

Introduction

The Reference Committee firmly shares the view that the state of the mathematical sciences and related quantitative disciplines in Australia has deteriorated to a dangerous level, and continues to deteriorate. Accordingly we decided to structure this Report around a small number of recommendations, some long term and others to address immediate problems.

In the last five years there have been many reviews analysing the mathematical sciences in Australia and elsewhere. See Appendix A for a list of eleven Australian sources, two major studies from the United States and reports from the United Kingdom and Ireland.

Australia has gone backwards over the last 20 years in terms of the quality and quantity of students completing Year 12 mathematics. This is despite considerable effort put into improving the situation, including Government funding. This deterioration hasn't been the case in every country.

This report does not attempt a comprehensive overview of the mathematical sciences, but

rather, on the basis of these sources, stakeholder consultations and material provided by individual universities, attempts a concise justification for our view expressed in the opening sentence.

All is not gloom. The sense of potential crisis, which was evident from the stakeholders and the Reference Committee itself, has created a willingness for constructive cooperative activity. Discussions have been remarkably free of internal 'tribal' bickering within or between the broad quantitative disciplines and there is a commitment to mutual self-help. The Government recognises the importance of supporting the mathematical sciences, most recently (13 October 2009) providing \$2m centred on an Australian Mathematical Sciences Institute (AMSI) project, Improving Mathematics Education in Schools, which began with the BlueScope Steel Illawarra Outreach Program encouraging and resourcing students of low socio-economic background. Obviously much more needs to be done and that requires the formulation of sound advice.

Recommendations

- 1. The Go8 should encourage dialogue between Faculties of Education and Mathematics Departments with a view to introducing a component in the primary training program giving mathematical confidence and resources to future teachers. This would be taught by the Mathematics Department or School.**

Comment: Much can be learned from the Universities of Newcastle and Wollongong including the need to choose appropriate lecturers. This needs to be recognised by the university as important work.

- 2. The Go8 should support the raising of mathematics and science awareness in the community, covering all years of high school. This includes extra-curricular resource provision**

Comment: There are initiatives in this area by CSIRO and RiAus, and the ABS. The universities can contribute by encouraging staff to participate in existing and new programs. It is essential that teachers, career advisers and parents become more aware of the importance of mathematics skills across a wide range of other disciplines.

- 3. Each Go8 vice-chancellor should review service teaching arrangements especially the internal funding model which drives them. Insight should be shared.**

Comment: In universities where Mathematics, Science and Engineering sit within the same “super faculty” arrangements appear to have been easier. There are other quantitative disciplines which are stakeholders. It is possible that some modification of the government funding formula should be sought. At present there is some incentive for attributing each course to the highest funded discipline involved.

- 4. The Go8, sharing expertise already gained, should develop a systematic structure of enabling programs to counter the drop in students entering with low mathematics experience.**

Comment: This has a strong social equity dimension and should include careful lobbying for government support. This recommendation is additional to addressing the problems of low mathematics experience and skills acquisition in schools, before students reach university.

- 5. The Go8 should encourage research networking within Australia, not confined to its own universities. One specific proposal is that AMSI should be invited to organise research programs of six months or a year on specific topics with international visitors. The Go8 by contributing \$10K each annually could, in sequence, second a program leader on sabbatical. Other costs could be sourced from research agencies and philanthropic organisations.**

Comment: The “equivalent” of AMSI in the United States or United Kingdom is funded to provide such research infrastructure. This proposal demonstrates pre-emptive self-help.

- 6. The Go8 should pay particular attention to Statistics, the ongoing consulting needs within the universities, the training of the next generation and the recovery of a strong research culture.**

Comment: It seems timely to review the structural deployment of statisticians within each university. There is likely to be strong high level cooperation with Go8 from CSIRO, ABS and employer groups for the purposes of graduate training.