 (Spring 2008): 22–24.
3. David F. Robitaille, William H. Schmidt, Senta Raizen, Curtis McKnight, Edward Britton, and Cynthia Nicol, *Curriculum Frameworks for Mathematics and Science* (Vancouver: Pacific Educational Press, 1993).
4. James S. Coleman, Ernest Q. Campbell, Carol J. Hobson, James McPartland, Alexander M. Mood, Frederic D. Weinfeld, and Robert L. York, *Equality of Educational Opportunity* (Washington, DC: National Center for Educational Statistics, 1966).
5. William H. Schmidt, Curtis C. McKnight, Richard T. Houang, HsingChi Wang, David E. Wiley, Leland S. Cogan, and Richard G. Wolfe, *Why Schools Matter: A Cross-National Comparison of Curriculum and Learning* (San Francisco: Jossey-Bass, 2001).
6. Schmidt et al., *Why Schools Matter*, chapter 4.
7. Schmidt et al., *Why Schools Matter*, chapter 4.
8. Karl L. Alexander, Martha Cook, and Edward L. McDill, "Curriculum Tracking and Educational Stratification: Some Further Evidence," *American Sociological Review* 43, no. 1 (1978): 47–66; Karl L. Alexander and Martha A. Cook, "Curricula and Coursework: A Surprise Ending to a Familiar Story," *American Sociological Review* 47, no. 5 (1982): 626–640; Karl L. Alexander and Bruce K. Eckland,

- "School Experience and Status Attainment," in *Adolescence in the Life Cycle: Psychological Change and Social Context*, ed. Sigmund D. Dragastin and Glen H. Elder Jr. (Washington, DC: Hemisphere, 1975), 171-210; Karl L. Alexander and Edward L. McDill, "Selection and Allocation within Schools: Some Causes and Consequences of Curriculum Placement," *American Sociological Review* 41, no. 6 (1976): 963-980; Jeannie Oakes, *Keeping Track: How Schools Structure Inequality* (New Haven, CT: Yale University Press, 1985); James E. Rosenbaum, "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, no. 2 (1980): 74-88; and Beth E. Vanfossen, James D. Jones, and Joan Z. Spade, "Curriculum Tracking and Status Maintenance," *Sociology of Education* 60, no. 2 (1987): 104-122.
9. Adam Gamoran, "The Stratification of High School Learning Opportunities," *Sociology of Education* 60, no. 3 (1987): 135-155; Adam Gamoran and Robert D. Mare, "Secondary School Tracking and Educational Inequality: Compensation, Reinforcement, or Neutrality?" *American Journal of Sociology* 94 (1989): 1146-1183; Adam Gamoran, Andrew C. Porter, John Smithson, and Paula A. White, "Upgrading High School Mathematics Instruction: Improving Learning Opportunities for Low-Achieving, Low-Income Youth," *Educational Evaluation and Policy Analysis* 19, no. 4 (1997): 325-338; Maureen T. Hallinan and Warren Kubitschek, "Curriculum Differentiation and High School Achievement," *Social Psychology of Education* 3(1999): 41-62; Thomas B. Hoffer, "Middle School Ability Grouping and Student Achievement in Science and Mathematics," *Educational Evaluation and Policy Analysis* 14, no. 3 (1992): 205-227; Xin Ma, "A Longitudinal Assessment of Antecedent Course Work in Mathematics and Subsequent Mathematical Attainment," *Journal of Educational Research* 94, no. 1 (2000): 16-28; Barbara Schneider, Christopher B. Swanson, and Catherine Riegle-Crumb, "Opportunities for Learning: Course Sequences and Positional Advantages," *Social Psychology of Education* 2 (1998): 25-53; and David Lee Stevenson, Kathryn S. Schiller, and Barbara Schneider, "Sequences of Opportunities for Learning," *Sociology of Education* 67 (1994): 187-198.
10. Leland S. Cogan, William H. Schmidt, and David E. Wiley, "Who Takes What Math and in Which Track? Using TIMSS to Characterize U.S. Students' Eighth-Grade Mathematics Learning Opportunities," *Educational Evaluation and Policy Analysis* 23, no. 4 (2001): 323-341.
11. Schmidt et al., *Why Schools Matter*, chapter 4.

