

**Algebra Requirement Debates**

Nicholson Baker, “Wrong Answer: The Case Against Algebra II,” *Harper’s Magazine*, September, 2013

Why, if math is so great and timeless and beautiful, do millions of people hate it so much? In particular, why do so many high school students hate algebra? On an opinion-gathering website called Amplicate, 86 percent of recent respondents registered a hatred for algebra — putting it near the top of Amplicate’s list of disliked high school subjects, just below geometry. Grant Wiggins, an educational consultant and former teacher, told me it was a “nasty gatekeeper course”: the compulsory Greek grammar of the modern era.

Lots of students love math, of course. It comes easily to them, or it doesn’t come easily but they are willing to put in the hours and they enjoy the challenge. (That’s my story, more or less: in high school, I took a week to memorize the problem-solving tactics in a Barron’s test-prep paperback and got a 93 on the New York State Regents Algebra II exam, learning, in the process, almost no actual math.) But many math conscripts are angry, many resigned, and some have reached states of real panic or despair.

The reason these kids are upset is that they are required to do something they can’t do. As a result, they feel angry, dumb, sometimes downright suicidal. A college professor, now in his fifties, who in high school unsuccessfully took algebra three years running, responded to a Washington Monthly blog post on the subject with his own tale of woe:

I have no idea, to this day, why I find math, and algebra in particular, so excruciatingly hard, but I do. I admire those who can learn it, but I could no more master algebra than I could leap off the roof and fly. The experience of being made to reenact your inability, over and over, is deeply warping. . . . If you continually ask a one-armed man to play the guitar, he’ll either come to hate himself or hate you.

Arne Duncan, the U.S. secretary of education, wants everyone working their asymptotes off, learning about rational functions and their points of discontinuity. He is one of the required-algebra “Standardistas” (as the education blogger Susan Ohanian calls them), and he is backing up his views with the financial power of the federal government. In 2011, Duncan — a broad-shouldered, well-meaning, Harvard-educated former basketball player from Chicago who occasionally scrimmages with President Obama — gave a speech under a spotlighted infinity symbol at the annual meeting of the National Council of Teachers of Mathematics (NCTM).

“In recent years,” he told the crowd, “it has become increasingly clear to the country — not just to you guys as teachers — that algebra is a key, maybe the key, to success in college. Students who have completed Algebra II in high school are twice as likely to earn a degree as those who didn’t.” A rigorous dose of algebra teaches students reasoning and logic, he claimed, leading to academic success “not just in math but across the curriculum.”

There was plenty of polite applause after Duncan’s NCTM speech, but not all educators agree with what he’s doing. “I’m a math guy,” Grant Wiggins told me. “It’s not like I’m some fuzzy-headed humanist.” But where, he wondered, was the next generation of plumbers and carpenters going to come from? “You don’t need algebra for the majority of jobs. You need it for the burgeoning field of high-tech, but that’s not all the jobs. I just don’t get it. We’ve eviscerated vocational-training programs over the past fifteen years.” Programs in graphic design and the building trades have disappeared, he notes, while billions are spent on math enrichment and testing.

Underwood Dudley, a number theorist who taught for many years at DePauw University, is another longtime critic of math requirements. He’s against them because he loves the subject. As he wrote in The American Mathematical Monthly in 1987:

Mathematics is so useful that there could be no civilization without it, and it is so beautiful that some theorems and their proofs — those which cause us to gasp, or to laugh out loud with delight — should be hanging in museums. And yet: “The vast majority of the human race, and the vast majority of the college-educated human race never need any mathematics beyond arithmetic to survive successfully.”

I called Dudley and asked him point-blank whether we should be requiring Algebra II of all high schoolers. “Good heavens, no,” he said. “Forcing people to take mathematics is just terrible. We shouldn’t do it. But we are.” He then warned me that I would get in trouble for writing this article, although he also said that he thought, or hoped, that his opinions were shared by a silent majority of math teachers.

Andrew Hacker, a political scientist at CUNY, took a similar position in a 2012 op-ed for the New York Times called “Is Algebra Necessary?” His piece caused an earthquake in the math world, and there were ripostes from some professors, most notably UC Berkeley’s Edward Frenkel, who wrote passionately but confusingly about the right to bear “mathematical arms.” (As if making algebra an elective would remove that right.) But others endorsed Hacker’s piece, some publicly, some privately.

