Common Sense About the Common Core

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Is the Common Core the best thing since sliced bread, or the work of the devil? Is it brand new, or a rehash of old ideas? Is it anything more than a brand name, or is there substance? Can it work, given the implementation challenges in our political and school systems? Opinions about the Common Core are everywhere, but the op-eds I've seen are often short on facts, and equally short on common sense. A mathematician by training, I've worked for nearly 40 years as an education researcher, curriculum materials developer, test developer, standards writer, and teacher. What follows is a Q&A based on that experience. I focus on the Common Core State Standards for Mathematics, known as CCSSM, but the issues apply to all standards (descriptions of what students should know and be able to do).

What's the CCSSM about?

Take a look for yourself – the Common Core documents are available at <http://www.Corestandards.org/>. If you read the first 8 pages of CCSSM and then sample the rest, you'll get a good sense of what's intended. In brief, CCSSM focuses on two deeply intertwined aspects of mathematics: the content people need to know, and the knowhow that makes for its successful use, called mathematical practices. You can think of the content as a set of tools – the things you do mathematics with. The practices emphasize problem solving, reasoning mathematically, and applying mathematical knowledge to solve real world problems. Without the practices, the tools in the content part of the CCSSM don't do much for you. It's like being taught to use a saw, hammer, screwdriver, lathe, and other woodworking tools without having any sense of what it means to make furniture.

At heart, the CCSSM are about thinking mathematically. Here are two visions of a third grade class, both taken from real classrooms. In one, students are practicing addition and subtraction, getting help where needed to make sure they get the right answers. In another, the students have noticed that every time they add two odd numbers, the sum is even. A student asks, "Will it always be true?" Another says "but the odd numbers go on forever, we can't test them all." Pretty smart for a third grader! But later, a student notices that every odd number is made up of a bunch of pairs, with one left over. When

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you put two odd numbers together, you have all the pairs you had before, and the two left-overs make another pair – so the sum is even. And this will always be the case, no matter which odd numbers you start with. Now that's mathematical thinking – and it's what the core should be about. Of course, kids should do their sums correctly, and, they should be able to think with the mathematics.

It's important to understand what the Common Core is *not*. Most importantly, the Common Core is not a curriculum. CCSSM provides an outline of the mathematics that students should learn – an outline endorsed by 43 states. Equally important, the common core does not prescribe a particular teaching style: effective teachers can have very different styles. To date – and despite what you read or hear – the desired reality of the Common Core has not made its way into even a small minority of American classrooms. What happens in classrooms will depend on the curricula that are developed and adopted, on the high stakes tests that shape instruction (for better or worse), on the capacity of teachers to create classrooms that really teach "to the Core," and on the coherence or incoherence of the whole effort.

What do powerful classrooms look like?

CCSSM describes what kids should be able to do mathematically, including problem solving, producing and critiquing mathematical arguments, and more. Students won't get good at these things unless they have an opportunity to practice them in the classroom, and get feedback on how they're doing. (Imagine a sports coach who lectured the team on how to play, and then told the team to practice a lot before the big match. You wouldn't bet on that coach's success.) So, classrooms that produce students who are powerful mathematical thinkers must provide meaningful opportunities for students to *do* mathematics. Just as there are many successful (and different) coaches and coaching styles, there are many ways to run a successful classroom. At the same time, there's consistent evidence that classrooms that produce powerful mathematical thinkers have these five properties:[i]

- *High quality content and practices.* Students have the opportunity to grapple with powerful ideas in meaningful ways, developing and refining skills, understandings, perseverance and other productive "habits of mind" as they do.
- *Meaningful, carefully structured challenge.* Solving complex problems takes perseverance; students should neither be spoon-fed nor lost. In powerful classrooms students are supported in "productive struggle," which helps them build their mathematical muscles.
- *Equitable opportunity.* We've all seen the classroom where the teacher moves things along by calling on the few kids who "get it," leaving the rest in the dust. It shouldn't be that way. In the kind of classroom that lives up to the standards, all students are productively engaged in the mathematics.
- *Students as sense makers.* In powerful classrooms students have the opportunity to "talk math," to exchange ideas, to work collaboratively, and build on each other's ideas (just as in productive workplaces). In contrast to classrooms where students

come to learn that they're not "math people," students in these classes come to see themselves as mathematical sense makers.

- *A focus on building and refining student thinking.* In powerful classrooms the teachers know the mathematical terrain and how students come to understand that content so well that they can anticipate common difficulties, look for them, and challenge the students in ways that help them make progress, without simply spoon-feeding them.

We call this kind of powerful teaching "Teaching for Robust Understanding": see <http://ats.berkeley.edu/tools.html>. Our goal should be to provide such learning experiences for all students. It's very hard to do this well – which is why the issue of supporting teachers' professional growth is crucially important. There are no quick fixes. We should be thinking in terms of consistent, gradual improvement.

