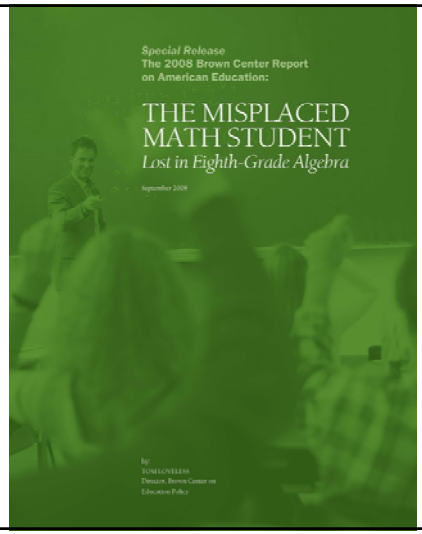



**Advanced Math Classes, 2007 (with 8th-grade NAEP math score)** 2-1

| Jurisdiction | 8th-Grade NAEP Score | Total Advanced Enrollment |
|---|---|---|
| National | 281 | 38% |
| Massachusetts | 298 | 45% |
| Minnesota | 292 | 35% |
| North Dakota | 292 | 21% |
| Vermont | 291 | 26% |
| Kansas | 290 | 39% |
| New Jersey | 289 | 40% |
| South Dakota | 288 | 30% |
| Virginia | 288 | 42% |
| New Hampshire | 288 | 30% |
| Montana | 287 | 24% |
| Arkansas | 274 | 33% |
| Louisiana | 272 | 24% |
| Nevada | 271 | 34% |
| California | 270 | 59% |
| West Virginia | 270 | 33% |
| Hawaii | 269 | 28% |
| New Mexico | 268 | 34% |
| Alabama | 266 | 30% |
| Mississippi | 265 | 21% |
| District of Columbia | 248 | 51% |

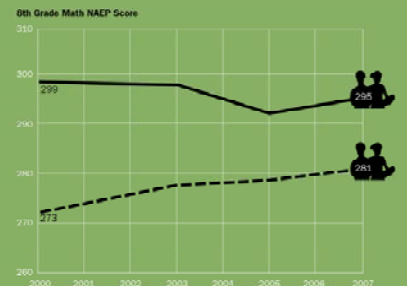
Source: Author's calculations from 8th grade math state main NAEP, NAEP data explorer http://nces.ed.gov/nationsreportcard/nde/

**Eighth-grade NAEP scores: National average for students in advanced math (2000–2007)** Fig 2-1

The national average rose steadily while advanced scores fell.

NOTE: Truncated vertical axis exaggerates trends.

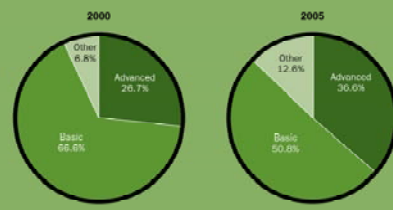
Source: NAEP data explorer http://nces.ed.gov/nationsreportcard/nde/



## Course-taking in eighth-grade math, 2000 and 2005

**Eighth-grade enrollment in Algebra I and other advanced math classes rose sharply from 2000 to 2005. Enrollment in basic math saw a decline.**

Source: Author's calculations from NAEP restricted-use data sets: U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. NAEP 2000 Mathematics Restricted-Use Data Files, Grade 8 (NCES 2003-506rev) and NAEP 2005 Mathematics Restricted-Use Data Files, Grade 8 (NCES 2007-486).




Advanced Math: Algebra I, Geometry, Algebra II
Basic Math: General Math & Pre-Algebra
Other*

## Math courses taken by low achievers (10th percentile and below students), 2000 and 2005

Table 2-2

Percentage of low achievers enrolled in various math classes.

| | | 2000 | | 2005 | |
|---|---|---|---|---|---|
| Advanced | Algebra I | 4.8 | | 17.4 | |
| | Geometry | 2.1 | 8.0 | 5.0 | 28.6 |
| | Algebra II | 1.1 | | 6.2 | |
| Basic | General math | 50.7 | 73.7 | 27.1 | 46.3 |
| | Pre-algebra | 23.0 | | 19.2 | |
| Other | | 18.3 | 18.3 | 25.0 | 25.0 |

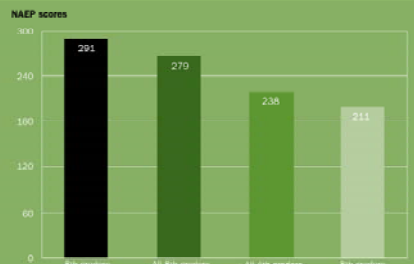
Source: Author's calculations from NAEP restricted-use data sets: U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. NAEP 2000 Mathematics Restricted-Use Data Files, Grade 8 (NCES 2003-506rev) and NAEP 2005 Mathematics Restricted-Use Data Files, Grade 8 (NCES 2007-486).

