One might reasonably assume that the math wars have died down. From occasional newspaper reports, one might have the impression that the sides have agreed to make nice.

Not so.

The National Mathematics Advisory Panel, established by the Bush administration in April of last year, has been meeting to discuss the improvement of achievement in mathematics in the schools. A good portion of its members have no experience in mathematics, no experience teaching children, or both.

Transcripts published on the U.S. Department of Education’s Web site reveal the disdain and/or lack of knowledge many panelists have regarding the past 20 years of reform in K-12 mathematics.

Many of these advances enjoyed the support of the National Science Foundation. But the role of the NSF, a nonpartisan leader in the support of high-quality curriculum development in math and science for 50 years, is under grave threat.

And throughout the nation, there are groups with anti-reform goals. Organized with fiery zealousness, messages mounted on Web sites in various states, these groups exist to influence parents and school districts to eliminate reform programs, curricula, even language (such as “constructivist”).

One label for these people is “purist.” For example, the person or curriculum that answers the question “What comes next: 2, 4, 6, 8, _?” with 10 is viewed as beneath contempt because, as research mathematicians have known since the Norwegian mathematician Niels Henrik Abel (1802-1829), any number could fit. (The pattern could be “four consecutive even numbers, then jump 100, then continue with the next four consecutive even numbers.”) Many of the usual mathematics activities involving patterns at a child’s level are impure.
As recently as October of 2006, anti-reformers traveled to Seattle to conduct a marathon of presentations. According to reports, they called for the dismissal of everyone in the state superintendent’s office who had been involved in developing the state’s math standards and the Washington Assessment of Student Learning, from Superintendent of Public Instruction Terry Bergeson on down.

Their other pleas, it is said, included replacing the state’s standards with a set of “world-class standards.” Get rid of any vestige of any “reform” curricula; erase the influence of the National Council of Teachers of Mathematics over the state’s curriculum; make sure that no decision on math instruction is influenced by any educational research or anyone from a college of education; adopt certain textbooks, such as ones now being produced in Russia or Singapore; look to mathematicians and “good teachers,” while avoiding “mathematics educators” (a rung or two below the night custodian) and teachers who have any sympathy with constructivist notions, who are therefore not “good teachers.” Ironically, one session was said to be titled “Finding Common Ground in the Math Wars.”

The fact is that “make nice” is not the best descriptor for the present status of the math wars.

The institutional response to opposition commonly amounts to dishearteningly neutral responses, that really there is no conflict at all. This is a message that makes the protesters very happy.

The anti-reform people do not recommend the caning of children, but they have been harsh to fellow scholars and professionals who disagree with them.

Throughout the anti-reform rhetoric, one hears the trumpeting of the need for “world class” standards. Unfortunately for the case of anti-reform champions of world-class standards, the data don’t give much support. Last year, research from the California department of education showed that 23 percent of coursetakers are proficient at Algebra 1, and 25 percent at Algebra 2. (But the number of coursetakers for Algebra 1—707,000—dropped to 214,000 in Algebra 2.) For Hispanics, the corresponding figures are 14 percent and 12 percent, but there were 351,000 coursetakers in Algebra 1 and only 67,000 in Algebra 2. For African-Americans, 11 percent are proficient in Algebra 1, and 8 percent in Algebra 2, with 61,000 coursetakers for the former and 13,000 for the latter.
Students whose scores gave us these numbers were educated not by the fuzzy math of the NCTM and the NSF, but the instruction derived from the world-class standards generated by some of the present anti-reform mathematicians and adopted by California almost 10 years ago.

“World class” is an attractive label, but what does it mean?

According to their critics, the anti-reform people emphasize what they see as “basic”: Don’t figure things out. Don’t make sense. Act rapidly and obediently. Copy what the teacher says and give it back at test time. Be pure.

Those who wish innovative programs to disappear seem to have ignored people (especially children) in their education manifestos, and thus it seems reasonable to label their wares “Parrot Math,” a term I have used in my writing since the late 1980s.

Is the human being a parrot? The answer is an unequivocal NO. We interpret things in terms of our existing mental networks, and we change those networks in the face of things that we experience. We construct our own realities. Your view of today’s Yankees game is not the same as mine, even though we sat next to each other at Yankee Stadium and cheered for Derek Jeter.