What's new in the CCSSM?

The ideas behind CCSSM are not new. We've known for some time that students need a well rounded diet of skills, conceptual understanding, and problem solving – rich mathematics content *and* the opportunities to develop strong mathematical practices.[ii] The "standards movement" began in 1989, when the National Council of Teachers of Mathematics issued its *Curriculum and Evaluation Standards*. NCTM's (2000) *Principles and Standards for School Mathematics* represented an updating of the 1989 standards, based on what had been learned, and the fact that technology had changed so much over the 1990s. CCSSM can be seen as the next step in a progression.

So what's different? First, the organization is new. CCSSM offers grade-by-grade standards for grades K through 8, rather than the "grade band" standards of its predecessors. It represents a particular set of "trajectories" through subject matter, being very specific about what content should be addressed. Second and critically important, the Common Core has been adopted by the vast majority of states. Prior to the Common Core, each of the 50 states had its own standards and tests. Some of these were world class, with a focus on thinking mathematically; some were focused on low-level skills and rote memorization. Some states compared favorably with the best countries in the world, and some scored near the bottom of the international heap. Mathematics education across the US was totally incoherent; where you lived determined whether you got a decent education or not. That's no way to prepare students across the US for college and careers, or the nation's work force for the challenges of the decades to come. And it's inequitable when your zip code determines whether or not you have access to a good education. IF CCSSM are implemented with fidelity in the states that adopted them, we'll have something like nationwide consistency and opportunity instead of the crazy quilt patchwork that we've had.

What's wrong with CCSSM?

I can find lots of things to complain about – everyone can. Can you think of a class you took that was so perfect that you wouldn't change a thing? With under 100 pages to outline all of school mathematics, the authors made a series of choices. Those choices can be defended, but so could other choices. However, if schools and classrooms across the US make strides toward implementing the vision of the Common Core described above, we'd make real progress.

What IS wrong is our political system, and the fact that teachers and schools are not being provided adequate preparation and resources to implement the Common Core. This lack of support can destroy the vision, because real change is needed. Teaching the same old way, called "demonstrate and practice," just doesn't cut it. (How much of the math that you memorized in school do you remember, and actually use as part of your tool kit?) The math we want kids to get their heads around is deeper and richer. Kids need to work hard to make sense of it; and in order to provide powerful learning environments teachers need to learn how to support students in grappling with much more challenging mathematics. This isn't a matter of giving teachers a few days of "training" for teaching the Core; it's a matter of taking teaching seriously, and providing teachers with the kinds of sustained help they need to be able to create classrooms that produce students who are powerful mathematical thinkers. The REAL reason some nations consistently score well on international tests (pick your favorite: Finland, Japan, Singapore…) is that those nations take teaching seriously, providing ongoing support and professional development for teachers. When teachers have a deep understanding of the mathematics, and are supported in building the kinds of rich classroom environments described above, the students who emerge from those classrooms are powerful mathematical thinkers.

What do "Common Core Curricula" look like?

I could say, "Who knows?" It bears repeating that the Common Core is not a curriculum. What might be called Common Core curricula – widely accessible curricula intended to be consistent with the common core – don't really exist yet, although publishers are rushing to get them out. When those curricula do emerge, we'll have to see how faithful they are to the vision of problem solving, reasoning, and sense making described here.

One thing is for sure: the vast majority of materials currently labeled "Common Core" don't come close to that standard. Here's a case in point: A student recently brought home a homework assignment with "Common Core Mathematics" prominently stamped at the top of the page. The bottom of the page said, "Copyright 1998." That's more than a decade before the CCSSM were written. Remember when supermarkets plastered the word "natural" on everything, because it seemed to promise healthy food? That's what's being done today with phony "Common Core" labels. To find out whether something is consistent with the values of the Common Core you have to look at it closely, and ask: are kids being asked to use their brains? Are they learning solid mathematics, engaging in problem solving, asked to reason, using the math to model real world problems? In short, are they learning to become mathematical sense makers? If not, the "Common Core" label is just plain baloney.

Now, there *are* materials that support real mathematical engagement. For one set of such materials, look at the Mathematics Assessment Project's "Classroom Challenges," at

<http://map.mathshell.org/materials/index.php>. But, such materials do not a curriculum make – and again, materials without support are not enough. What really counts is how the mathematics comes alive (or doesn't) in the classroom.

What about testing?

