Opinion: The Common Core is today's New Math – which is actually a good thing

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Credit: AI-generated image (disclaimer)

Math can't catch a break. These days, people on both ends of the political spectrum are lining up to deride the Common Core standards, a set of guidelines for K-12 education in reading and mathematics. The Common Core standards outline what a student should know and be able to do at the end of each grade. States don't have to adopt the standards,

although many did in an effort to receive funds from President Obama's Race to the Top initiative.

Conservatives oppose the guidelines because they generally dislike any suggestion that the federal government might have a role to play in public education at the state and local level; these standards, then, are perceived as a threat to local control.

Liberals, mostly via teachers' unions, decry the use of the standards and the associated assessments to evaluate classroom instructors.

And parents of all persuasions are panicked by their sudden inability to help their children with their homework. Even comedian Louis CK got in on the discussion (via Twitter; he has since deactivated his account).

My kids used to love math. Now it makes them cry. Thanks standardized testing and common core!— Louis CK (@louisck) April 28 2014

In the middle are millions of American schoolchildren who are often confused and frustrated by these "new" ways of teaching mathematics.

Thing is, we've been down this path before.

The old New Math

When the Soviets launched Sputnik in 1957, the United States went into panic mode. Our schools needed to emphasize math and science so that we wouldn't fall behind the Soviet Union and its allegedly superior scientists. In 1958, President Eisenhower signed the National Defense Education Act, which poured money into the American education system at all levels.

One result of this was the so-called New Math, which focused more on

conceptual understanding of mathematics over rote memorization of arithmetic. Set theory took a central role, forcing students to think of numbers as sets of objects rather than abstract symbols to be manipulated. This is actually how numbers are constructed logically in an advanced undergraduate mathematics course on real analysis, but it may not necessarily be the best way to communicate ideas like addition to schoolchildren. Arithmetic using number bases other than 10 also entered the scene. This was famously spoofed by Tom Lehrer in his song "New Math."

I attended elementary school in the 1970s, so I missed New Math's implementation, and it was largely gone by the time I got started. But the way Lehrer tries to explain how subtraction "used to be done" made no sense to me at first (I did figure it out after a minute). In fact, the New Math method he ridicules is how children of my generation – and many of the Common Core-protesting parents of today – learned to do it, even if some of us don't really understand what the whole borrowing thing is conceptually. Clearly some of the New Math ideas took root, and math education is better for it. For example, given the ubiquity of computers in modern life, it's useful for today's students to learn to do binary arithmetic – adding and subtracting numbers in base 2 just as a computer does.

The New Math fell into disfavor mostly because of complaints from parents and teachers. Parents were unhappy because they couldn't understand their children's homework. Teachers objected because they were often unprepared to instruct their students in the new methods. In short, it was the *implementation* of these new concepts that led to the failure, more than the curriculum itself.

Those who ignore history…

In 1983, President Reagan's National Commission on Excellence in

Education released its report, A Nation at Risk, which asserted that American schools were "failing" and suggested various measures to right the ship. Since then, American schoolchildren and their teachers have been bombarded with various reform initiatives, privatization efforts have been launched and charter schools established.

Whether or not the nation's public schools are actually failing is a matter of serious debate; indeed, many of the claims made in A Nation at Risk were debunked by statisticians at Sandia National Laboratories a few years after the report's release. But the general notion that our public schools are "bad" persists, especially among politicians and business groups.

Enter Common Core. Launched in 2009 by a consortium of states, the idea sounds reasonable enough – public school learning objectives should be more uniform nationally. That is, what students learn in math or reading at each grade level should not vary state by state. That way, colleges and employers will know what high school graduates have been taught, and it will be easier to compare students from across the country.

The guidelines are just that. There is no set curriculum attached to them; they are merely a list of concepts that students should be expected to master at each grade level. For example, here are the standards in Grade 3 for Number and Operations in Base Ten:

- Use place value understanding and properties of operations to perform multi-digit arithmetic.
- CCSS.Math.Content.3.NBT.A.1 Use place value understanding to round whole numbers to the nearest 10 or 100.
- CCSS.Math.Content.3.NBT.A.2 Fluently add and subtract within 1,000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

- CCSS.Math.Content.3.NBT.A.3 Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (eg, 9 × 80, 5 × 60) using strategies based on place value and properties of operations.

There is a footnote that "a range of algorithms may be used" to help students complete these tasks. In other words, teachers can explain various methods to actually accomplish the mathematical task at hand. There is nothing controversial about these topics, and indeed it's not controversial that they're things that students should be able to do at that age.

However, some of the new methods being taught for doing arithmetic have caused confusion for parents, causing them to take to social media in frustration. Take the 32 - 12 problem, for example:

Once again, it's the *implementation* that's causing the problem. Most parents (people age 30-45, mostly), remembering the math books of our youth filled with pages of exercises like this, immediately jump to the "Old Fashion" (sic) algorithm shown. The stuff at the bottom looks like gibberish, and given many adults' tendency toward math phobia/anxiety, they immediately throw up their hands and claim this is nonsense.

Except that it isn't. In fact, we all do arithmetic like this in our heads all the time. Say you are buying a scone at a bakery for breakfast and the total price is US$2.60. You hand the cashier a $10 bill. How much change do you get? Now, you do *not* perform the standard algorithm in your head. You first note that you'd need another 40 cents to get to the next dollar, making $3, and then you'd need $7 to get up to $10, so your change is $7.40. That's all that's going on at the bottom of the page in the picture above. Your children can't explain this to you because they don't know that you weren't taught this explicitly, and your child's teacher can't send home a primer for you either.

Better intuition about math, better problem-solving

As an instructor of college-level mathematics, I view this focus on conceptual understanding and multiple strategies for solving problems as a welcome change. Doing things this way can help build intuition about the size of answers and help with estimation. College students can compute answers to homework problems to 10 decimal places, but ask them to ballpark something without a calculator and I get blank stares. Ditto for conceptual understanding – for instance, students can evaluate integrals with relative ease, but building one as a limit of Riemann sums to solve an actual problem is often beyond their reach.

This is frustrating because I know that my colleagues and I focus on these notions when we introduce these topics, but they fade quickly from students' knowledge base as they shift their attention to solving problems for exams. And, to be fair, since the K-12 math curriculum is chopped up into discrete chunks of individual topics for ease of standardized testing assessment, it's often difficult for students to develop the problem-solving abilities they need for success in higher-level math, science and engineering work. Emphasizing more conceptual understanding at an early age will hopefully lead to better problem-solving skills later. At least that's the rationale behind the standards.

Alas, Common Core is in danger of being abandoned. Some states have already dropped the standards (Indiana and South Carolina, for example), looking to replace them with something else. But these actions are largely a result of mistaken conflations: that the standards represent a federal imposition of curriculum on local schools, that the standardized tests used to evaluate students *are* the Common Core rather than a separate initiative.

As the 2016 presidential campaign heats up, support for the Common Core has become a political liability, possibly killing it before it really

has a chance. That would be a shame. The standards themselves are fine, and before we throw the baby out with the bathwater, perhaps we should consider efforts to implement them properly. To give the Common Core a fair shot, we need appropriate professional development for teachers and a more phased introduction of new standardized testing attached to the standards.

But, if we do ultimately give in to panic and misinformation, let's hope any replacement provides proper coherence and rigor. Above all, our children should develop solid mathematical skills that will help them see the beauty and utility of this wonderful subject.

Source: The Conversation