## NAEP scores of different student groups, 2005

Fig. 2-3

**Low-performing eighth graders in advanced classes score even below the average fourth-grade student.**

Source: Author's calculations from NAEP restricted-use data set: U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. NAEP 2005 Mathematics Restricted-Use Data Files, Grade 8 (NCES 2007-486) and NAEP data explorer http://nces.ed.gov/nationsreportcard/naepdata/




## Sample NAEP item (working with percentages)

Table 2-3

Grade 8 Item Block 2005-8M3 No. 17:

**There were 90 employees in a company last year. This year the number of employees increased by 10 percent. How many employees are in the company this year?**

**A) 9**
**B) 81**
**C) 91**
**D) 99 ✔**
**E) 100**

| | Overall | Advanced Classes | Misplaced 10th |
|---|---|---|---|
| Percent answering correctly | 36.5 | 48.7 | 9.8 |

Source: NAEP question tool http://nces.ed.gov/nationsreportcard/itmrls/startsearch.asp and author's calculations from NAEP restricted-use data set: U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. NAEP 2005 Mathematics Restricted-Use Data Files, Grade 8 (NCES 2007-486).

**Sample NAEP item (rounding decimals)**
Grade 8 Item Block 2005-8M4 No. 9:

Table 2-4

**Alba needed to know about how much the sum of 19.6, 23.8, and 38.4 is. She correctly rounded each of these numbers to the nearest whole number. What three numbers did she use?**

**A) 19, 23, 38**
**B) 19, 24, 38**
**C) 20, 24, 38 ✔**
**D) 20, 24, 39**

| | Overall | Advanced Classes | Misplaced 10th |
|---|---|---|---|
| Percent answering correctly | 85.2 | 87.9 | 37.1 |

Source: NAEP question tool http://nces.ed.gov/nationsreportcard/itmrls/startsearch.asp and author's calculations from NAEP restricted-use data set: U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. NAEP 2005 Mathematics Restricted-Use Data Files, Grade 8 (NCES 2007-486).

**Performance on sample NAEP items involving fractions (percentage answering correctly)**

Table 2-5

| | Overall | Advanced Classes | Misplaced 10th |
|---|---|---|---|
| Item A | 72.6 | 78.4 | 42.3 |
| Item B | 45.1 | 57.2 | 3.9 |
| Item C | 47.2 | 58.4 | 6.6 |

Source: Author's calculations from NAEP restricted-use data set: U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. NAEP 2005 Mathematics Restricted-Use Data Files, Grade 8 (NCES 2007-486).

**Demographic characteristics: misplaced students and comparison groups, 2005**
Percentage of students by characteristic

Table 2-6

| | Misplaced 10th | Advanced Classes | National Average |
|---|---|---|---|
| Eligible Free Lunch | 69.8 | 30.4 | 36.1 |
| White | 18.5 | 60.9 | 61.1 |
| Black | 38.4 | 14.2 | 16.1 |
| Hispanic | 38.6 | 17.1 | 16.2 |
| Mother College Grad | 20.3 | 44.8 | 36.9 |

Source: Author's calculations from NAEP restricted-use data set: U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. NAEP 2005 Mathematics Restricted-Use Data Files, Grade 8 (NCES 2007-486).

**School characteristics: misplaced students and comparison groups, 2005**

Table 2-7

| | Misplaced 10th | Advanced Classes | National Average |
|---|---|---|---|
| Urban | 50.9% | 33.4% | 31.3% |
| Suburban | 35.4% | 46.4% | 43.1% |
| Rural | 13.7% | 20.2% | 25.6% |
| School enrollment | 1012 | 844 | 794 |
| Private school | 2.3% | 10.5% | 8.8% |
| >50% eligible lunch | 67.6% | 30.4% | 31.6% |
| 8th-grade math untracked | 34.8% | 22.8% | 26.9% |

Source: Author's calculations from NAEP restricted-use data set: U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. NAEP 2005 Mathematics Restricted-Use Data Files, Grade 8 (NCES 2007-486).

**Teacher characteristics: misplaced students and comparison groups, 2005**
Percentage of students by characteristic

Table 2-8

| | Misplaced 10th | Advanced Classes | National Average |
|---|---|---|---|
| Less than 5 years experience | 30.3 | 21.3 | 22.5 |
| Regular or advanced teaching certificate | 74.7 | 83.7 | 82.5 |
| Undergraduate major: mathematics | 20.1 | 28.6 | 26.2 |

Source: Author's calculations from NAEP restricted-use data set: U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. NAEP 2005 Mathematics Restricted-Use Data Files, Grade 8 (NCES 2007-486).

# Summary

One hundred twenty thousand eighth graders are sitting in advanced math classes even though they score in the bottom 10 percent of students nationwide on the NAEP math test. They know about as much math as the typical second grader. They do not know basic arithmetic and cannot correctly answer NAEP items using fractions, decimals, or percents. These students are disproportionately black and Hispanic. They hail from poor households with parents whose own education is below the national average. The schools that these children attend are large, urban public schools with predominantly low socioeconomic status populations. Their algebra classes are populated by students with mathematical abilities spanning several years. Their math teachers are less experienced, less credentialed, and less well prepared in mathematics training than the typical teacher of advanced math students in eighth grade.

No element of this story is educationally sound.

# Recommendations: Elements of A Realistic Algebra Policy

- Get the goal right: learning algebra—not sweeping all 8th graders into algebra classes
- Teach and assess prerequisite skills
- Early intervention
- Collect data, conduct research