

Whole Math

Here are two textbooks from the same people who brought you whole language.

By Marjorie Gann

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Although school-teachers tend to be good parents, they don't necessarily make the best teachers for their own offspring. As my two daughters frequently complain, Mom has her own ways of doing things that often don't coincide with their teachers' expectations.

The conflict between Mom's views and the school's came to a head last year when I discovered that — despite her A's in math — my grade 6 daughter could not multiply or divide one decimal by another, add or subtract fractions with unlike denominators, or operate with percents to calculate sale prices. So the summer was spent with a grade 6 math text, catching up to where I — though not the New Brunswick Department of Education — believed she should be.

I suspect more parents are about to discover deficits in their children's math skills, thanks to a sea change in math instruction. Dismayed by poor results on international measures, the influential National Council of Teachers of Mathematics (NCTM) in the U.S. has radically rethought mathematics instruction. The result is the NCTM's Curriculum and Evaluation Standards for School Mathematics (1989), now adopted by many states and provinces.

Rooted in educational "constructivism," the NCTM approach favours active learning: using "manipulatives" such as counters or base ten blocks and working in small groups ("cooperative learning" in today's jargon). It stresses problem-solving (a weak area on international comparisons) over arithmetical algorithms (operations). Calculators are permitted, teaching students to divide by two-digit divisors discouraged, and estimating, which enhances the ability to judge whether calculator results make sense, emphasized. Math problems are realistic,

embedding the math classroom in "the real world."

NCTM math is the object of considerable controversy in the United States, where it is variously tagged the "New New Math," "visual math," "fuzzy math" or — to highlight parallels with the now largely-discredited whole language approach — "whole math." Critics point to a decline on standardized test scores in Oregon and Idaho following NCTM implementation. A powerful California lobby of highly-educated parents, including a molecular biologist, geophysicist and statistician, has set up a website called Mathematically Correct to counter NCTM claims. ([http:// our-world.compuserve.com/homepages/mathman](http://our-world.compuserve.com/homepages/mathman))

In Atlantic Canada, NCTM math is in the ascendant. The NCTM Standards provide the philosophical underpinning for a new document called "Foundation for the Atlantic Canada Mathematics Curriculum." Two new math textbook series — Prentice Hall-Ginn's *Interactions* and Addison-Wesley's *Quest 2000* — have been developed to align with the NCTM guidelines. My daughter's school used *Interactions* for the first time this year, with the results I noted.

Without an extensive grasp of the research, it is hard for a parent or teacher to determine whether the NCTM is on the right track. Does repeated practice in arithmetic operations enhance a feel for numbers, or do children arrive at arithmetical understanding better by playing with geoboards and centicubes? Do students learn to estimate by doing accurate pen-and-pencil calculations or does this skill develop by estimating answers to real-life problems?

What is clear is that the execution of these ideals in *Interactions* and *Quest 2000* is ineffective. Lavishly-printed in large format with brilliant graphics and full-colour photographs of cheerful

young mathematicians, the texts are poorly organized and frequently confusing. In traditional math texts, chapters are organized according to mathematical principles — measurement, fractions, ratio-rate-percent. To make math "relevant," the organizing principle behind some chapters in *Interactions* is thematic. The "Investigating Transportation" unit, for example, lurches from volume and mass problems to time-rate-distance problems to money problems, time problems, and map reading. There are no model problems for students to imitate; each is one-of-a-kind, requiring a great deal of teacher assistance. When I helped my daughter with a problem on population densities, for example, I had to explain rounding, ratio and equivalent fractions — all in one night! When concepts are dropped as quickly as they are introduced, nothing is practised, assessed and mastered.

Interestingly, consumer pressure has forced both publishers to rethink the value of practice and drill. In its first edition, *Quest 2000*, for example, had very few practice exercises; the revised edition has short "Practise Your Skills" boxes — though the practice is often limited to a mere handful of exercises and a booklet of extra practice and testing masters that provide exercises hardly distinguishable from the practice pages in a traditional text.

When I taught elementary math, I was often stymied by the enormous range in my class. At the bottom were children who didn't know their number facts and could barely read word problems. At the top were kids who got every mechanical operation right and were wasting their time on multiplication and division drills. With their challenging word problems, *Interactions* and *Quest 2000* might have been just what these top students needed — but only to supplement a solid, sequential core math program.

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