

ATSE Responses to questions on notice from Senator McKenzie

1. *Should mathematics be made a compulsory subject for all senior high school students, and be counted towards all year 12 final scores?*

ATSE response

ATSE supports the need for more maths and science to be undertaken in senior high school years. However, a “one size fits all” approach will be problematic and thus careful policy consideration is needed as to how, or whether, to implement compulsory mathematics or science subject at year 12. One approach may be to influence subject choice at year 12 by the introduction of maths (and science) prerequisite requirements for a range of university programs including those requiring advanced STEM knowledge.

2. *I'd like to ask you about your relationship with universities.*

- a. *Have you expressed to university deans your concern about the ability of primary school teachers to teach mathematics? In what forum? What was their response?*
- b. *Have you considered how you can assist your members to build links with education faculties to ensure that first year students know what subjects they need to take to become maths teachers? [AMSI, Submission 5, p. 12]*

ATSE response: No comment as this question is directed at ASMI.

3. *The government recently created the Office of the Chief Australian Scientist. Do you believe that this has assisted in promoting the status of science and mathematics in Australia?*

ATSE response:

ATSE strongly supports the continuing role of the Chief Scientist in Australia. The Office of the Chief Scientist plays a vital role in providing high-level independent advice to the Prime Minister and other Ministers on matters relating to science, technology and innovation. This is important as it is the application of science, technology and innovation that enables knowledge creation to be converted to end use application, creating economic growth, social wellbeing and environmental sustainability. The Chief Scientist also serves as a “champion” of Australian science, research and evidence-based decision making. This also involves communicating science to the broader public. Having the position now as a full time position strengthens this role and is appropriate for an advanced nation such as Australia.

ATSE also supports the role of the Chief Scientist as an advocate for Australian science internationally as well as facilitating national thinking on science across the states and territories through the Forum of Australian Chief Scientists.

It is through independent analysis and advice on key science issues that the Chief Scientist can provide authoritative advice and considered reports to assist policy and decision makers to better harness the potential that science and technology and innovation offer Australia's productivity and prosperity. For example, recent reports such as *The Health of Australian Science – May 2012* (a comprehensive overview of Australia's science system, outlining our strengths and vulnerabilities) and *Mathematics, Engineering & Science in the National Interest – May 2012* have been invaluable in focussing discussion and policy debate on how Australia can best realise its investments in science, technology and innovation.

4. The STELR program run by ATSE in schools looks like a great initiative. Can you explain how this program is funded? Is demand for the program high? Do you run the program in rural and remote areas? [*Submission 11, p. 3*].

ATSE response

The STELR program today is run in over 330 schools around Australia including those in remote and rural locations and has provided subsidies to disadvantaged schools to ensure access and equity.

The demand continues to exceed ATSE's financial capacity to supply STELR to schools.

The STELR Project has been funded through a combination of state and federal government grants, corporate sponsorship, university sponsorship, grants from philanthropic organisations and private donations. In addition it is also funded via co-payments from the participating schools as part of ATSE's cost recovery model to ensure ongoing sustainability of the program. As background:

The STELR proof-of-concept program (2008) was made possible through the support of:

- Victorian Department of Education and Early Childhood Development
- Australian Academy of Technological Sciences and Engineering (ATSE)
- Australian Academy of Science (AAS)
- Individual Fellows of ATSE

The STELR Project pilot program (2009) was made possible through the generous support of:

- Queensland Department of Education, Training and the Arts
- South Australian Department of Education and Children's Services
- Tasmanian Department of Education
- Victorian Department of Education and Early Childhood Development,
- Victorian Department of Innovation, Industry and Regional Development
- Victorian Catholic Education Office
- Western Australian Department of Education & Training
- Hydro Tasmania
- Rio Tinto
- Aurora Energy
- Roaring 40s
- Transend Networks
- Alan and Elizabeth Finkel Foundation

The ATSE STELR Stage One Project (2010) was made possible through the principal support of the Australian Government, with substantial sponsorship provided by:

- Orica Pty Ltd
- The Australian Power Institute
- Rio Tinto

The STELR Project (2011) was made possible through the support of:

- Orica Pty Ltd
- The Australian Power Institute
- Rio Tinto

The STELR Project (2012) was supported by:

- Orica Pty Ltd
- The Australian Power Institute
- Xstrata Coal
- The University of South Australia

- The University of Queensland
- The South Australian Department of Education and Children's Services
- The Australian Capital Territory Department of Education and Training
- COSMOS Magazine

The STELR Project (2013) has been made possible through the support of:

- | | |
|-------------------------------------|------------------------|
| • Orica Pty Ltd | • BHP Billiton |
| • The Australian Power Institute | • Inpex |
| • The University of Queensland | • Incitec Pivot |
| • The University of South Australia | • The Kirby Foundation |
| • The University of New England | • The Myer foundation |
| • Deakin University | • COSMOS Magazine |
| • The University of Wollongong | |

Funding from the Kirby Foundation and Myer Foundation is specifically to provide subsidies so that remote and regional schools can co purchase STELR kits. These funds have been used for schools such as Tennant Creek High School to buy equipment and send teachers to regional centres for professional learning workshops.

Many corporate sponsors have assisted remote areas schools with their funding, for example BHP Billiton covered all costs for Cloncurry State School, and Xstrata fully subsidized schools in Miles, Wandoan and Taroom.

ATSE itself has sponsored a number of remote and indigenous schools including Tagai College on Thursday Island.

Support is available for teachers in remote areas via the internet and phone and visits from mentors when this is possible.

5. *I understand from your submission that your STELR program is held out by 13 universities as an example of high quality science teaching. Is this the result of your liaising with universities? [ATSE, Submission 11, p. 3].*

ATSE response:

Yes. ATSE has engaged with the University Education sector to promote the STELR program. ATSE has formal arrangements with 13 universities to utilise STELR as part of their Teacher Education training. This is in addition to universities providing sponsorship to ATSE for STELR.

Engagement of eth universities occurred principally University education lecturers approaching ATSE to use STELR as a part of their pre-service programs following a presentation by Professor Russell Tytler at a conference of the Australian Science Education Research Association (ASERA) in 2010. Professor Russell Tytler is the chairman of the STELR Steering Committee. Other lecturers attended STELR workshops at the Conference of Australian Science Teachers Associations (CONASTA). One lecturer was previously a teacher at a school using the STELR materials and saw how it could be used in pre-service teacher education.

Further, a consortium of eight universities, led by Southern Cross University, has partnered with ATSE to bid for a priority grant to the Australian Maths and Science Partnerships Program. If successful, this bid will see universities providing cutting edge science and technology content and the latest pedagogical theory to develop new science and mathematics modules for STELR that support the implementation of the Australian Curriculum. The modules will use inquiry-based science activities and involve extensive professional learning for teachers based on eth STELR model and approach.

Finally, ATSE's Education Forum works to shape the future of education in Australia – driving innovation and creativity in the education of engineering and technological sciences. It draws on the expertise of more than 100 ATSE Fellows and other experts from the Science, Technology, Engineering and Education faculties of Australian Universities. This network is also used to promote the involvement of education specialist and academics to ensure STELR's pedagogy and curriculum remain at world best practice.