



## President's column

Nalini Joshi\*

*Imagine a world without mathematics: there would be no mobile phones, no internet shopping, no CDs or DVDs, no DNA analysis, no climate modelling, no science. Mathematics is critical to modern life and it will be essential for formulating a response to the current economic crisis.* These were the opening lines of my submission to *The Australian* on the dire state of mathematics education in Australia<sup>1</sup>. In addition to this article headed 'A disturbing set of numbers'<sup>2</sup>, I have had a letter published in the *Australian Financial Review*, was interviewed for an article in the *Sunday Telegraph* and interviewed on ABC radio three times on World Mathematics Day.

Of course, my message is well known and has been stated before. Australian Year 8 students' performance in the TIMMS study has been declining since 1995. This is probably responsible for the fact that fewer Australian students attempt advanced level mathematics subjects at high school each year and consequently, fewer students attempt to complete mathematics majors at Australian universities each year. The potential pool of skilled mathematics teachers consists of the pool of mathematics majors. And so fewer teachers are available to nurture and encourage our young students to study mathematics. This vicious cycle continues and deepens each year.

Other people and groups have reiterated the same message. The latest submission to the Government entitled 'A National Strategy for the Mathematical Sciences in Australia'<sup>4</sup> was prepared by Professor Hyam Rubinstein, who chairs the National Committee for Mathematical Sciences, with the support of AMSI and the backing of the Australian Council of Heads of Mathematical Sciences. I was pleased to see that journalists and radio interviewers have heard the message and thought it important and interesting enough to provide the space and air-time to allow it to be heard again.

One august and powerful body which has reiterated this message is the Productivity Commission. Its Research Report entitled 'Public Support for Science and Innovation'<sup>4</sup> contains the following statements:

In the case of science and mathematics teachers, shortages have instead been accommodated by using teachers without adequate skills in these areas. This may adversely affect student performance and engagement and decrease future university enrolments in the sciences. (p. XXIV)

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\*E-mail: [President@austms.org.au](mailto:President@austms.org.au)

<sup>1</sup>These lines were deleted in the published version by the sub-editor by reason of space limitations.

<sup>2</sup><http://www.theaustralian.news.com.au/story/0,,25069225-25192,00.html>

<sup>3</sup>[http://www.amsi.org.au/pdfs/National\\_Maths\\_Strategy.pdf](http://www.amsi.org.au/pdfs/National_Maths_Strategy.pdf)

<sup>4</sup>Released 27 March 2007 and available from <http://www.pc.gov.au/projects/study/science/docs/finalreport>.

In regard to teachers of science and mathematics, most jurisdictions have reported ongoing shortages and difficulties in recruitment. More recent analysis indicates that these problems continue. p. 249

According to DEST, there was a strong perception that Australia lacked sufficient suitably qualified secondary school science and mathematics teachers which had adverse impacts on student engagement in science, engineering and technology. Importantly, the lack of suitably qualified teachers in these areas limited the ability of the system to expand to increase the number of students studying mathematics and science in the senior years of high school and potential entrants to tertiary studies in science, mathematics and related courses. p. 721

It is clear from these excerpts that this issue has been brought time and time again to the attention of decision-makers in government. So my question is, what is the government waiting for?

I had a tiny glimpse of what more might be needed when I attended the Science Meets Parliament dinner, held at Parliament House in Canberra on 17 March 2009. I had the opportunity to buttonhole the Honorable Senator Kim Carr for five minutes in the mingling before dinner. I gave him the above message. Yes, he had heard it before, but there were many competing claims all stating that Australia would be in dire straits unless something was done for their area.

I moved on to a second message: that full-funding for research is essential in order to stop the erosion of overall funding to mathematics within the University system. The usual budget models adopted by Universities include a tax for 'strategic research initiatives'. For mathematics, this invariably eats into our allocation arising from our student numbers; the more students we teach, the more we get from our teaching allocation and the more tax is taken off the top. We get very little of this tax back because any claim we might make on a strategic research initiative is so cheap compared to those people who need wet labs (or telescopes) to conduct their research. If the government brought in full-funding for research then universities would not need to impose a tax in order to fund expensive research and mathematics would get the funding it is entitled to have to teach. Senator Carr heard this message also.

But my insight came when I repeated the same message to one of his departmental staff. She said she had heard the message before but she needed to convince Treasury. After all, we were saying that more funding was needed to do the same work; that is, people would do the same amount of research as before, but Treasury would need to cough up more funds for it. I was so flabbergasted for a moment that I lost the opportunity to make the logical response, that is, of course we would be more productive if more funds were available from our teaching allocation to actually allow us to hire more teaching and research staff. This would lead to lower student-staff ratios and more time to do research.

The fact that I had not heard this objection before leads me to wonder how many other illogical and political arguments are out there to counter the evidence we provide to government. As a collective group of mathematicians, we need to become more aware of these exercises in shadow-boxing that go on behind the

sciences. We need to be more agile and practiced at making appropriate on-the-spot responses to all such political manoeuvres. I am sorry to say that as a mathematician more used to logical deduction, I need a lot more practice!



Nalini Joshi holds a PhD and MA from Princeton University in Applied Mathematics and a BSc (Hons) from the University of Sydney. In 2002, she returned to the University of Sydney to take up the Chair of Applied Mathematics and became the first female mathematician to hold a Chair there. In 2008, she was elected a Fellow of the Australian Academy of Science. She is currently the Head of the School of Mathematics and Statistics. Her research focuses on longstanding problems concerning the asymptotic and analytic structure of solutions to non-linear integrable equations.