The Federation of Australian Scientific and Technological Societies

Science and Technology for the Social, Environmental and Economic Benefit of Australia

(FASTS Policy - 8 June 1995)

1. EDUCATION

Science education is the foundation of effective understanding, dissemination and application of scientific knowledge in modern technological society. An understanding of science and of the technologies derived from it is also a cultural goal for society, as it broadens people's education.

A general science and mathematics education is important since it ensures that people have an understanding of scientific principles and methods, and an awareness of scientific and technological applications to everyday life. This in turn enables people to make informed judgements about the benefits of science and technology to society, and helps eliminate prejudices or misconceptions caused by ignorance.

In Australia today we need a high level of scientific and technological literacy in the parliaments, public sector management and boardrooms of the country. Such literacy is essential if we are to take advantage of scientific and technological innovation, enhance our standard of living, and compete successfully with other advanced nations.

It is important that science and mathematics education should be of the highest standard at each level in the educational sector: primary, secondary and tertiary. To ensure such a standard, it is vitally important that priority is given to the understanding of scientific principles, facts and methods. This should be complemented, but not replaced, by discussion about science, technology and innovation and their relevance to social issues.

Effective science education is essential for the training of a highly skilled workforce to meet the increasingly technological demands of employers in business and industry. Furthermore, higher levels of science education produce the next generation of scientists and engineers, on whom the nation will depend for major advances in research, development and innovation. We therefore need to provide incentives for the most able students to develop their knowledge and abilities to the highest level.

In order to achieve the above goals, excellence in the teaching, practice and research of science and mathematics must receive the rewards and recognition that it deserves. The professional societies (both discipline and teacher based) involved in science and mathematics education are committed to achieving excellence in all these roles.

1A. A NATIONAL SCIENCE AND MATHEMATICS CURRICULUM

An agreed national curriculum framework must be developed to maintain a high standard of
science and mathematics education. By raising the standard of science and mathematics education, a national curriculum framework would assist with equality of access to employment, workforce mobility, and the elimination of barriers to higher education. Unnecessary inconsistencies between States need to be eliminated at the same time as a diversity in approach and non-core content are encouraged. The development of a national curriculum framework can only be achieved by close collaboration between those who are actively involved in science and mathematics education at all levels, not merely by government-commissioned educators without reference to professional expertise in science and mathematics disciplines.

**Policy 1.1** FASTS strongly supports the concept of a national curriculum framework which would assist with the uniform development of high quality science and mathematics curricula within each State and enable mobility of students. However, FASTS finds defects in many aspects of the present Australian Science and Mathematics Statements and Profiles. These defects are particularly apparent at high school levels, although FASTS recognises the contribution made to increasing scientific awareness and content at primary levels. In particular, FASTS believes that the major objective should be the acquisition of scientific knowledge, which can then be followed by discussion about science issues once a proper knowledge base has been established.

*Action 1.1.1* FASTS will strongly support the revision of the Science and Mathematics Statements and Profiles in full and open consultation with both discipline and teacher based professional societies, including those within FASTS.

*Action 1.1.2* FASTS will encourage excellence and rigour at all levels as criteria for achievement in science and mathematics education.

**1B. TEACHER EDUCATION**

It is essential that teacher training, both initial and in-service, be of a high standard in specific disciplines so that teachers can impart their knowledge of subjects effectively to their students. Teachers should be allowed time, and be rewarded, for increasing their knowledge and teaching skills in science and mathematics, in order to encourage enthusiasm for these subjects in their students.

**Policy 1.2** Science and mathematics courses, particularly in secondary schools and especially in Years 11 and 12, should be taught only by qualified teachers who also have a high degree of proficiency in the particular discipline, typically a university major or higher degree in that discipline. There must be an adequate supply of teachers who are qualified in science and mathematics as well as in teaching and learning skills.

*Action 1.2.1* FASTS will lobby strongly for the implementation of the Speedy Report recommendations for teacher training and qualifications in mathematics and science.

*Action 1.2.2* FASTS will support and promote the introduction of continuing higher differential salary rates for all teachers who have appropriate higher level qualifications and expertise in their learning area.

*Action 1.2.3* FASTS will lobby for appropriate recognition of teachers who undertake additional accredited professional development.
Action 1.2.4 FASTS will support the provision of additional in-service and retraining schemes, particularly in association with higher education and public sector research institutions, to increase the level of teacher expertise in science and mathematics disciplines and in teaching and learning skills.

