



Australian Government

OFFICE OF THE CHIEF SCIENTIST

THE NATIONAL ADVISER FOR MATHEMATICS AND SCIENCE EDUCATION AND INDUSTRY

Ensuring the right skills for our future

MARCH 2014

The world is preparing for a future that is increasingly dependent on science, technology, engineering and mathematics (STEM). It is important that we build our capacity in STEM to position Australia to advantage.

To compete and contribute globally we must strengthen workforce capability and increase levels of numeracy and science literacy across the community. To achieve this it is imperative that we improve STEM education at all levels.

To help meet this challenge, the Office of the Chief Scientist has appointed Dr Roslyn Prinsley as National Adviser for Mathematics and Science Education and Industry.

Background

STEM skills are central to Australia's future productivity and prosperity. In other countries such as the UK, USA and Canada, efforts are being made to boost student participation in STEM subjects. The Chief Scientist has called for Australia to follow suit, or be left behind.¹



Dr Roslyn Prinsley,
National Adviser for
Mathematics and Science
Education and Industry,
Office of the Chief Scientist

The National Adviser for Mathematics and Science Education and Industry, advises the Chief Scientist and promotes the role of STEM across education and industry.

Dr Prinsley is working in partnership with the education, industry, research and government sectors through consultation, survey, analysis and advice, to develop a strategic framework for Australia's STEM education to build:

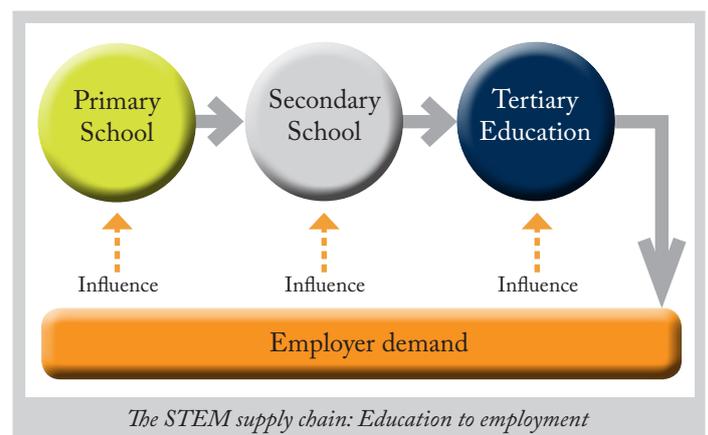
- Higher quality inspirational teaching of STEM across all levels of education
- Collaborative strategies matching the supply of STEM skillsets with the needs of employers
- A high level and understanding of science literacy and numeracy in the community
- Better coordination and communication of STEM education across education, industry and government.

Goals

Our challenge is to develop and utilise fully our potential capacity in STEM to secure social, cultural and economic prosperity for all Australians. Improving STEM teaching and learning lies at the heart of this challenge.

Working together, we must take practical steps to achieve:

- **Inspiring teachers** using evidence-based teaching practices, supported by high quality accessible teaching resources
- **More students** participating and engaged in STEM in primary, secondary and higher education
- **STEM graduates meeting industry needs**
- A systemic **culture of innovation** and entrepreneurship
- Greater **workforce demand** for STEM skills
- Strong **community awareness** of the value and benefits of STEM
- Community capability in **STEM literacy and numeracy**
- **Top world rankings** in innovation and STEM education



Activities

The Office of the Chief Scientist has initiated a range of activities that will help to: (1) define the factors that contribute to inadequate science and mathematics skills in the community and in the workforce, (2) create targets to improve scientific literacy and numeracy in the workforce and in the wider population, and (3) start working towards meeting these targets.

Education

Education round tables

The Office of the Chief Scientist is convening a series of education round tables to consult with a broad range of stakeholders across primary, secondary and tertiary education and industry to report on the state of STEM education and to advise on problems and opportunities.

