The Dreaded Standards

Math Standards for the early grades, particularly K and 1, are distasteful, but the new Common Core Standards may have premiere distasteful status.

What makes them distasteful? A subtle combination of vagueness, misplaced specificity, and a lack of understanding about teaching young children. But let the committee or braintrust that made up the descriptions about the standards speak for itself.

Below is a sidebar summary of seven mathematical practices for K and 1. They aren't practices for teachers, but presumably practices that are induced in children through instruction that complies with the standards. Think of at-risk kindergarten children as you read the list.

Mathematical Practices

1. *Make sense of problems and persevere in solving them.*
2. *Reason abstractly and quantitatively.*
3. *Construct viable arguments and critique the reasoning of others.*
4. *Model with mathematics.*
5. *Use appropriate tools strategically.*
6. *Attend to precision.*
7. *Look for and make use of structure.*

There is no doubt that these mandates are composed of English words and follow English syntax, but some of them don't seem to convey more than a suggestion of meaning or relate in an obvious manner to any specific standard or combination that would induce the mandate.

Mandate 1: *Make sense of problems and persevere in solving them.*

This item raises the question of whether the authors or committee who wrote it has a clear idea of what kindergartners are. They are little guys who are just getting their feet wet in the sea of formal instruction. Do we design material so it is easy for them? Not according to mandate one. Rather, it appears that we're going to make math "challenging" so kids have to frown and struggle as we remind them, "Persevere, damn it."

If this interpretation seems like a stretch, consider mandate one with the p word replaced by a Webster definition:

Make sense of problems and persist in the undertaking in spite of opposition or discouragement.

If children are going to persevere, we're going to have to do our part and provide them with opposition and discouragement. Why? Apparently so we can show them that they are to persevere, damn it.

Mandate 2: *Reason abstractly and quantitatively.*

This mandate is what seems to be a tautology, words that are strung together and say nothing more than what we would know if we said that the children are to learn math. In other words, if children learn anything relevant about math or even math applications, they have to learn to reason abstractly and quantitatively.

To confirm that the person on the street understands this interpretation I asked an unkempt person who was pushing a grocery cart down the sidewalk, “Can young children do math without reasoning abstractly and quantitatively?”

He looked at me and said, “No. Got any change?”

I think this response, particularly the reference to monetary application, is quite as thoughtful as mandate number 2, which is a good number for this tautology.

Mandate 3: *Construct viable arguments and critique the reasoning of others.*

If we’re talking about kindergarteners, what mathematical arguments are they going to construct? And how are they going to determine their degree of “viability” without knowledge of facts?

For math applications nearly all relevant arguments will hinge on whether something is true or false. On the K level, we could expect the viable argument and critique might go something like this.

“I got more money than you do cause I got four dollars.”
“Oh yeah? Show me.”
“Those aren’t dollars. They’re pennies. You only got four pennies.”

In a broader sense, exactly what are the properties of a viable argument? Is it one that’s supported by or based on sound evidence? Is it unassailable or irrefutable in logical form? Or is *viable* some kind of slush word that refers to constructing, developing, growing through the complexities of dynamic interaction? I forgot to ask the person with the grocery cart this question, so I remain unsure.

The ultimate question, however, is, what central role would arguments or critiquing the reasoning of others have to do with kindergarten math? The children do not have extensive knowledge of the facts and relationships needed to formulate either arguments or critiques. And most relevant, where are the K standards that provide the instruction children receive to create these viable arguments and critiques?

Mandate 4: *Model with mathematics.*

No, Virginia, I don’t know what this means. In this sentence, the word *model* is an intransitive verb; I have some idea of what mathematics is, but modeling with mathematics? I strike out. The dictionary doesn’t help a lot. One meaning of model is: To design or imitate forms. I don't know what forms are being designed? Do kids design something out of mathematics? If they make a concrete model of *anything* it will be replete with mathematical details, but this isn't really modeling with math.

Another meaning of model is: to act as a fashion or art model. This possible meaning provokes some pretty strange images, like kids walking down the runway with numbers and geometric forms all over them. In this case, at least a kid would be able answer the question, "What on earth are you doing?" "Modeling with mathematics."

Mandate 5: *Use appropriate tools strategically.*

This mandate seems to have redundant parts. If you use *appropriate* tools, it's given that you know that they're appropriate for particular "strategies." We could also express the same idea without reference to appropriate. "Use tools strategically." If we use them strategically, we must have selected the ones that are appropriate.

Even if we accept the mandate as being clear in form, however, the mandate does not suggest what kindergarten tools are related to math. Let's see: a calculator? Probably not, but certainly not as a central "tool." If we're talking about ruler, scissors, pencils and crayons, they are tools, all right, but for these, the best-phrased mandate would be something like, "Use tools appropriately." That mandate would imply both information about how to use the tools and also, what not to do with them. For instance, "Don't hit Daniel with your ruler; stop cutting Lynn's hair with your scissors, and don't ever write on the chalkboard with your crayons again, or stick pencils up your nose so you look like a walrus."

Mandate 6: *Attend to precision.*

Granted, these mandates are for math, not physics, but the committee who wrote the mandates should have some knowledge about the "scientific" relationship between precision and accuracy. The problem with attending to "precision" without reference to accuracy is that a little guy could give evidence of being very precise but dead wrong. For instance,

What's 5 + 1? *(Five.)*
What's 3 + 1? *(Three.)*
What's 9 + 1? *(Nine.)*
What's 1 plus 9? *(One.)*

The proof that the responses are precise is that that we could make big bets on how the learner would respond to an item that was not tested, such as, "What's 18 plus one?"

We could even make sure that the learner is attending to precision by telling him to "Think carefully before you answer."

