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The Core Knowledge Blog

“When Will I Ever Use That?”

by Robert Pondiscio

August 26th, 2011

Tags: [mathematics](#), [New York Times](#), [project-based learning](#)

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Stop me if you've heard this one before.

The problem with math instruction is that it's just not relevant to the lives or future careers of our students. Writing in the [New York Times](#), Sol Garfunkel and David Mumford say there is no “single established body of mathematical skills that everyone needs to know to be prepared for 21st-century careers.” The authors are the executive director of the Consortium for Mathematics and Its Applications; and an emeritus professor of mathematics at Brown. They write that, in fact, “different sets of math skills are useful for different careers, and our math education should be changed to reflect this fact.”

“How often do most adults encounter a situation in which they need to solve a quadratic equation? Do they need to know what constitutes a “group of transformations” or a “complex number”? Of course professional mathematicians, physicists and engineers need to know all this, but most citizens would be better served by studying how mortgages are priced, how computers are programmed and how the statistical results of a medical trial are to be understood.”

Say goodbye to algebra, geometry and calculus. In their place, Garfunkel and Mumford propose “a sequence of finance, data and basic engineering.”

“In the finance course, students would learn the exponential function, use formulas in spreadsheets and study the budgets of people, companies and governments. In the data course, students would gather their own data sets and learn how, in fields as diverse as sports and medicine, larger samples give better estimates of averages. In the basic engineering course, students would learn the workings of engines, sound waves, TV signals and computers. Science and math were originally discovered together, and they are best learned together now.”

Hey, I get it! It's project-based learning! [Again](#).

It all sounds sensible, even seductive. The [worst ideas](#) in education always do. “Relevant” isn't supposed to be a synonym for dumbed-down, for example. It just always seems to work out that way. And my hunch is that students might struggle less with algebra, geometry and calculus if they showed up in high school with a strong foundation in basic math skills. As is often the case, Garfunkel and Mumford seem to be offering up a classic false dichotomy. Of course we want students who can calculate a tip, understand mortgage pricing or

understand credit card interest payments. But we also need a math track that will produce scientists, engineers and mathematicians, who are already in short supply.

Anyone seen the baby? She was right here when I threw away the bathwater...

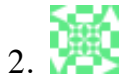
Over at [Joanne Jacobs](#), she asks, "Math or quantitative literacy?" (echoing Garfunkel's and Mumford's preferred term). Here's another good rule of thumb: When someone describes a content area as a "literacy" watering down follows.

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1. [...] "Relevant" always seems to mean "dumbed-down," writes Robert Pondiscio on Core Knowledge Blog. [...]

Pingback by [Math or quantitative literacy? – Joanne Jacobs](#) – August 26, 2011 @ [1:42 pm](#)



Smart Teachers in Stupid Schools:

Smart teachers in stupid schools still produce well-educated students; we just wish the schools would get on board!

<http://www.rantrave.com/Rant/Smart-Teachers-in-Stupid-Schools.aspx>

Smart teachers, who are bold and use common sense, must take a stand, and speak out against the common trends in academia to waste time and dumb down our classrooms. We want to produce bright students who have much knowledge and can think critically. You can't put the cart before the horse; the ability to think critically only comes with much knowledge and understanding of many disciplines.

Smart teachers in stupid schools still produce well-educated students; we just wish the schools would get on board!

Comment by Dan Dempsey – August 26, 2011 @ [2:45 pm](#)



Don't people keep saying the world is changing so fast that our children will work in jobs that don't exist today? Then why do we suppose that we can predict what math skills will be needed in those jobs? If EVERYONE gets a broad understanding of math, then EVERYONE will be able to go into a broad range of jobs. Otherwise, many jobs will be closed off to many people.

Comment by Mia Munn – August 26, 2011 @ [2:53 pm](#)



Stop, Robert, stop! I have heard it before!

You are absolutely right. There is nothing new here. And you make an excellent point: while “relevant” learning need not be dumbed down, somehow it tends to work out that way. Now, why might that be?

Perhaps it’s because you really need to understand the stuff in order to solve any “relevant” problems anyway. For instance, Garfunkel and Mumford suggest teaching formulas not through variables (such as x) but through “abbreviations for simple quantities.” But this approach will lead to confusion. Something is wrong if you grasp such abbreviations but don’t understand what a variable is.

Comment by [Diana Senechal](#) – August 26, 2011 @ [3:11 pm](#)



So, why DO we teach Math in schools? If we can’t answer that question, how can we ‘reform’ it?

Comment by [Deirdre Mundy](#) – August 26, 2011 @ [3:13 pm](#)

6. [...] “When Will I Ever Use That?” Core Knowledge Blog [...]

Pingback by [What We’re Reading « Common Core](#) – August 26, 2011 @ [3:33 pm](#)



Yes, it’s the project method all over again. And it’s relevance all over again. And it’s the romantic view all over again, the view that says children are wonderful, we don’t need to do anything, if we’ll just get out of the way kids will educate themselves, and on and on.

It’s also a view of math that is pretty narrow and confining, the view that math is a bag of tricks, at best a series of types of problems and methods to be learned. A broader and much more liberating view of math is as a set of mathematical ideas, ideas that are not necessarily easy to understand or to learn, but that have wide applicability and power once they are understood and learned to a sufficient level of fluency.

Where in the world do people get the idea that problems that are relevant to everyday life are therefore motivating?

With very few exceptions we learn math by doing problems. Therefore problems are very important to learning math, but that is not at all the same as saying that math is nothing more than problems.

Which should come first in the learning of math, the problems, or the mathematical ideas that make those problems solvable? That, I believe, is an important question, but the answer is not necessarily easy or obvious. Garfunkel and Mumford strongly support the “problem first” approach. I do not. But that does not mean that I come down solidly on the “math first” approach. I don’t think it’s that simple. I’ve have given my perspective on this question at <http://www.brianrude.com/modelm.htm>.

