President's column

Peter Hall*

Different approaches to problem-fixing

Nepal Airlines operates just two jet aircraft, both of them Boeing 757s. They are essential to the airline's international services, which involve routes to cities as far from Nepal as Hong Kong and Dubai. So last September, when the flights of one of the 757s were repeatedly cancelled, or postponed, because of unfathomable electrical problems, the airline's management decided that serious measures were called for. Following local tradition, two goats were sacrificed to the Hindu sky god, Akash Bhairab, on the tarmac at Kathmandu, in front of the recalcitrant 757. The aircraft is now reported to be functioning well, carrying passengers reliably and safely.

The challenges that confront the mathematical sciences in Australia are at least as vexing as those that were faced by Nepal Airlines' perplexed engineers. In the last few years we have tried just about everything we can to draw these challenges to the attention of governments, bureaucracies, industry and other potential sources of support. Nevertheless, I'm sure we would all shrink from the Nepalese approach. When I mentioned to a colleague the Nepal Airlines solution, he wondered aloud who I had in mind to play the role of the goats.

We have certainly enjoyed successes this year, and they deserve to be celebrated. I'll say a little shortly about the successes. However, the predicament that we face is the result of more than a decade of a downwards spiral of university mathematics, and it is going to be tricky to claw our way back, even using the extra support we have gained.

The spiral is evident from data. For example, student numbers in mathematical sciences departments declined by 34% between 1989 and 2005[1], a period in which enrolments in Australian universities more than doubled. Staff numbers in mathematical sciences departments have fallen by at least a third during the last decade[2]. For those of us who work in universities, our experiences as lecturers, and as supervisors of graduate students, have made these trends painfully obvious. In particular, we know that in many areas of the mathematical sciences, employers can find attractive positions for all the good students we can train. But, in important respects, Australian schools are not producing the young men and women that universities need.

Of course, to a large extent the latter problem is due to another, interlinked, long-term spiral, connecting the supply of mathematically trained school teachers

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[1] Australian Council of Deans of Science, *Sustaining Science: University Science in the Twenty-First Century* (2007).

[2] Australian Academy of Science, *Mathematics and Statistics: Critical Skills for Australia's Future* (2006).

with the number of mathematically able high-school graduates. When I was a student there were essentially two jobs to which a university undergraduate with mathematics qualifications could aspire: becoming an actuary or a school teacher. Although other options existed, they did not have a high profile. Today, however, the employment horizon for mathematicians is vast. Jobs in many fields, for example in the banking, finance and insurance sectors, attract many mathematics graduates of whom some, in the past, would likely have become high-school teachers. There is now a 'recognised shortage of ... secondary school teachers in science and mathematics', and it is an established fact that these 'shortages have sometimes been accommodated by using teachers without adequate skills in these subjects'[3].

How we might break this nexus is one of the major challenges that we face. It needs partnership among state and federal governments to address the strategically debilitating skills shortage in mathematics. And it seems to require ingenious ventures by mathematical sciences departments in universities, to attract students who, in turn, could be attracted to careers as high-school teachers. No amount of slaughtering of helpless animals will help us.

One of the successes we have enjoyed in 2007 is an increase in government funding for mathematical sciences courses, including statistics, in Australian universities. However, to truly benefit from that development we must increase the number of students taking mathematics courses, and that is the point at which breaking the nexus becomes essential. Some of the increased number must go on to become high-school mathematics teachers, resisting the many attractions of positions in business and industry.

Another recent success is the government's announcement, in September, of a \$2 million CASR grant to help support AMSI's activities over the next three years[4]. The long-term future of AMSI still needs to be guaranteed, but at least now we have a breathing space in which to address this problem. Also in September, the Senate Employment, Workplace Relations and Education Committee issued a thoughtful report[5] into the quality of Australian school education. The report's third recommendation was 'that schools and school systems take particular measures to improve teacher professional development in mathematics'. This gives still more strength to the hands that we must use to break the nexus.

These successes have been made possible only through hard work, over a long period, to bring to the attention of others the challenges that face the mathematical sciences in Australia. We should give thanks particularly to Hyam Rubinstein, Chair of the National Committee for the Mathematical Sciences; Phil Broadbridge, AMSI Director; Garth Gaudry, ICE-EM Director; Jan Thomas, AMSI Executive Officer; Jim Lewis, Chair of the AMSI Board; and Barry Hughes, Executive Director of the Strategic Review of Mathematical Sciences Research in Australia, to name just a few.

[3]Australian Government Productivity Commission, *Public Support for Science and Innovation* (2007).
[4]For details, see http://www.amsi.org.au/pdfs/CASR2007.pdf.
[5]Senate Standing Committee on Employment, Workplace Relations and Education, *Quality of School Education* (2007).