In the math arena we are concerned with accuracy, not only with the answers, but accuracy in the steps that the learner takes to arrive at the answers. Are the steps and answers correct? If so, the process is accurate. Note, however, that the students' accuracy is the result of the *precision* with which the process is designed and taught to the learner. So the precision is properly in the teacher's bailiwick, and we need to be very compulsive about precision, so the teacher will be able to *accurately* judge from the children's responses whether or not they are learning what is being taught.

Mandate 7: *Look for and make use of structure.*

Once more, Virginia, I am perplexed. Is this structure in the problems kiddies are working, in the surroundings, in the knowledge children have, or does structure lie in some intricate relation between hosts of the structural elements? Maybe nobody knows where the structure is and that's the reason the kids have to look for it. Or maybe the game is simply based on pragmatics. Find something—anything—you can make use of. That thing (whatever it is) has structure.

But once we've found the structure, how do we go about making use of it? Do we use it as a basis for performing mathematical operations? If so, the mandate is opaque and would be more clearly stated as, "Identify numerical relationships and express them in number operations."

In summary, singly or as a group, these sidebar mandates are an insult. Somebody might argue that they don't really reflect the actual standards for K. They are simply some kind of window dressing designed to call attention to … The words that follow are the ones that would make this justification an easy target to shoot down. What possible virtue would a document that is designed to change the lives of children through education have if it is cloaked in vagueness, with directives that have no obvious application to kindergarteners?

The sidebar is not the only problem. On the same page is an overview of what children are to learn more specifically in K. One item presents a very sophomoric analysis.

Number and Operations in base 10:

Work with numbers 11–19 to gain foundations for place value.

No, we're not going to carp over the fact that the heading refers to only one number, but focus on the assertion that the teen numbers (which should really start with 10 not 11 in base ten) provide a good foundation for place value. If you really thought about it and tried to come up with the most confused, screwed up, non-generalizable decade, 10–19 would win in a landslide. In other words, this decade, isolated from the other two-digit decades, teaches very little about place value.

Consider the relationship between the names and what the kindergartener is to write. One name is sixteen. For that name, you say the 6 first, but write it last. Hmmm. The same pattern holds for all the numbers that end with the word teen, 13 through 19. For some of these numbers the name for the second digit is a familiar counting number, 14, 16, 17, 18, 19. For 13 and 15, the name you say before saying “teen” is not really a counting number. You don’t say threeteen or fiveteen, but you write a three or five as the second digit.

Then you have 10, 11,and 12, which have names that are totally independent of what you write. If they followed the pattern of 14, 16, and the others, the name for 10 would be zeroteen; 11 would be oneteen; 12 would be twoteen. Also, if all the teens were regular, 13 would be threeteen and 15 would be fiveteen.

Even though the pattern for the teen numbers is very lumpy, at best, let’s say that we work on it until children are super firm in writing numbers from dictation and reading teen numbers.

Have they learned solid foundations for place value? Unless they work on other two-digit numbers, the answer has to be no. Here’s the test. We tell them, “You’re going to write a number you’ve never written before. This number has two parts, but does not have a one in it. Write the number 75. Remember, write two parts—a part for 70 and a part for 5.”

What are the odds of them writing it correctly? Given that the children don’t know how to write 70, they wouldn’t write 570 (the 5 before the 70.) They might write 57. They might forget the ban against using 1 and write 517 (thinking that the 10 in 70 is really 17). But they would have absolutely no basis for knowing that the 7 was the first digit.

Yet, the conventions that apply to 70–79, apply to 20–29, 30–39, 40–49, 50–59, and all the other decades through 99. So with respect to the relationship of name parts with what you write, which is more generalizable for place value, 70–79 or 10–19? Clearly, 70—79. It doesn’t have oddball irregular names for 70, 71, and 72 (compared to 10, 11, 12). The name for each digit to write is specified by the name, and they are written in the same order they occur in the name, not in reverse order.

Not only are there problems with the relationship of name to the order of digits. Children can’t really learn much about place value for base ten numbers before they learn *a range of two-digit numbers.* If they become familiar with all numbers to 100, it is now possible to show them how the digits relate to place value. The rule we present is simply that the first digit tells the number of tens. The second digit tells the number of ones.

Now it’s just a question of presenting examples like 56, 34, 81, 27, and 13, and asking the children:

How many tens?
How many ones?

If children can write and read the numbers correctly, this relationship is pretty easy to teach. But if the only numbers that children work with are 10–19, it doesn't make a lot of sense because the number of tens is no variable. There's always one ten. So this is a poor foundation because it doesn't show the relationship between the number of tens (the first digit) and the number of ones (the second digit). In other words, the only reasonable foundation for place value is the understanding that both digits of the numeral tell about groups. The first digit specifies the number of groups that have ten; the second digit specifies the number of groups that have one.

I haven't presented viable arguments and critiques about any of the actual standards for K, but I have pointed out enough slop to suggest why at least some of the actual standards would be distasteful. Most of this distastefulness results from the committee's strange notions of how children learn. The standards clearly follow the Piagetian myth that children first manipulate then internalize the manipulations, which slowly grows into "concrete operations," and later into "abstractions" or formal operations.

It does not work that way, and manipulatives are an instructional nightmare in K. The products—what children actually learn from manipulation activities—are trivial compared to what could be taught directly in the same amount of time. This fact implies the fundamental problem with these and other standards for the early grades. *Committees keep writing standards that are not based on empirical evidence of what children are able to learn about math and the specific technical details of instruction that cause the learning.*
Until those who create standards for the early grades let go of superstition and start looking at facts of performance, math standards continue to be a potpourri that includes standards that are perfectly reasonable both in terms of what is teachable and what is necessary for good math instruction, and nonsense standards that instructional programs have to incorporate if these programs are to be adopted by all the states that have bought into the latest distasteful standards.