

Math Wars

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A number of years ago, in the middle of the “Reading Wars” (to oversimplify a bit, phonics versus whole language), I smugly remarked that I thought it unlikely that disputes over mathematics education and mathematics texts could become nearly as politicized as the battles that waged over how to teach reading.

How wrong I was! Over the last few years, more and more people have taken to the ramparts over the issues surrounding what approaches are best for teaching mathematics. The math series we use in our Lower School, *Everyday Mathematics*, has been identified as one of several series deserving particular criticism, according to the perspective of one faction in the “math wars,” the group that believes strongly in going “back to basics.”

At the heart of the “back to basics” perspective is the belief that the abandonment of both the content and techniques of mathematics education that were prevalent prior to the introduction of the “new math” in the early 1960s is what is responsible for the decline in the mathematics preparation of American students.

That form of mathematics education consisted primarily of the teaching of arithmetic and algebraic pencil and paper algorithms, ranging from multiple digit multiplication and long division to the factoring of trinomials and other algebraic techniques. The assumptions seem to be that this is what mathematics education was all about prior to getting ruined by “reformers,” that it was very successful, and that it is exactly what students in the early 21st century ought to be studying.

It may surprise many that the nature of mathematics instruction changed significantly in the early to mid 20th century, along with the technology of the time, rather than staying constant.

When I was in middle school, my math teacher, a man in his 50s, showed the class how to calculate square roots by hand (think of long division on steroids!). He explained that he had to master the technique as a child, but that it was no longer taught because they were better ways of calculating square roots than by using a method that was very time consuming and arduous. There were many pencil and paper techniques developed over several centuries that died



natural deaths as better methods (involving technology or not) came along.

Mathematics educators recognized that it was rather pointless to force students to learn techniques that were clearly obsolete. It seems surprising that there are those today who reject that notion and would insist that the children of the 21st century use precisely the techniques that were suitable for the mid-20th century.

I find it equally surprising that anyone thinks that the mathematics education of our childhood was particularly successful. A large percentage of the adult population today (probably considerably more than a majority) would readily admit that they were “never very good at math.” This phenomenon is so prevalent that many people seem to wear it on their sleeve as a badge of honor!

When is the last time any of us ever heard someone readily admit to being poor at reading or writing? Surely there are those among us for whom this is true, but it is something that we hide rather than share, because it is something to be ashamed of. How can we consider successful a pedagogy that results in adults that neither are nor feel competent? I would argue that mathematics education historically has been a colossal failure if measured by what truly matters: the presence of a clear competence that one has confidence in.

The rate of technological change is rapid. We have the ability today to use machines to do things that either were not done at all or were done by hand in times gone by. We embrace that technology in so many aspects of our lives, from our automobiles to our microwave ovens, to our computers and cell phones. Why should we reject technology when it comes to the most tedious of mathematical computations? It seems absurd on its face.

Of course, reliance on technology can be taken to illogical extremes. Anyone who uses a calculator to calculate three times



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eight is not going to progress very far in mathematics, because it is simply too time-consuming and inefficient to reach for an external aid for something so elementary. So, it is vital that young children learn their math facts (addition, subtraction, multiplication, and division facts) backwards and forwards, so that they are automatic. Yes, this is rote learning, but so is learning the alphabet, and it is a necessary foundation for future work.

On the other hand, spending time learning to multiply accurately and speedily two numbers with three or more digits is a waste of time, and it is an equal waste of time to require that students become proficient with division with multiple digit divisors. Even those of us who are very good at this kind of thing always reach for a calculator.

An argument that is sometimes used in opposition to this perspective is to ask the simple question “what if one doesn’t have a calculator and one needs to do long division?” One might equally ask what one would do if one needed to go to the Tacoma Mall and did not have a car handy. Should we all learn to ride horses, just in case?

This leaves the question of what it is that should be taught in mathematics, beyond the necessary rote skills of early elementary school. Before answering that, it might be useful to think about why adults today who grew up with the “old math” of long ago feel so insecure about their math skills.

I would submit that by far the largest reason for this is that mathematics is too often taught as a collection of disconnected, independent skills and facts, each of which get memorized in turn. There is often little conceptual understanding of the underlying mathematics, and few connections drawn between the various concepts and skills that we are asked to master.

Why have we and do we continue to teach mathematics this way? I would submit it is because the overwhelming majority of those who teach mathematics (unfortunately, at all levels below college) themselves have a poor grasp of mathematics. One cannot teach well what one does not know!

Unfortunately, the percentage of well-qualified math teachers in schools today is declining, somewhat rapidly. The number of mathematics majors being produced by American colleges and universities today is less than half of what it was a generation ago, and the number continues to decline.

While in history and English it is possible to insist, if a school wishes, that new hires have a Masters degree in the subject, in mathematics it is increasingly difficult to find those that have even the rough equivalent of a bachelors degree, let alone an actual undergraduate degree or a Masters degree in the subject. This does not auger well for the future of mathematics education.

As an alternative to having qualified teachers, the education establishment in the US increasingly turns to trying to devise

the perfect set of materials, that somehow is “teacher proof;” and that does not require much mathematics expertise on the part of the instructors who use the materials.

On the surface, this appears to be the inadvertent approach that the Tacoma Public Schools is taking by churning math texts in the hopes of finding one with just the right approach. And the school district should not be singled out here, because what they are doing is very similar to what many, many other schools in the country are doing as well. I fear it is doomed to failure, because the key to successful mathematics education is to have well educated mathematics teachers who love and understand their subject and know how to impart it to others. And there just aren’t enough of us to go around.

I know that a few CWA parents are uneasy about our Lower School’s use of the Elementary Mathematics series. There are two strong pieces of evidence that should allay any concerns.

First, in the years after the series was first adopted in the 1995-96 school year, our Lower School standardized scores in mathematics improved markedly, and remain at a high level.

Second, the students who have progressed through that program and gone on to our Middle and Upper Schools have fared very well in mathematics. Our Advanced Placement scores in math in the Upper School are simply phenomenal! Our high school students consistently perform in mathematics (as measured by the Advanced Placement program) at a higher level than they do in any other subject.

As one might surmise from the length of this essay, this is something I feel very strongly about. I began my career teaching math, after finishing a Masters degree in the subject. I taught math full time for a while, and continued part time as I began my administrative career. It is no longer something that it is my role to think about and deal with on a full-time basis, but it remains nevertheless near and dear to my heart.

