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A Brief History

Early 60s - New Math Introduced

1989 - NCTM Standards Introduced

Curriculum Follows - Nationwide Adoption of “Standards Math”

1997 - California Standards

Curriculum Follows - Statewide Adoption of Aligned Curricula

2000 - New NCTM Standards (PSSM)
Introduced

Plan to Improve

- * Good Standards
- * Good tests linked to the Standards
- * Good curriculum linked to the Standards

Danger - Bait and Switch

- * Good Talk – Bad Implementation
- * Bad Standards
- * Bad Tests
- * Bad Curriculum

The 1989 NCTM Standards

- * Deliberately Revolutionary
- * Emphasized teaching method at least as much as content.
- * Low on specifics of content but clearly downgraded mastery of skills, memory, standards algorithms, analytical methods (e.g. algebra). Emphasized invented methods, generic problem solving, guess and check, “conceptual understanding,” statistics and data analysis.
- * Abjured direct teaching and practice and favored discovery learning and creation of ad hoc methods.

Standard Methods - Ready for the Ash Heap of History?

Algorithms not only are not helpful in learning arithmetic, but also hinder development of numerical reasoning...

...they unteach place value thereby preventing children from developing number sense...

Constance Kamii and Ann Dominick

Standard Methods - Ready for the Ash Heap of History?

It is time to recognize that, for many students, real mathematical power, on the one hand, and facility with paper-and-pencil computational algorithms, on the other, are mutually exclusive. In fact, it's time to acknowledge that continuing to teach these skills to our students is not only unnecessary, but counter productive and downright dangerous.

Steven Leinwand

Not Necessarily

We would like to emphasize that the standard algorithms are more than just ‘ways to get the answer’ - - that is, they have theoretical as well as practical significance. For one thing, all the algorithms of arithmetic are preparatory for algebra, since there are (again, not by accident, but by virtue of the construction of the decimal system) strong analogies between arithmetic of ordinary numbers and arithmetic of polynomials.

American Mathematical Society advisory committee on
NCTM Standards Revision

Not Necessarily

Could these authors be unaware of the fact that the division algorithm, like other standard algorithms, contains mathematical reasoning that would ultimately enhance children's understanding of our decimal system?

H.-H. Wu

If the ideas are so bad, why do
this?

Foolish Romanticism

Less flattering reasons

Racial and Gender Stereotypes

What we have now is nostalgia math. It is the mathematics that we have always had, that is good for the most part for the relatively high socio-economic anglo male, and that we have a great deal of research that has been done showing that women, for example, and minority groups do not learn the same way...

...males for example learn better deductively in a competitive environment, when - the kind of thing that we have done in the past. Where we have found with gender differences, for example, that women have a tendency to learn better in a collaborative effort when they are doing inductive reasoning.

- Jack Price NCTM President, 1996 KSDO Radio, San Diego

What Really Works

Successful at Risk Schools

<u>School</u>	<u>%AA+H</u>	<u>% poverty</u>	<u>Relative Rank</u>
Kelso, Inglewood	98	86	83
Bennet Kew, Inglewood	98	74	77
Robert Hill Lane, LA	93	97	75
Payne, Inglewood	98	91	75

What Really Works

		Year				SAT9
		98	99	00	01	Scores in percentile
<u>Kelso</u>						
	3	66	78	82	84	
	4	64	77	69	75	
	5	67	74	73	67	
<u>Bennett-Kew</u>						
	3	80	84	83	86	
	4	57	69	65	73	
	5	54	49	58	69	

What Really Works

		Year				SAT9 Scores in percentile
		98	99	00	01	
<u>Lane</u>						
	3	62	71	72	78	
	4	40	64	64	68	
	5	53	56	67	65	
<u>Payne</u>						
	3	55	78	76	79	
	4	43	61	67	66	
	5	44	51	57	68	

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Pernicious, Appealing, Romantic Fallacies

We are hard wired to learn math. Letting students discover the great truths of math is as natural as learning to speak

FALSE: We are hard wired to learn spoken language and simple math (e.g. 0, 1, 2 and who has more). Even simple arithmetic, much less the decimal system or algebra, is unnatural and must be taught.

Pernicious, Appealing, Romantic Fallacies

Brain Research Shows...Discovery learning and invented methods work best.

FALSE: Real brain research and top level cognitive psychology show that repetition and repeated stimulation are critical for long term memory and mastery.

Mastery and long term memory free the short term memory for the problems at hand.

Pernicious, Appealing, Romantic Fallacies

* Skills and knowledge are not important. The world is changing so fast that “mere facts” will be outdated before we know it.

FALSE- Newton’s Laws still hold for almost all situations we will encounter. Algebra is still algebra and the analytical methods of algebra are still among the most powerful ways we have to solve problems.

Pernicious, Appealing, Romantic Fallacies

What we need to teach is Problem Solving Skills

FALSE – Attempts to teach generalized problem solving are largely ineffective. Problem solving skill is domain-specific and based on mastery of domain-specific knowledge.

Pernicious Fallacies

Of course we teach phonics/skills/computation

FALSE- “embedded phonics” is ineffective in teaching children letter-sound correspondences and effective decoding skills.

Discovery learning and invention of “some method” for computation is not at all the same thing in teaching and practicing an effective and general method.

Slippery Words

Lots of words sound good, but tell us no more than Mom, Apple Pie and the Flag

- * Standards
- * Balance
- * Skills