# RETHINKING
# Multicultural
# EDUCATION

## *Teaching for racial and cultural justice*

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Hughes, L. (2001). My people. In B. Rochelle (ed.) *Words with wings: A treasury of African-American poetry and art.* Singapore: HarperCollins.

Walker, A. (2001). Women. In B. Rochelle (ed.) *Words with wings: A treasury of African-American poetry and art.* Singapore: HarperCollins.

Walker, M. (1989). For my people. *This Is My Century: New and Collected Poems.* Athens: University of Ga. Press.

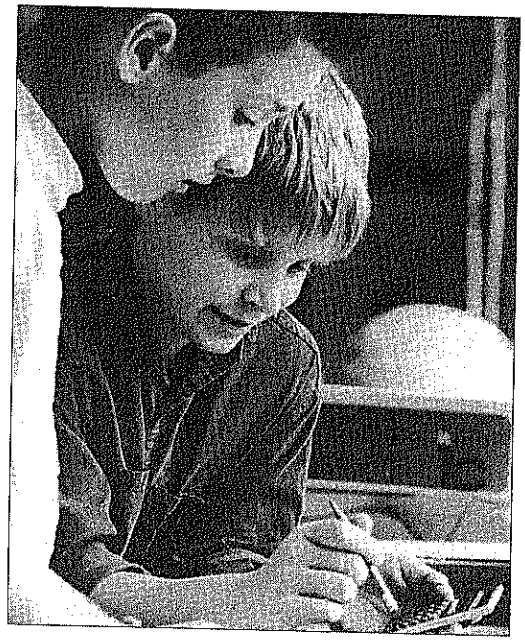
CHAPTER THIRTY-SEVEN

# Math, SATs, and Racial Profiling

*By Eric Gutstein*

In our classrooms, we may not often think of technology as a tool for teaching for social justice. But in my experience of teaching middle school mathematics, I've found that technology can be a powerful asset.

Although I am a university-based mathematics educator, I regularly teach at Rivera school, located in a Mexican immigrant community in Chicago. The following are examples of how my students and I have used technology to investigate racial profiling and to analyze the relationship of family income level to scores on standardized tests.



Jean-Claude Lejeune

In particular, I want to show the potential of using graphing calculators with students. (A graphing calculator is basically a hand-held computer that can do sophisticated mathematics, display various types of graphs and create tables from data, and perform various types of statistical analyses. While they are still too expensive for many students, many high school and middle school math departments have them.)

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Mathematics plays a central role in understanding racial profiling. The essence of profiling is proportion and expected value: A higher proportion of African Americans (or Arabs/Arab Americans today) are stopped and searched than would be expected given their percentage in the population—assuming random (i.e., fair) searches or stops.

## Driving While Black

In 2001, I did a project with my 7th-grade class called, "Driving While Black/Driving While Brown: A Mathematics Project About Racial Profiling." I gave students data about percentages of stops of Latino drivers and the percent of Latino drivers in Illinois. This was a difficult project conceptually because students had little experience with the mathematical ideas of expectation. Also, there is plenty of research documenting confusion about basic probability, in both children and adults. Children often believe results based on a few events and tend to overgeneralize. For example, if one tosses an unbiased coin three times and it comes up heads each time, children may wrongly believe that the odds are better (or worse!) than 50 percent that the next toss will be tails.

In mathematics, expected value is based on theoretical probability. If 30 percent of drivers are Latino, we would expect that 30 percent of random stops would be of Latinos—but only in the long run. This does not mean that if police made 10 stops and five were of Latinos that something is necessarily out of line, but it does mean that if they made 10,000 stops and 5,000 were of Latinos, something is definitely wrong.

Technology comes in handy to show how actual results tend to converge with theoretical probability as the number of events increases. I used a graphing calculator in class to demonstrate this on a graph called a histogram, which can visually display the results of probability events. I used a simple computer program (written for the calculator) which simulates a dice-tossing situation. If you throw two dice, the probability of throwing a seven is 1/6, while the probability of throwing a two is 1/36. However, if you toss two dice and do this just six times, there is good chance (about 1 in 3) that you won't even get one seven!



With the calculator and program, I simulated 10 tosses, then 100, 1,000, and finally 10,000, and we looked at each resulting histogram (shown on an overhead projector that displays the calculator screen). As the number of tosses increased, the histogram began to take on the "ideal" shape as predicted by the theoretical probability (for example, 1/6 of 10,000 is about 1,667, and we had quite close to that number of sevens). These gradually converging "shapes" helped students realize that the greater the number of "trials," the closer to the theoretical probability the results should be.

