Yes Virginia, There is a Difference and Your Students are Being Left Behind

Some thoughts from Steve Leinwand

When 44 states join in, and Virginia aligns itself with the likes of Texas and Alaska in saying "no thanks" to the new Common Core State Standards for Mathematics, a better explanation than "our SOL framework is better" is needed. The simple fact is that the Virginia Standards of Learning are *not* better than the new Common Core. Even Massachusetts, recognized as having the highest mathematics achievement in the U.S., the highest performance standards, and among the best mathematics standards, recognized that students would be much better off with the Common Core!

Better? Let's take a closer look. Virginia's grade 2 SOLs for basic addition and subtraction state that "the student, given two whole numbers whose sum is 99 or less, will estimate the sum, and find the sum using various methods of calculation." For subtraction, "given two whole numbers, each of which is 99 or less, the student will estimate the difference and find the difference, using various methods of calculation." That's it. Estimate and compute. Get correct answers. Where is the understanding? Where are the connections between computing and underlying place value understandings? Where is building a sense of number? Where is any guidance to help teachers help their students learn these critical foundational skills?

Compare these SOL standards for these foundational skills to the Common Core where at grade 2, within the cluster titled: "Use place value understanding and properties of operations to add and subtract" students are expected to:

- Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
- Add up to four two-digit numbers using strategies based on place value and properties of operations.
- Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
- Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.
- Explain why addition and subtraction strategies work, using place value and the properties of operations.

Better? Ask a second grader how much money is left if they start with $62 and spend $38. The SOLs imply that a student in Virginia is pretty much expected to subtract with regrouping – that is, since you can't take 8 from 2, regroup the 62 into 50 and 12 and go from there, crossing out 6s and sticking in little 1s. Sure the SOL says "using various methods of calculation, but none is

explicitly noted and this phrase disappears at grade 3. Alternatively, a student who has mastered the far richer Common Core standards might count on from 38 to 48 to 58 getting twenty and then add two more to get to 60 and two more to get to 62. Another student might reason 38 and 2 more gets you to 40 and 22 more gets you to 62. Still another student might start at 62 and subtract 40 to get to 22 and then adjust this up by two since only 38 were spend. These students are using strategies based on place value. They are making sense of subtraction, not just regurgitating a procedure. When teachers abide by the Common Core standards students expand their understanding to three-digit numbers and add three and four numbers, not just two. Most importantly, their teachers are being guided *by the standards* to provide better instruction.

Now take a peek at 6th and 7th grade. Virginia's SOLs for grade 6 call for the student to "describe and compare data, using ratios, and will use appropriate notation, such as a/b, a to b and a:b." At grade 7 this expands to "the student will solve single-step and multistep practical problems, using proportional reasoning. That's it. Important? Of course. Helpful to teachers? Not really. And where are any of the critical underlying concepts of proportional relationships?

So take a look at the Common Core for this topic. Here is grade 6:

Understand ratio concepts and use ratio reasoning to solve problems:

1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*

2. Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*1

3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

    a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

    b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*

    c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

    d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

And here is grade 7:

Analyze proportional relationships and use them to solve real-world and mathematical problems:

1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.*
2. Recognize and represent proportional relationships between quantities.
    a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
    b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
    c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.*
    d. Explain what a point *(x, y)* on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r)* where *r* is the unit rate.
3. Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*

It's not even close. The bottom line is that to prepare students for 21st century needs, Virginia apparently prides itself on a mathematics program that focuses primarily on using procedures to get right answers. The Common Core, as seen so clearly in these two examples, focuses on coherent progressions to build conceptual understanding and the ability to use skills to solve problems. It's hard for any fair-minded observer to believe that Virginia's SOLs are even close to better.

The fact is that, for as long as most of us can remember, the K-12 mathematics program in the United States has been aptly characterized in many rather uncomplimentary ways: underperforming, incoherent, fragmented, poorly aligned, unteachable, unfair, narrow in focus, skill-based, and of course, "a mile wide and an inch deep." Most teachers are well aware that there have been far too many objectives for each grade or course, few of them rigorous or conceptually oriented, and too many of them misplaced as we prematurely ram far too much computation down too many throats. It's certainly not a very pretty picture and helps to explain why so many teachers and students have been set up to fail and why we've created the need for much of the intervention that test results seem to require. This continues to be an apt description of Virginia's SOLs for math.

But for the rest of the country, hope and change have arrived! Like the long awaited cavalry, these new Common Core State Standards for Mathematics present a once in a lifetime

opportunity to rescue ourselves and our students from the myriad curriculum problems we've faced for years.

First, the new standards are **common**. No longer will publishers cater to a few large states and stuff their books with the union of 50 sets of demands. No longer will our assessments be developed by the lowest bidder and overwhelmingly comprised of low-level multiple-choice items. Instead, the prospects of a Common Core set of standards are for shorter, more web-based, better focused instructional materials and for computer-adaptive computer-delivered, instantaneously scorable constructed response item assessments. It almost sounds too good to be true, but once everyone is pushing and pulling and lifting in the same direction, market forces and public and private investments will be all the incentive needed to ensure an aligned system of materials and assessments that support the implementation of the new standards.

But it is the quality of the standards themselves – particularly at grades K-8 – that are the cause for such optimism. They are **coherent.** These standards replace the vagueness of strands (number, measurement, geometry, data and algebra) with domains, clusters and well-conceived progressions of standards. They are **fair.** Many procedures that we have come to teach at grade x, have been moved to grade x + 1, giving us all a chance to build prerequisite knowledge and slow down what has become a drag race through the curricular. And they are **teachable.** There are only about 30 standards – of varying sizes and depth – at each grade level, resulting in a far more manageable teaching load than the 40 to 50 objectives per year that many now face.

As important as the content standards, the Common Core also includes eight standards for **mathematical practice** that "describe varieties of expertise that mathematics educators at all levels should seek to develop in their students." Among these overarching practices that should guide planning, teaching and assessing mathematics at all levels are making sense of and persevering in solving problems, reasoning abstractly and quantitatively, constructing viable arguments and modeling with mathematics – key elements that distinguishes mathematics from other disciplines.

That's why this isn't a fad or likely to fade away. They may be common, but they are also a lot better. They draw from what works in Singapore and Hong Kong and Korea. There is a good reason why they have been so quickly and widely adopted. But don't take my word for it. Go to www.corestandards.org and take a look for yourself and compare it, topic for topic, with the Virginia SOLs. Then start asking why Virginia's students are being left behind.

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