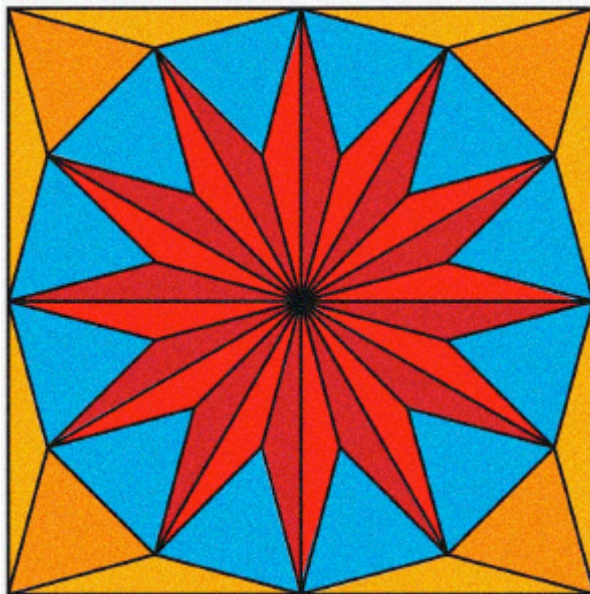


THE DECLINE AND CONTINUED FALL OF AUSTRALIAN MATHEMATICS

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Education is in the news. Education Minister Julia Gillard has just called for a renewed emphasis on “the basics”. Is there really a problem? Yes, with maths there is definitely a problem: we need the times tables. But it is not merely a problem with the basics. The real problem is one of basic meaningfulness.

To illustrate, here is an exercise from a current Victorian Year 9 maths text: a farmer has $2C$ cows and $3H$ horses. The exercise is to find the square of the sum of the farmer’s animals.

The Victorian texts are not uniformly that pointless or that bad. But not much is good. Definitions are clumsy, problems are contrived, natural connections and beautiful insights are overlooked. The texts do not reflect a mathematical culture.

It is not just the textbooks – teachers are poorly trained, and the curriculum is moribund, rife with silly, contrived applications; and everywhere there is pointless calculation. And calculators – the cane toads of education.

Is there still proof? Proof is the source of the power of mathematics, the reasoning and the understanding: it’s what holds the discipline together. But it is practically dead. The very little proof which remains is meaningless and ritualised: maths as Latin mass.

How did it get this bad? Primarily, it results from the failure to involve mathematicians, the people for whom mathematics is their life's blood. The simple fact is, many of those responsible for mathematics education do not know sufficient mathematics to do the job.

Things are unlikely to improve. The answer is to engage mathematicians, but they are scarce. University mathematics is being destroyed – by budget cutbacks and absurd funding models, and consequently by a perverting over-emphasis upon industry funding. The hiring of mathematics lecturers is not solely determined by quality of research or teaching: what matters at least as much is the ability to raise money, and to play the game.

The consequence is that many mathematics lecturers are simply unqualified to teach university mathematics. This is a remarkable statement, but there is ample evidence to support it. A perusal of many university lecture notes reveals fundamental misunderstandings of the mathematics, and the reasons to learn it. The clangers may not be on a par with squaring cows and horses, but they are not far off.

How can such lecturers continue in the system? They are saved by the huge decline in the standards of university mathematics, and a pass-them-at-all-costs mentality. Many subjects now consist of little more than spoon-fed formulas, starting with fill-in-the-blanks lecture notes and ending with fill-in-the-blanks exams. They demand little of either the students or the lecturers, and most everyone obliges.

And what of the education faculties? The lecturers generally have even less training in mathematics, and their interests definitely lie elsewhere. Perhaps they are too preoccupied with technology fetishism to face the elephant fact – that the majority of their student-teachers have little clue what mathematics is about.

The Federal Government is of course concerned about maths in school. The drafting of a National Mathematics Curriculum is now underway. But it can do little good, until someone begins teaching genuine mathematics to the teachers.

And a National Curriculum may well make things worse. The Framing Paper is now available: until February 28, feedback may be submitted at

http://www.ncb.org.au/our_work/preparing_for_2009.html. The Paper makes some good points, but there is clear cause for concern.

The Paper is naively trusting of the power of “technology” to repair the teaching of maths. It ignores the fact that calculators have

already been an unmitigated disaster. Higher level students must have arithmetic and trigonometric facts at their fingertips – thanks to calculators, they do not.

And now the presumption is to mimic the awful Victorian decision, and to impose high-powered CAS calculators. Students' algebraic skills will be weakened to the point of non-existence. And the fingernail presence of proof in the curriculum will be removed entirely.

The Paper also features a recurring buzzword: numeracy. It may please Minister Gillard, but it is in fact meaningless jargon. The heavy focus in the Paper is on what could be called functional numeracy – the arithmetic and statistics needed for everyday life. This is tragic.

People need to be functionally numerate, just as they need to be functionally literate. But any suggestion that all this “relevance” and “real-life connection” will induce anybody to learn to read or to add is delusional. What is needed is the mathematical equivalent of *Harry Potter*, and what is being offered is the calculation of interest rates. Dickens's mind-numbing schoolmaster Mr. Gradgrind would be delighted.

What do I want from a national curriculum? I want a dodecahedron in every classroom, and beautiful diagrams to ponder. I want students to know *why* there are infinitely many prime numbers, and for them to realise no one knows about twin-primes. I want them to know what the golden mean is, and *why* it is irrational, and why we care. I want pattern and play and beauty. And I want the times tables.

Is teaching any of the above useful? It is exactly as useful as teaching *Harry Potter* and Shakespeare. Judge as you will.

Mathematicians do mathematics because it is fun and it is beautiful. If the curriculum is not written in that spirit, and if teachers are not trained in that spirit, then we are doomed. We will have yet another generation devoted to gradgrinding students into hating mathematics.