

### **Do these proposals adequately respond to the Chief Scientist’s recommendations – both now and over the longer term?**

The proposals present a range of responses to the Chief Scientist’s recommendations. However, APPA notes that neither the Chief Scientist’s recommendations nor the Consultation Paper mention the role of school leaders and principals as the key stakeholder and driver of school improvement.

The Consultation Paper presents something of a ‘silo’ approach to improving the teaching of STEM and there is little that addresses the particular issues found in primary schools. The ‘review of the Graduate level of the Australian Professional Standards for Teachers’, for example, flows from the fact that ‘some teachers without a background knowledge in STEM are teaching these subjects’. In fact, this is the case with the vast majority of primary teachers who have not majored, or hold an undergraduate degree, in a STEM area. APPA would recommend that all Initial Teacher Education primary teaching courses have strong components across all areas of the curriculum, including STEM subjects.

NAPLAN data provides a ‘point in time’ assessment of a limited range of mathematics skills and knowledge. While the paper notes that the Office of the Chief Scientist will use this data to determine successful approaches to teaching maths and numeracy it is important to recognise that NAPLAN testing is not an inquiry-based assessment exercise. APPA would encourage a wider ‘selection process’ to identifying primary schools that are implementing successful numeracy programs.

APPA endorses the notion of a national strategy that builds the STEM capacity of all teachers in primary school and thereby contributes to the vision of Australian as a Science Nation.

### **Do you consider there are any areas that require more urgent action? Have we missed anything?**

The proposals outlined in the Government’s *Vision for a Science Nation* Consultation Paper, and also in the Chief Scientist’s *STEM: Australia’s Future*, do not include four essential aspects for improving the teaching of STEM in primary schools. These are:

1. The role and importance of school leadership in building the capacity of teachers to teach STEM subjects. This firstly requires that principals have more than simply leadership expertise. Principals need knowledge about STEM, an understanding of the effective pedagogy required to teach STEM successfully and STEM’s importance to our nation so that they are able to lead school-wide improvement (refer APPA’s *Principals as Literacy Leaders* project).

2. Most, if not all, Initial Teacher Education courses do not, at present, give enough focus and time to developing the in-depth skills and knowledge required to teach STEM subjects in the way outlined i.e. inquiry based learning, teaching STEM as it is practised and 'in ways that engage students and encourage curiosity and reflection, and link classroom topics to the real world'. (The Chief Scientist's recommendation that 'active scientists, technologists, engineers and mathematicians are involved in the delivery of content in pre-service STEM teacher education courses at university' is entirely relevant to primary teaching.)
3. The provision of adequate resourcing, including personnel, that ensures the delivery of STEM subjects is of a high level. A particular problem in primary schools is that there is not the administrative or teacher assistant support for activity based and resource dependent areas of the curriculum.
4. The availability of STEM focused and in-depth professional learning is essential to building the STEM capacity of current primary teachers. Such learning should be available in a variety of contexts including, for example, 'STEM Coach in the Primary School' summer programs, online STEM Courses or financially supported postgrad STEM studies. (The reality of a specialist STEM teacher in every primary school is a long way off.)

#### **Which of these proposals will have the greatest impact on Australia's STEM performance?**

APPA believes that there is the foundation for greatest long-term impact on Australia's STEM performance when primary teachers have the necessary depth of content knowledge and pedagogical skills required to deliver the Australian Curriculum. Equally importantly, this must be supported by strong leadership capacity that supports effective and knowledgeable teaching, and the resourcing levels that allow for innovative and active lessons.

Other proposals that offer greatest impact include connecting schools with STEM professionals though, in relation to Australia's 7000+ primary schools, mandating publicly funded research agencies to participate in school engagement programs may present difficulties at a practical level. The suggested business database is supported.

#### **Which of these proposals will enable you and your organisation to contribute to Australia's STEM performance?**

- APPA is strongly supportive of summer schools for STEM subjects and would readily support any proposal focussed upon, or inclusive of, primary teachers and/or primary school leaders.
- APPA is supportive of Mathematics by Inquiry projects that include 'school leadership' components and is investigating tendering for a project under this initiative.
- APPA has engaged with a company that provides Coding / STEM programs that are integrated with the school's curriculum and specific to the school's context. Critically, it includes building classroom teacher capacity to deliver STEM-based learning programs.