Working with teachers, I have gathered data in hundreds of simple experiments with young children, experiments that have been widely known and replicated worldwide for many decades. Here is one example:

*Fill a glass three-fourths full of colored fluid and show it to a child.*

*Give the child a drawing of a tilted empty glass, and tilt the glass that has the colored fluid to the same angle as the one in the drawing.*

*Show the drawing and the glass to the child, and ask the child to draw the fluid just as it appears in the glass.*

You’ll find that very different drawings occur at various ages, a function of the child’s developmental level. What the child draws is almost certain to be fundamentally different from what he saw. In fact, it is unlikely that he ever saw such a thing.

The late psycholinguist Hermina Sinclair de-Zwart, a research colleague of Jean Piaget at the University of Geneva, said: “We should see children as wearing signboards saying ‘Under Construction.’” No, wait a moment. I should say it more
We should see everybody as wearing signboards saying ‘Under Construction—Self-Employed.’

Further, there is reason to distrust confidence in goals (and tests) that emphasize rote memory and instant atomistic responses, however correct the answers. In the 1980s, a colleague and I asked 4th, 5th, and 6th grade children who had been on a chant-out-arithmetic-facts regimen what the answer to $6 \times 3$ was. The result: close to perfect success across grade levels, 18.

Pretty good, yes? High marks for those kids? High marks for that test?

No. And no. And no.

In individual interviews, the children were then asked to give a real-life story or a word problem for $6 \times 3 = 18$.

These kids had been surrounded by real life for at least nine years by that time, and for virtually all their school lives they had been surrounded by (if not drowned in) arithmetic “facts.”

A large proportion of the children said something like this: “On Monday, I bought six doughnuts. On Tuesday, I bought three doughnuts. How many doughnuts did I buy altogether? Eighteen, because six times three equals 18.”

Indeed, more than 75 percent of the responses at grade 4, and 85 percent of the responses at grade 5, were incorrect. Worse, half the incorrect responses at grades 4 and 5 were stories for six plus three. (See *School Science and Mathematics*, Spring 1983 and Fall 1983.)

Let’s be clear, kids need to know their facts. But to know them (or to know anything) in the same way that a parrot says “six times three is 18” is a waste of everyone’s time.

The British mathematician Alfred North Whitehead must have foreseen Parrot Math when he said, 90 years ago, “In training a child to activity of thought, above all things we must beware of what I will call ‘inert ideas’—that is to say, ideas that are merely received into the mind without being utilized, or tested, or thrown into fresh combinations.”

The education of children (especially their mathematical education) should be concerned with activities like explaining, justifying, predicting, comparing, conjecturing, representing, inventing, classifying, ordering, inferring, logically multiplying, reasoning propositionally, reasoning causally, thinking
combinatorially, reasoning probabilistically and proportionally, keeping all but one variable constant to assess its effect, visualizing, and so forth. These are the basics. And this is not parrot stuff.

The anti-reform people do not recommend the caning of children. But they have been harsh to fellow scholars and professionals who disagree with them, and one journalist has recommended, in public print, that one should “slap the face” of any school principal who does not adhere to their narrow orthodoxy. The Parrot Math rhetoric dismisses departures as irredeemably wrong and labels alternative policies and practices as fuzzy, an all-purpose word meant to be utterly damning. Purists do not do fuzzy.

How sad to be so certain in the face of enormous complexity. How sad to be disdainful of those outside one’s narrow circle.

The British educator Molly Brearley was appropriately tentative and modest, and utterly correct, when she described the basics in education some 50 years ago. Her words are good to keep in mind when we are tempted by authoritarian solutions for complex human issues such as the education of young children:

“The main work of the school is surely the fostering and developing of mental life, enabling children to experience more fully and consciously all that life has to offer. This large, overall aim is to be achieved by an infinity of small steps. The material we provide children can seldom be thought of as an end in itself, but rather as a means through which effective thinking and feeling are fostered.”

This is modest and realistic.

Messianic proclamations and demands for total purity are dangerous. History abounds with persecutions and wars against “impure” ideas.

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