



ENGINEERS
AUSTRALIA

Future Workforce Position Statement

2016

Engineers and Australia's future challenges

High terms of trade from the resources boom have been the principal driver of improved living standards during the past decade and a half. That period is over and we now see slower growth, slowing improvements in living standards, low productivity, slower employment growth and shortfalls in state revenue.

In the decades ahead Australia faces the challenges of an aging populace and providing for a population expected to expand by a quarter to over 30 million by 2030. There is broad political agreement that transforming the Australian economy through innovation to meet these challenges will be essential.

Invention and creativity result in new ideas. Innovation is the process through which new ideas are successfully exploited to create economic, social and environmental value. A growing body of research has demonstrated that innovation and competitiveness are driven by workers with technical expertise in engineering, science and mathematics.

Over half of private sector research and development expenditure is on engineering work.

Engineers are, and will continue to be, critical to effect changes to existing products and services (product innovation), how products and services are created and delivered (process innovation), changes to the context in which products and services are introduced (position innovation) and changes in underlying models and technologies (paradigm innovation).

Engineering already underpins virtually every aspect of our modern lives and is embodied in practically every good or service used by Australians. Unfortunately, this contribution is not fully understood and valued in government policy. Australia's innovation policy and plans for future economic growth must correct this and ensure that there are enough competent practicing engineers to achieve our innovation ambitions.





Recommendations

Governments at all levels should:

- Use innovation policies to recognise and highlight the critical role of engineers in turning ideas into products and services with social, economic and environmental value.
- Implement policies and programs to ensure sufficient competent, practising engineers to realise opportunities created by the inventiveness of Australians.

Declining educational foundations

Building the technical workforce of the future is undermined by entrenched trends in school studies away from vital enabling subjects. Less than 10% of year 12 students study advanced maths, less than 20% study intermediate maths, about 14% study physics and under 18% study chemistry. These figures are serious constraints on Australia's ability to build its engineering and scientific capacities.

There are persistent shortages of teachers with specialist knowledge in these subjects and many students finish high school without the benefit of their instruction. This is unfair to both students and teachers and is inconsistent with achieving our national aspirations.

Gender imbalance adds to these problems. At present, the majority of year 12 students are young women, but their participation in maths and science subjects is especially low. Just 6.5% of young

women study year 12 physics and advanced maths. This reflects unfortunate and unacceptable attitudinal legacies and the failure of governments to adequately invest in teachers and the teaching of science and maths in Australia's schools.

Recommendations

Governments at all levels should implement policies and programs to encourage:

- More students to study advanced and intermediate maths and science to year 12 so as to build the necessary technical educational foundation for Australia's innovation revolution.
- The development of more specialist teachers of maths and science.
- More young women to participate in school-level advanced and intermediate maths and science.

Developing the profession

Engineers undertake professional formation following the completion of essential courses. It typically takes about nine years to complete education and professional formation and so qualify to be fully competent, practicing engineers. Registration on the voluntary Engineers Australia National Engineering Register (NER) signifies the attainment of that status.

The time and social cost to train engineers and their role in advancing Australia's technological progress underpin the importance of retaining them in the profession.

At present about 60% of qualified engineers are engaged in occupations typical of technical engineering careers. The balance contributes to Australia's general skilled workforce. Far fewer women stay in engineering work than men, and far fewer migrant engineers stay in engineering jobs compared with Australian-born engineers.

The trend towards short term employment is detrimental to building national engineering capacity and the capacity to bring new ideas to market. It limits engineering careers, particularly for women, and creates circumstances that favour the old, tried and tested solutions in preference to innovative ones because it is quicker and less risky.

Recommendations

Governments at all levels should:

- Align policies and programs that foster innovation with the educational requirements and professional development necessary to become an engineer.
- Recognise the costs to society and innovation policy associated with low retention of qualified engineers in engineering work, and find ways to improve retention, especially for women and migrants.
- Recognise the importance of continual technological progress and commit to long term and stable innovation policies and programs.