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Students learned important mathematical ideas about probability through considering actual data about "random" traffic stops and compared these to the theoretical probability (what we should "expect"). Graphing calculators can easily simulate large numbers of random "traffic stops" (since they have a built-in "random" number generator).

Without calculators, one can still do the simulation, albeit with fewer repetitions and more effort. I had students pick cubes from a bag (without looking) where three of 100 were brown (Latino), and the rest white (because in that part of Illinois, 3 percent of the drivers were Latino). Each group's record of 100 picks simulated how many Latinos should have been stopped out of 100 random stops. We then combined all the groups' data and had a larger number which came fairly close to 3 percent, although individual groups' data ranged from 2 percent to 7 percent. But in real life, the percentage of Latinos actually stopped was about 21 percent. Students saw through their own simulations that what they "expected" was not what the Illinois State Police actually did.

At the end of the project, students reflected on what they had learned through using mathematics and technology. They had a range of responses, but most reached the conclusion that the disproportionate number of traffic stops for Latinos was related to racial discrimination. A fairly typical response was:

> I learned that police are probably really being racial because there should be Latino people between a range of 1-5 percent, and no, their range is 21 percent Latino people and also I learned that mathematics is useful for many things in life, math is not just something you do, it's something you should use in life.

But not everyone saw it that way. One student commented:

> Police are maybe just stopping people because they might look suspicious, drunk, or something. They don't just stop you for anything. I think that this project was not accurate

to prove anything. I mean what is it proving, it is not accurate in the cubes.

*What did emerge was students' sense of justice and sense of agency.*

In hindsight, a weakness in the project was that although students understood that the data showed something was amiss, we spent insufficient time discussing and analyzing the complexities of racism. What did emerge was students' sense of justice ("Why do they make random stops? ... Just because of their race and their color?") and sense of agency, as well as perhaps a sense of naïveté ("And Latinos shouldn't let them [police], they should go to a police department and tell how that person was harassed just because of a racial color.").

## Bias in SAT scores

This issue of the complexity of the social issues also surfaced in an earlier project I did with an 8th-grade class in 1998-99. In this project, students investigated the relationship between race, gender, and family income and ACT and SAT scores. We were studying data analysis and creating scatterplots, a type of graph one can use to visually inspect the correlation of two variables (e.g., test scores and family income). Students had to create a scatterplot from data that I downloaded from FairTest's web site (www.fairtest.org). We did not use graphing calculators for two reasons—individual scores and income levels were not available (the FairTest data aggregated the 1,127,021 students who took the test in 1997 by income level ranges of $10,000 or $20,000) and at the time, Rivera had no graphing calculators (they have since bought a classroom set).

**1997 SAT Scores**

SAT: Total Test-takers (1.1 million)

| | Verbal | Math | Total |
|---|---|---|---|
| American Indian or Alaskan Native | 475 | 475 | 950 |
| Asian, Asian Amer,. or Pacific Is. | 496 | 560 | 1056 |
| Black or African American | 434 | 423 | 857 |
| Mexican American | 451 | 458 | 909 |
| Puerto Rican | 454 | 447 | 901 |
| Hispanic/Latino | 466 | 468 | 934 |
| White | 536 | 526 | 1052 |
| Other | 512 | 514 | 1026 |
| Males | 507 | 530 | 1037 |
| Females | 503 | 494 | 997 |
| ALL TEST TAKERS | 505 | 511 | 1016 |
| less that $10,000/year | 428 | 448 | 873 |
| $10,000 – $20,000/year | 454 | 464 | 918 |
| $20,000 – $30,000/year | 480 | 492 | 972 |
| $30,000 – $40,000/year | 496 | 497 | 993 |
| $40,000 – $50,000/year | 507 | 508 | 1015 |
| $50,000 – $60,000/year | 515 | 518 | 1033 |
| $70,000 – $80,000/year | 522 | 526 | 1048 |
| $80,000 – $100,000/year | 540 | 544 | 1084 |
| more than $100,000/year | 559 | 571 | 1130 |



*SAT scores go up in an almost lockstep correlation with family income.*

But if individual data were available and we had calculators, I would have had groups of students input 500 pairs of data and inspect the graphs. In fact, I have had university math methods classes do similar work with graphing calculators, where they examined correlations of test scores of individual Chicago public schools with the percentage of low-income students in each school. At Rivera, due to circumstances, students made hand plots.