1C. EXPANDED SECONDARY AND UNDERGRADUATE STUDENT ENROLMENTS

There has been enormous growth in education in recent years through higher retention rates in Years 11 and 12, and through the massive expansion of the higher education sector. This growth has not always been accompanied by an appropriate increase in the allocation of resources, with the result that the quality of education has suffered.

Policy 1.3 Public funding of secondary and tertiary education institutions should be sufficient to accommodate the recent growth in student enrolments at both levels. In particular, there should be a range of courses available to meet the different goals of students retained in Years 11 and 12. The quality of education should not be compromised, and should be improved beyond current standards.

Action 1.3.1 FASTS will continue to press for improved infrastructure funding and facilities such as libraries, teaching laboratories etc., for example as recommended for higher education by the NBEET report on the Boston Consulting Group's findings and as recognised in the 1995 budget.

Action 1.3.2 FASTS will lobby for recognition of the true (higher) cost of higher education infrastructure in some science and mathematics disciplines by an increased allocation in the DEET formula EFTSU weighting as appropriate for each subject.

Action 1.3.3 FASTS will support the application of (reduced) student/staff ratios appropriate to the needs of science and mathematics disciplines, particularly those involving an experimental component.

Policy 1.4 There should be an increased participation of disadvantaged and/or under-represented groups in science and mathematics education.

Action 1.4.1 FASTS will publicly support initiatives aimed at both increasing public awareness of science and mathematics, and at increasing the participation of disadvantaged and/or under-represented groups, such as women in the physical sciences.

Action 1.4.2 FASTS will support the development of curricula which cater to the needs of a culturally diverse society while retaining a common content.

1D. POSTGRADUATE ENROLMENTS

To be competitive, Australia needs to develop its scientific and technological base. This will require a supply of highly trained researchers and teachers in science and mathematics. There is already a short fall in the private sector, particularly at middle management levels where expertise in these disciplines is currently greatly under-represented. As the private sector is increasingly being pressured to lift its performance in R&D, Australia may therefore face a shortage of appropriately trained people towards the end of this century, a shortage which may also affect the higher education and public research sector. Consequently, the training of postgraduate students in
science and mathematics should be monitored closely to ensure that this demand is met, particularly in view of the long lead time required to provide such highly trained people.

Postgraduate science and mathematics education provides individuals with valuable problem-solving skills and the ability to make informed decisions. These skills are important in both private and public sector management, which these days require a high level of scientific and technological literacy. Individuals with these skills often choose to perform roles, such as teaching or management, which are valuable to modern technological society but which lie outside their specific discipline areas. It is therefore important to ensure that the supply of highly skilled postgraduates in science and mathematics is not simply limited to the number of positions available strictly within these disciplines.

**Policy 1.5** An adequate supply of science-trained research workers, technologists and teachers is essential for national economic and cultural wellbeing.

*Action 1.5.1* FASTS will support the provision of at least as many postgraduate scholarships as are required for all First Class honours applicants at current levels.

*Action 1.5.2* FASTS will lobby for an increase in the postgraduate stipend for science and mathematics disciplines in order to indicate the value of scientific and technological education at this level, and to ensure that its value is maintained in real terms.

*Action 1.5.3* FASTS will support the provision of incentives for students wishing to relocate in order to broaden their experience, or to undertake specific courses or postgraduate study at the most appropriate institution in their field.

**1E. CONTINUING EDUCATION**

**Policy 1.6** In a time of rapid technological change, it is vital that the workforce undertake appropriate professional development in order to increase its knowledge and skill base.

*Action 1.6.1* FASTS will support the accessibility of continuing education opportunities in science and mathematics as an essential mechanism for retraining.

**1F. COMPETENCE-BASED STANDARDS AND ACCREDITATION**

Professional standards of training and expertise are recognised as being essential for some technology- and engineering-based disciplines. However, the multidisciplinary and serendipitous nature of much scientific research means that prescriptive qualifications for employment in science and mathematics must be more flexible in their application. Nevertheless, FASTS believes that it is important to maintain high standards of scientific excellence through such mechanisms as peer review and accreditation of degrees.

**Policy 1.7** Where there is a need for accreditation of degrees or individual qualifications, the most appropriate body to oversee this function is the relevant professional society for that discipline.

*Action 1.7.1* FASTS will encourage its member societies to become more involved in the accreditation process.