Comment by [Brian Rude](#) – August 26, 2011 @ [3:50 pm](#)



Sad to see all this, especially coming from an accomplished mathematician like David Mumford. He

should know better. The whole piece is a mix of inexactitudes, balderdash and logical fallacies.

Mumford and Garfunkel complain about ‘traditionalists’, but state with reverence that “...Science and math were originally discovered together, and they are best learned together now.”

Confusion reigns supreme. When was ‘math’ discovered? Never: it was abstracted out, delimited, given a name – never ‘discovered’. Leaving that aside, if early mathematicians were mixing in philosophy, and some (like Pythagoras) mysticism, should our students be more successful if they do the same?

Preposterous.

“There is widespread alarm in the United States about the state of our math education. The anxiety can be traced to the poor performance of American students on various international tests...”, write Mumford and Garfunkel.

OK, but where’s the scrutiny as to how these other countries actually achieve this?

Here’s something plain wrong:

“...George W. Bush’s No Child Left Behind law, which requires public school students to pass standardized math tests by the year 2014 and punishes their schools or their teachers if they do not”

No. The law requires since 2002 for students to pass the tests, and it did not punish teachers if students failed the tests. The law arguably ‘punished’ schools, by cutting funding – even so ‘punish’ is a hard word. Do Mumford and Garfunkel actually have any idea about NCLB?

“All this worry, however, is based on the assumption that there is a single established body of mathematical skills that everyone needs to know to be prepared for 21st-century careers.”

Gobbledygook. There are plenty of people concerned about our standing on international tests like PISA and who would never consider themselves advocates of the ‘21st century skills’ movement.

Incidentally, what is it with Mumford and Garfunkel’s fascination with the 21st Century? This cult for the new goes hand in hand with disdain for the past (or for ‘traditionalists’).

“The truth is that different sets of math skills are useful for different careers, and our math education should be changed to reflect this fact.”

Here Mumford and Garfunkel refer indirectly to high school math. Two new problems arise:

One, a student can’t know in 9th grade what career you will pursue four to eight years later, especially in the US, where we do not have professional school tracks.

And two, our high school math education already has plenty of sequences for students (and teachers) uninterested in touching math with a long pole.

“Today, American high schools offer a sequence of algebra, geometry, more algebra, pre-calculus and calculus (or a “reform” version in which these topics are interwoven).”

Misleading. The level in the algebra classes varies from zero to infinity, and not all students take pre-calculus or calculus. Some students can choose to take probabilities, for example, without any calculus.

“This has been codified by the Common Core State Standards, recently adopted by more than 40 states. This highly abstract curriculum is simply not the best way to prepare a vast majority of high school students for life.”

Here Mumford and Garfunkel’ already low bar – school as preparation for career – drops even lower. Schools should prepare “a vast majority” of students for “life”, they say. This is the “life adjustment” mantra of the 1950s schools all over again, repainted and propped as ‘new’, with a sneer for ‘traditionalists’.

Riddle this: if the goal is to breathe air, why bother with a course of study?

“But there is a world of difference between teaching “pure” math, with no context, and teaching relevant problems that will lead students to appreciate how a mathematical formula models and clarifies real-world situations. ”

Even in the purest most rarefied formal math, the context is always there, even if the model is a simpler math construction, which models something at the n-th level real in the sense that you can touch it.

All the same, elementary math always has context, and even if it is abstract it is nevertheless real – just that it appeals to a higher sense. As in the adage:

‘The ears are deaf, the eyes are blind,
What hears is mind, what sees is mind.’

More nonsense on the way:

“...how algebra courses currently proceed — introducing the mysterious variable x , which many students struggle to understand.”

Mr. Mumford should know – if we looked at some of these other countries who beat us hands down at elementary math education, we’d observe that the idea of variable is introduced from 2nd grade, with great ease, by virtue of looking at common arithmetic patterns. By the time of 9th grade algebra, if a student has not seen the variable ‘ x ’ and is not well familiar with it – sorry, the cognitive window has closed, and our fellow is bound to one of those 21st century careers which exclude the math, engineering and sciences.

“By contrast, a contextual approach, in the style of all working scientists, would introduce formulas using abbreviations for simple quantities — for instance, Einstein’s famous equation $E=mc^2$, where E stands for energy, m for mass and c for the speed of light. ”

I’ve got some bad news here: the Physics fare in high school is very light from sea to shining sea – nominally, one year in 12th grade, when there is just sufficient time for some rudimentary mechanics and electronics, and certainly no space is found for in-depth Relativity Theory. So much for using the $E=mc^2$ formula to introduce algebra.

“Imagine replacing the sequence of algebra, geometry and calculus with a sequence of finance, data and basic engineering. [...] In the basic engineering course, students would learn the workings of engines, sound waves, TV signals and computers.”

In real life, these basic engineering classes exist – but focus on the engineering processes, without a clue as to what is being actually engineered. Why is that, Mr. Mumford? Must be the ‘hands on’ education which has gotten out of hand.

Assume for a second that such classes would be taught by whiz teachers expert in physics, math, computer and mechanical engineering. Would those teachers have to be better, or less prepared to teach this material than the good old separate disciplines?

And by Mumford and Garfunkel's own bar, why would 21st century careers benefit from learning the innards of TV signals and sound waves? What's the practical benefit of that, which a Physics class could not provide?

Comment by andrei radulescu-banu — August 27, 2011 @ [12:59 am](#)



Andrei,

Great response. I hope you post this (or some form of it) on your blog.

Comment by [Diana Senechal](#) — August 27, 2011 @ [5:30 am](#)

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