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Mathematics and Statistics: Critical Skills for Australia's Future

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(officially launching the review report)

Welcome all today to the launch of the Australian mathematics and statistics review. I'm going to use the term "maths" by the way as a short phrase for "mathematics and statistics". And I start off by saying Australian maths research and teaching is in poor health. That's a rather distressing observation, but rather evident and that's what led to several of this nation's most eminent mathematicians coming together, analysing the issues, identifying the prime principal causes of that malaise and then in devising strategies that, if taken up by the nation, will rectify the problem. Personally I think the people in that team have done an excellent job, it's a great report and I congratulate you on it.

However I have to ask the question, does the health of Australian mathematics matter? Seems it does to you, do you think? But there is a whole pile of people out there, the average mum and dad in Australia, industry, the national economy, politicians. Does it actually matter to these people or is this just the grumblings of a relatively small and perhaps dwindling group of people who are indulging themselves in an esoteric intellectual excise, the health of which the rest of us can afford to ignore? That's an important issue.

Well there's no doubt about it, that mathematics is in and of itself a really beautiful and a really challenging intellectual exercise. But unfortunately in the world today that in itself is not a compelling argument to say that it matters. So I'd ask you to look at some of the stunning applications that have come directly from mathematics, without any intervening else in the way. I'm just going to pick up two rather mundane applications, because they happen to matter to me. Look at secure keys in cryptography, worth billions of dollars to the security and banking industry and that came out of prime number theory. It's a bit hard to find a more esoteric area of maths and prime number theory and yet here we have it leading directly to this incredibly important application. I also look at group theory and the fact that this is involved in so many high level engineering enterprises. This came from the quest of a young French guy, Evariste Galois[1], trying to develop a mathematical theory to solve quintics. Now maybe some of you do, but I must say I don't spend a lot of my nights awake worrying about how to solve quintics. I do however really value the many valuable applications of it. Now it's critical in nuclear engineering, so whether the nation either likes it or not, their very safety may well rely on the fact that Evariste Galois was trying to solve some quintics. Mathematics is a fascinating source of these kind of things.

I could talk at length, but also want point out, as Graham Farquhar has done so eloquently[2], that mathematics is the language of science. As you've heard him say, it is the language of which scientists formulate their hypotheses and actually the language in which they think. Mathematics today is the core of geology. It's obviously of importance to me and therefore

[1] Evariste Galois (1811–1832); see http://en.wikipedia.org/wiki/Evariste_Galois
[2] In the speech immediately preceding the present one

it is the core of a science that supports one of the largest industries in this nation. In fact two of the largest industries in this nation. You've heard Graham talking about the impact in biology. It used to be just the purview of physics and chemistry to say "we're the greatest because we can use maths", but it has now got to the point where it's expanded throughout the whole of sciences. I lead you to the example of Lord Robert May, a physicist who hails from University of Sydney, who took his mathematics into biology. Look at the incredible impact he has made there in terms of our understanding of this natural world, our understanding of biology and the applications that are flowing to the human race as a consequence of that. Absolutely stunning.

The fact of the matter is that in the modern world, in the modern science there is no area of science in which fluency in mathematics is not absolutely critical. Now the fact of the matter is that a major reason for a nation investing in science is that science creates a whole set of new options, options that a nation can exercise at times of change, for example changing environmental conditions, things like that, or in fact for driving change through commercial applications of science.

It produces for a nation a resilience and robustness against and for change. It's rather like the way evolution produces for life a set of options and choices to be able to survive through difficult times and to be able to develop new ways of going. Science provides that for a nation. Poor health in mathematics feeds through into each and every one of the sciences and that then feeds through into restricting the new options that a nation can generate for itself. That is happening today in Australia, make no mistake about it and the poor health in mathematics is feeding through the whole nation. It's affecting the options that we are developing for the future. It is the language of economics, development of high-level economic theory, almost inevitably feeds through some way into government policy. And so the development of high-level economic theory in the absence of absolute fluency in mathematics is a terrifying thought. If you haven't had any terrifying thoughts yet think on that one and what it's going to mean to this nation if we don't have that development in this country. It is the language of engineering and so mathematics is core to the many of the developments and deployment of our high-level technologies and I can speak at length.

Anyway the reality is the answer to my question, does the health of mathematics matter, the answer has to be a resounding and emphatic yes. It does matter to people out there. It does matter to mum and dad. It does matter to industries. It does matter to politicians. And it matters, even though those individuals may not recognise that mathematics is core to many of the capabilities, that then drive and underpin a healthy national economy. One of the things that has to be done is to get it out there, to get a recognition of this. It is vital that we do this. So in launching this review I want to commend it to you, I want to congratulate the team who has worked on it. But in that it actually matters, in that it actually makes a difference whether mathematics is healthy or not, I would urge you to, I would particularly urge the press because of the enormous influence in that estate, I would urge each of you to recognise that from here on this is a wonderful start, which you actually wish to change and improve the health of mathematics. From here on it's a long hard work road and I urge each of you to be intimately involved in doing whatever you can to improve the health of Australian mathematics and statistics research and teaching. Thank you and well done.