

Math students need to practise, practise, practise

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I was at the gym a few days ago, and I picked up a copy of Maclean's magazine to read on the treadmill. What caught my eye was an article on how much trouble Canadian elementary, junior and high school students are having with mathematics. Even basic arithmetic skills, such as dealing with fractions, are not being acquired with the requisite level of competence.

I get to see the problem first-hand when I teach first- or second-year level university math courses, where, for some students, the issue isn't with understanding the concepts but with handling the numbers. Back in 2009, only 45 per cent of Nova Scotia Grade 12 students passed the provincial math exams, and on the South Shore, it was a dismal 34 per cent. With results like that, how can our kids compete for the best jobs?

The Maclean's article goes on to say that the math curricula aren't difficult just for students; parents and even teachers often find the approaches opaque. The repetitive drilling of basic skills such as times tables, fractions and long division are falling by the wayside (perhaps in conjunction with our reliance on computers).

What are being emphasized are alternate viewpoints for understanding math concepts. There is a great song by Tom Lehrer (a songwriter who gave music up for mathematics) called The New Math where he ironically states that "in the new approach, as you know, the important thing is to understand what you're doing rather than to get the right answer."

Does full understanding need to precede rote learning? I believe that the answer is "no" in basic mathematics. Students need to practise, practise, practise essential tasks; some understanding will develop only after the routines are memorized and well rehearsed. I often regale students with the fact that when I was a young lad at school, not only did I walk 10 miles in the snow to school (often having to stay home several days until it snowed so I could walk those 10 miles in the snow), but I also did every single exercise in the textbook before tests and exams. There is an excellent book called *Outliers: The Story of Success* by Malcolm Gladwell that posits the number of 10,000 as the required number of hours that one needs to spend woodshedding to achieve expertise. Command of an ability or talent requires repetitive work — no two ways about it.

The lack of math skills holds people back. I remember meeting a girl many years ago who was going to go through university to be a psychologist, but when she found out she had to do a course in statistics, she changed her major. What a loss. And sometimes, the losses are deadly. My lovely wife, who is a nurse, dropped on my desk an article she read about a 43-year-old mother of three in Edmonton who had cancer. This woman did not die of the disease itself, but from the erroneous administration of her chemotherapy medication over four hours (at a rate of 26 ml/h) rather than the prescribed four days (at a rate of 1.1 ml/h). The mistake was in the calculation of the delivery rate of the drug, and had the nurses (the one who made the error and the one who double-checked the result and failed to catch it) only written out the conversion factors (a basic but essential mathematical tool for all adults), the tragedy could have been avoided.

So where does this leave us and our children? Math education is a big investment. We need to convince our kids that there is no substitute for the sweat equity of practice in mathematics — the work they put in now will pay off big dividends later.

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