For the SAT, the raw data themselves make the correlation pretty clear (since the data set is so small), but the graphs students created made it even clearer to them. SAT scores go up in an almost lockstep correlation with family income. Students, who also saw Mexican Americans near the bottom of the listed racial groups and males above females, had plenty of questions.

In Part 2 of the project, I had students write letters to Educational Testing Service (ETS) about the data, asking any questions and making any points they wanted to. Their responses ranged, but many asked pointed (and sometimes confused) questions about inequality and about the interrelationships of race and class; some even expressed hope and trust in ETS to change what was obviously an unjust situation. Samples from two letters follow:

> Both the SAT's and the ACT's had a low score if their income was low. I think this really isn't giving anyone a chance. You see, what if you have a really smart student that only [has] an income of $9,000, would he/she not get much of an education? Is it just a stereotype or do you give a better education to people that pay more? If this is true, I hope you can make a change.
>
> I have noticed that the people and genders who have been "oppressed" are doing worse than the "whites." I have noticed that many books used at my curriculum (8th grade) have not been related to me in any way because I'm a Mexican American. I don't believe that they relate to anyone except "whites." For some reason I believe that's the reason, but not the whole reason ... Minorities—when you hear that word, what does it mean? It means poor African

Americans, Mexican Americans, Puerto Ricans and other poor non-white people. You don't hear a lot about poor whites and minorities! You hear about rich whites. So who do you think has the high scores with the high salaries? Who? Why?

*For three full class periods, we sat in a circle, and students read and discussed their letters with each other. This was difficult and emotional, since students saw themselves at the bottom of the data.?*

This story would not be complete without raising a few other issues. For three full class periods, we sat in a circle, and students read and discussed their letters with each other. This was difficult and emotional, since students saw themselves at the bottom of the data. But this was an honors class, and students were strongly college oriented. They wanted an answer to their key question: Why are we on the bottom?

I tried to help them understand that there were multiple, interconnected reasons: that schools in general and the tests in particular did not value (nor assess) their "cultural capital"—their home language, culture, ways of communicating, and experiences—but were instead geared to that of white, middle-class families. We talked about how schools in wealthier areas usually had more resources, smaller classes, more experienced teachers, and more challenging curricula, and that in the United States, the overall educational opportunities for urban students of color tended to be inferior compared to those of white students.

But some of these ideas were abstract to students who rarely experienced other communities or cultures, and we did not end the discussion with a definitive answer—nor was that my intent. While they understood that both race and class played a role—the data speak clearly to this—they continued to search and think, throughout the year, about the meaning of what they were learning.

And different students reached various levels of awareness, including some who tended to explain away what appeared to other students to be unjust situations (e.g., espousing the view that immigrants expected to be at the bottom in a new country to justify why Mexicans so often wound up with the jobs no one else wanted.)

## Read the World

Paulo Freire, the noted Brazilian educator, stressed the idea of teaching students not only to read but to "read the world." In my lessons, I did not try to answer their questions about the world (nor could I always do so), because my focus was more on helping them develop the orientation to raise questions and critique rather than satisfying them with answers. But in this case, their reading of the world had the real potential to paralyze and demoralize them.



This raises a question about the relationship of students reading the world to their self-perceptions and points out our responsibilities when we attempt to teach for social justice. That is, how do we help students develop a sense of agency, confidence, and determination while at the same time helping them learn about concrete examples of racism, classism, and injustice that may be outside their immediate experience? There is no room to address this here, but I leave readers with a comment from a student I taught for close to two years as she reflected on what she had learned at the end of our time together:

*How do we help students develop a sense of agency, confidence, and determination while at the same time helping them learn about concrete examples of racism, classism, and injustice that may be outside their immediate experience?*

> With every single thing about math that I learned came something else. Sometimes I learned more of other things instead of math. I learned to think of fairness, injustices and so forth everywhere I see numbers distorted in the world. Now my mind is opened to so many new things. I'm more independent and aware. I have learned to be strong in every way you can think of it.

These examples may serve as food for thought as we consider how technology and mathematics—neither of which many of us immediately link to social justice—can be used to help students read the world and begin to make sense of things like racism and classism. Clearly, initial explorations should not serve as final explanations, as these are complex issues that even adults are often trying to make sense of and connect to other aspects of society. They cry out for further and ongoing investigations, to be returned to again and again. But the possibilities exist to help young people develop the orientation to seek ever-deeper answers to these types of questions, and we can take advantage of available technology and turn it to uses for social justice. Students, as young people and as they become adults, can and will raise their own voices in the world. Ultimately, it is how we structure society—for what purposes and in whose interests—that determines how science and technology are used.