WILLIAM H. SCHMIDT is a university distinguished professor and codirector of the Education Policy Center at Michigan State University.

LELAND S. COGAN is a research associate at the Center for the Study of Curriculum at Michigan State University.

CURTIS C. MCKNIGHT is a professor emeritus of the University of Oklahoma.



EXPLORING THE ISSUE

Can Schools Close the Achievement Gap between Students from Different Ethnic and Racial Backgrounds?

Critical Thinking and Reflection

1. Reflect on your experiences in elementary through high school. Can you generate examples of ways in which your racial and ethnic identity (or that of a peer) affected treatment by teachers or other school personnel?
2. Do you think that the detracking discussed by Burris and Welner and the types of curricular changes suggested by Schmidt and colleagues would close the achievement gap? Why or why not?
3. Do you think that schools should have "closing the achievement gap" as a goal?

Is There Common Ground?

It would appear from the results described by Burris and Welner that the answer to our question should be a resounding "yes." After all, Burris and Welner describe what seem to be substantial improvements in several indicators of the academic achievement of the participating students in the Rockville Centre School District. It is important to recognize, however, that before we fully understand the effects of any educational intervention or curricular change, we must evaluate both the long-term effects and their generalizability. Maintaining the momentum of these curricular changes may be especially difficult because so many of the students may still experience the pernicious effects of ethnic and racial discrimination outside of school. So it will be important to continue to follow the achievement of the students experiencing the curricular change as well as cohorts of students who experience the curriculum in later years to determine the long-term effects of the change. Even if the effects last, we must still be concerned with whether the changes will lead to similar positive results if implemented in other school districts enrolling different types of students, with different resources, and different levels of support from administrators.

It is also important to point out that even if current school-based approaches turn out not to have lasting, transportable effects on the achievement gap, it is possible that more dramatic (i.e., far-reaching) changes could be successful. So, for example, perhaps extending

the school year through the summer would help to reduce the achievement gap when coupled with the sorts of curricular changes described by Burris and Welner. In fact, there is considerable evidence that many of the benefits accrued during the school year by economically disadvantaged African American and Hispanic students are "lost" during the summer, presumably because the pernicious effects of poverty overwhelm the benefits of schooling. Other changes might include having schools provide after-school care for students.

The selection by Schmidt and colleagues identifies many of the same factors as at the root of the achievement gap as does the Burris and Welner selection. Nevertheless, the tone of the former selection is decidedly more pessimistic; hence, our categorization as providing a "no" response to the question: Can schools close the achievement gap between students from different ethnic and racial backgrounds? The difference between the selections lies in part in the fact that whereas Burris and Welner focus on what can be done at the level of an individual school, Schmidt and colleagues take a broader perspective, summarizing the state of affairs in U.S. schools as a whole or at a somewhat more granular level, at the level of the city or school district. This difference in perspective between the selections also provides a valuable lesson: changing a single class or a single school may be possible, but changing the educational system is far more daunting and, more importantly, will probably require different forms of intervention including perhaps, changes in law.

Additional Resources

James Gallagher, "Education, Alone, Is a Weak Treatment," *Education Weekly* (July 1998).

Jonathon Kozol, *Savage Inequalities: Children in America's Schools* (Crown, 1991).

Richard Rothstein, "Class and the Classroom," *American School Board Journal* (October 2004).

Internet References . . .

National Education Association

www.nea.org

Achievement First: Public Charter Schools

www.achievementfirst.org/

The Achievement Gap Initiative at
Harvard University

www.agi.harvard.edu/