Do you know the phrase "What you test is what you get"? When the stakes are high, teachers will – for their and their students' survival! – teach to the test. If the tests require thinking, problem solving and reasoning, then teaching to the test can be a good thing. But if a high stakes test doesn't reflect the kinds of mathematical thinking you want kids to learn, you're in for trouble. I worked on the specs for one of the big testing consortia, to some good effect – the exams will produce separate scores for content, reasoning, problem solving and modeling – but I'm not very hopeful at this point. To really test for mathematical sense making, we need to offer extended "essay questions" that provide opportunities for students to grapple with complex mathematical situations, demonstrating what they know in the process. Unfortunately, it appears that test makers' desire for cheap, easy-to-grade, and legally bullet-proof tests may undermine the best of intentions. It takes time to grade essay questions, and time is money. The two main tests being developed to align with the CCSSM[iii] barely scratch the surface of what we can do. That's an issue of political will (read: it costs money and will shake people up), and the people footing the bill for the tests don't seem to have it.

The best use of testing is to reveal what individual students know, to help them learn more. That is, the most important consumers of high quality tests should be teachers and students, who can learn from them. It IS possible to build tests that are tied to standards and provide such information; there are plenty of examples at all grade levels. In addition, scores from such tests can be used to tell schools, districts, and states where they're doing well and where they need to get better. It's a misuse of testing when test scores are used primarily to penalize "under-performing" students and schools, rather than to help them to improve. (Moreover, high stakes testing leads to cheating. How many testing scandals do we need to make the point?) Finally, it's just plain immoral to penalize students when they fail to meet standards they were never prepared for. Holding students accountable for test scores without providing meaningful opportunities to learn is abusive.

What's needed to fix things?

There's no shortage of "solutions." To mention one suggestion that's been bandied about, why not just adopt the curricular materials from high-performing countries? That would be nice, if it would work – but it won't. If conditions were the same in different countries – that is, if teachers here were provided the same levels of preparation, support, and ongoing opportunities for learning as in high-performing countries, then this approach could make sense. But the US is not Singapore (or Finland, or Japan), and what works in those countries won't work in the US, until teachers in the US are supported in the ways teachers in those countries are. Singaporean teachers are deeply versed in their curricula and have been prepared to get the most out of the problems in their texts. Japanese teachers are expected to take a decade to evolve into full-fledged professionals, and their work week contains regularly scheduled opportunities for continuous on-the-job training with experienced colleagues. Finnish teachers are carefully selected, have extensive preparation, and are given significant amounts of classroom autonomy.

In short, if importing good curricula would solve the problem, the problem would have been solved by now. It's been tried, and it failed. Of course, good curricular materials make life better – IF they're in a context where they can be well used. The same is true of any quick fix you can think of, for example the use of technology. Yes, the use of technology can make a big, positive difference – IF it's used in thoughtful ways, to enhance students' experience of the discipline. I started using computers for math instruction in 1981. With computers you can gather and analyze real data instead of using the "cooked" data in a textbook; you can play with and analyze graphs, because the computer can produce graphs easily; and so on. But in those cases, the technology is being used to in the service of mathematical reasoning and problem solving. You can get much deeper into the math if you use the technology well, but the presence of technology in the classroom doesn't guarantee anything. In particular, putting a curriculum on tablets is like putting a book on an e-reader: it may be lighter to carry, but it's the same words. The serious question is, how can the technology be used to deepen students' sense making, problem solving, and reasoning?

The best way to make effective use of technology is to make sure that the teachers who use it in their classrooms are well prepared to use it effectively. Fancy technology isn't going to make much of a difference in a world where half of the new teacher force each year will drop out within the next 5 years (within 3 years in urban school districts) – a world in which there are more teachers in their first year of teaching than at any other level of experience. In professions with a stable professional core, the number of newcomers is a much smaller percentage of the total population: there are more established professionals to mentor the newcomers, and a much smaller drop-out rate. The best educational investment, as the highest performing nations make clear, is in the professionalization of teachers – so that they can make powerful instruction live in the classroom. In nations where teachers are given consistent growth opportunities, the teachers continue to develop over time. And, they stay in the profession.

Living up to the vision of the Common Core requires focus and coherence. Curricula and technology need to be aligned with the vision, and implemented in ways true to the spirit of sense making described here – including equitable access to the mathematics for all students. Administrators need to understand what counts, and support it. Testing needs to focus on providing useful information to teachers and students. Most important, we need to provide steady support for the teaching profession, so that teachers can make that vision live in their classrooms. We owe this to our kids.

[i] The quickest path to documentation is through the web site <ats.berkeley.edu>. The front page shows the big ideas; click on the "tools" page to see evidence about, and tools for, productive thinking.

[ii] There's a massive amount of research behind this statement. For one early summary, see Schoenfeld, A. H. (2002, January/February). Making mathematics work for all children: Issues of standards, testing, and equity. *Educational Researcher*, 31(1), 13-25.

[iii] See the web sites of the Partnership for Assessment of Readiness for College and Careers, PARCC, at <http://www.parcconline.org/>, and the Smarter Balanced Assessment Consortium, SBAC, at <http://www.smarterbalanced.org/>.