Cornell’s Steven Strogatz, a mathematician of crowds and swarms and oscillating bridges, told me that he agreed with much of what Hacker wrote. “As someone who is working on the front lines, it’s alarming to me, and discouraging, that year after year I see such a large proportion of people really not learning anything — and just suffering while they’re doing it.” We need less math for the average kid, Strogatz said, but more meaningful math. “We spend a lot of time avalanching students with answers to things that they wouldn’t think of asking.”

Life’s prerequisites are courtesy and kindness, the times tables, fractions, percentages, ratios, reading, writing, some history — the rest is gravy, really.

Arne Duncan’s endlessly repeated defense of Algebra II is derived from an obvious statistical tautology: people who take Algebra II are more likely to go to college, since Algebra II is, after all, a college requirement. In their eagerness to impose “reasoning skills” on young people, they have in fact succumbed to an old bit of illogic: the post hoc ergo propter hoc fallacy of misplaced causation.

But though the NCTM published hundreds of articles on curriculum reform and on the disciplinary and work-ethical and even religious values that came with a strong mathematical education, they fought a losing battle. Ohio was among the first states to remove the math requirement from high school, in 1921, declaring that “it is not fair to impose a study upon a pupil on the contingency that he may some day utilize it in a practical way when the indications all point in the opposite direction.”

In 1931, with about half of New York’s elementary-algebra students failing the statewide Regents exam, an NYU professor of education, Philip Cox, wrote an editorial in a journal called The Clearing-House. “If the mathematics enthusiasts would study the failure rates of mathematics throughout the junior- and senior-high-school period,” he said, “they might be aghast at the death and destruction that prescribed and even recommended mathematics scatter in their trains.”

There may have been fewer math teachers employed in public high schools as a consequence of the removal of the algebra requirement, but those who fancied math were working hard at it and doing it well, and the sciences that relied on applied-math proficiencies were making discoveries by the boatload. By 1950, at a time when only a quarter of American high school students were taking algebra, the nation’s technological prowess was the envy of the planet.

 “The educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a nation and a people,” said a 1983 report, A Nation at Risk, emanating from the Reagan White House. By lowering our standards, the report said, America had been “committing an act of unthinking, unilateral educational disarmament.” Math requirements and math homework were increased further, but this wasn’t enough for defense-minded worriers. A national “report card” followed in 1989, making the case that we were in an educational death spiral because students tested so badly in math.

Actually, wrote Paul E. Burke, a federal statistician and former math teacher, what the report card showed was encouraging: “Two-thirds of students know most of what we want them to know in math.” William Raspberry, a columnist for the Washington Post, interviewed Burke in April 1989. “Requiring unnecessary math does not create future scientists,” Burke told Raspberry. “It creates dropouts and hatred for math and for school.” (When I reached Burke at home, he said, “We should listen to the customers” — the students.)

Burke was ignored, as was another columnist for the Washington Post, Colman McCarthy, who wrote in 1991 that algebra was, for most, “useless torture.” Since then, it’s been decades of crisis, crisis, crisis. We are an innumerate nation, we don’t know where enemy countries are on a map, we can’t divide fractions, we’re under-STEMed, we’re worse at middle-school math than the Estonians. Bush’s No Child Left Behind has become Obama’s Race to the Top. We need more equations, more formulas, more benchmarks, more testing, more assessment software, more of what Arne Duncan calls “data-driven education.”

Math-intensive education hasn’t done much for Russia, as it turns out. But historical counterexamples don’t seem to interest the latest generation of crisis-mongers. We’ve once again gotten ourselves caught up in a strangely self-destructive statistical cold war with other high-achieving countries. The recruits are young teenagers, their ammunition the little bubbles on standardized tests. America’s technological future hinges, say the rigorists, on whether our student population can plug-and-chug the binomial theorem better than, say, Korean or Finnish or German or Chinese students. The childishness of this hypernationalistic mentality depresses me, and I want it to end, and I am not alone.