Australia's Future: Science, Technology, Engineering, Mathematics

The Office of the Chief Scientist and the Australian Science Teachers Association (ASTA) have brought together the organisers that manage national STEM competitions and programs (e.g. Olympiads, CSIRO Education and the National Youth Science Forum) to communicate the achievements of successful participants to all students in Australia. These activities aim to inspire increased interest in studying STEM subjects, provide inspiring role models, and identify pathways to success.

Primary school science teaching – What works? What is needed?

The Office of the Chief Scientist and ASTA are surveying primary school teachers and principals to understand better their attitudes towards the teaching of science, levels of science knowledge (from pre-service training and professional development), their views on the science curriculum, their requirements for advice, assistance and resources, and the best ways to provide these. The findings will contribute to our understanding of current science teaching practices in Australia's primary schools, and the resources that teachers need to improve the quality of science teaching and learning.

University science staffing

The Office of the Chief Scientist and the Australian Council of Deans of Science have commissioned an analysis of university science staffing data from 2002 to 2012.

STEM workforce supply and demand

Through a series of activities and studies the Office of the Chief Scientist is investigating the demand and role for STEM skills in the workplace.

Characterising the STEM workforce

The Office of the Chief Scientist has commissioned the Australian Bureau of Statistics to characterise Australia's STEM workforce, including: A comprehensive profile of the STEM-qualified population; the occupations for which STEM skills are most common; the employment pathways of STEM PhD graduates; the labour force characteristics of the STEM-qualified population; and the relationship between research and development expenditure, innovation, productivity and STEM employment across all industries.

Survey of employers

The Office of the Chief Scientist is surveying employers to better understand employer experiences and attitudes to employing STEM graduates. The survey is identifying employer needs for STEM skills over the short and long terms, and providing insights into the extent of engagement between industry and higher education.

Industry Working Group

The Industry Working Group is advising the Chief Scientist on mechanisms to improve the quantity and preparedness of STEM graduates to meet Australia's future workforce needs. Members include the Australian Industry Group, the Business Council of Australia, the Australian Chamber of Commerce and Industry, Universities Australia, Australian Collaborative Education Network, and the Australian Technology Network of Universities. The group will recommend a road map for effective and efficient collaboration between educational institutions and industry to improve the quantity and preparedness of graduates.

Science literacy and numeracy

Numeracy in the workforce: making sure we teach the right maths skills in schools

The Office of the Chief Scientist has brought together the Australian Association of Mathematics Teachers with the Australian Industry Group to assess the numeracy and problem solving skills currently used in 21st century workplaces. Mathematics teachers across Australia are visiting workplaces to interview employers and employees, and 'shadow' workers to identify required numerical skills. This work will result in recommendations and resources for improving the teaching of numeracy and problem solving skills to meet workplace needs.

STEM Education and Industry Advisory Group

The Office of the Chief Scientist has established a STEM Industry and Education Advisory Group chaired by the Chief Scientist. The members offer a range of perspectives from academia, education, industry and research. They are working with the Office of the Chief Scientist to develop a clear strategic framework for building a broad, high quality STEM base in the workforce and community.

STEM Industry and Education Advisory Group

Professor Ian Chubb AC (Chair)
Dr Alan Finkel AM, Academy of Technology, Sciences and Engineering
Dr Terry Lyons, University of New England
Dr Brendan Nelson, Australian War Memorial
Alan Noble, Google
Dr Roslyn Prinsley, Office of the Chief Scientist
Robert Randall, ACARA
Dr Deborah Rathjen, Bionomics
Professor Brian Schmidt AC, Australian National University
Anita Trenwith, Salisbury School, Adelaide

Conclusion

Improving STEM education, STEM skills in the workplace, and STEM literacy in the community requires a coordinated approach. The Office of the Chief Scientist has established a strategic framework for STEM education and the workforce to monitor the success of these activities. These activities, together with the wider work of the Office of the Chief Scientist, will provide a quality evidence base upon which to build policies and support the development of a STEM education strategy.

¹ Office of the Chief Scientist (2012). *Mathematics, Engineering and Science in the National Interest*.