ATSE SUBMISSION ON THE DRAFT NATIONAL TEACHER WORKFORCE ACTION PLAN

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ATSE

ATSE Australian Academy of
Technological Sciences
& Engineering

The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of independent, non-political experts helping Australians understand and use technology to solve complex problems. Bringing together Australia's leading thinkers in applied science, technology, and engineering, ATSE provides impartial, practical, and evidence-based advice on how to achieve sustainable solutions and advance prosperity.

ATSE welcomes the opportunity to respond to the draft national teacher workforce plan. ATSE recently released the *Our STEM Skilled Future: An Education Roadmap for an Innovative Workforce* report which examined how to improve STEM education and lifelong learning to help Australia reach a technology-powered, human-driven future (ATSE 2022). Based on this work, ATSE makes the following recommendations to improve the teaching workforce, particularly in STEM education:

Recommendations

Recommendation 1: A broad National Skills Taxonomy be established to enable comprehensive and strategic communication and planning for skills needs and pathways among industry, governments, educators, and the greater workforce.

Recommendation 2: State and Territory Government education departments employ sufficient teacher assistants in primary and secondary education to alleviate teacher time pressure and support teachers' continual learning and development.

Recommendation 3: A centralised resource be established providing digital self-serve STEM education resources to teachers, quality assessed against the recommended National Skills Taxonomy.

Recommendation 4: Develop and invest in a targeted paid internship program for undergraduate tertiary mathematics and computer science students, to expose them to regional, rural, and remote teaching career options that they may not have otherwise considered.

Recommendation 5: Establish a Regional, Rural and Remote Mathematics Community of Practice, and consider the development of similar communities focused on other critical areas of STEM teaching.

Recommendation 6: Include as part of the National Teacher Workforce Action Plan a long-term strategy to recruit and retain in-field STEM teachers.

Recommendation 7: Government education departments invest in programs to improve and provide culturally appropriate and engaging delivery of STEM education for Aboriginal and Torres Strait Islander students, particularly acknowledging Traditional knowledge, and including teaching 'in language'. These should be developed in consultation with local Aboriginal and Torres Strait Islander communities.

A national skills framework for education and industry

Developing a framework to recognise prior skills and expertise, as proposed in the Draft National Teacher Workforce Action Plan, will make mid-career transitions into teaching easier. However, a targeted skills framework will only benefit those individuals who are already taking active steps to join the teaching profession. A broader skills framework, that encompasses both education providers and industry, and considers alignment with global markets, may help individuals with skills compatible with teaching to identify the skills similarity. This framework could combine and expand on previous attempts to classify skills, such as the National Skills Classification, Occupation Profiles and Jobs and Education Data Initiative.

Recommendation 1: A broad National Skills Taxonomy be established to enable comprehensive and strategic communication and planning for skills needs and pathways among industry, governments, educators, and the greater workforce.

Alleviating time pressures via teaching assistants

Australian teachers have highlighted recruiting additional support staff to reduce administrative loads as their number one priority (OECD 2018). The draft action plan recognises the importance of utilising teaching assistants effectively but provides no provision for additional teaching assistants to support teachers. Education peak bodies should work with educators to undertake job role profiling to separate teaching activities from administrative activities, and schools should be funded to recruit teacher assistants to both

relieve administrative burden from, and provide support to, educators, enabling the maximisation of time to teach. This would provide educators with more capacity to re-skill and up-skill. This additional support may also encourage career changers from STEM fields to consider entering the teaching profession.

Recommendation 2: State and Territory Government education departments employ sufficient teacher assistants in primary and secondary education to alleviate teacher time pressure and support teachers' continual learning and development.

Resources to support STEM teachers

With 76% of Australian teachers describing their workload as unmanageable (Heffernan et al. 2019), freeing up teachers' time to focus on teaching and collaboration is critical to improving the teaching workforce. Previous fragmented initiatives to build digital resource repositories (e.g., the Australian Maths Trust digital teacher resources), should be connected and expanded into a central self-serve STEM teaching and careers resource repository. This will enable teachers, particularly those teaching out-of-field, to be supported by quality resources to supplement their STEM and pedagogical knowledge and skills. Additionally, including career information will allow students to access the resource to find out more about STEM careers and pathways, allowing for accurate and up-to-date career advice. To ensure time-poor teachers can find these resources, such a resource repository should be integrated into established systems.

Recommendation 3: A centralised resource be established providing digital self-serve STEM education resources to teachers, quality assessed against the recommended National Skills Taxonomy.

Improving STEM teacher quantity and quality in regional, rural, and remote schools

Students at regional, rural, and remote schools do not have access to the same resources, opportunities, infrastructure, and teaching quality as their metropolitan peers. This is reflected in national statistics, where 10.7% of remote students and 35% of very remote students, scored below the minimum standard in mathematics (Australian Mathematical Sciences Institute, 2020). Often these schools have a single specialist maths teacher, or mathematics is taught by an out-of-field teacher, with less than a quarter of year seven to ten students having an in-field mathematics teacher, with remoteness being a key determining factor (Australian Mathematical Sciences Institute, 2018; Shah et al., 2020). The few teachers available are backed by insufficient infrastructure and equipment that falls well below the standard provided to city-based teachers.

A paid internship program, which places undergraduate mathematics and computer science students in regional schools, may help to expose them to a teaching career that they may not have considered. This program could be used to both encourage metropolitan students to consider regional teaching and may help to retain regional students in their local communities. This would be of most benefit in Aboriginal and Torres Strait Islander communities where connection to country can benefit student learning. To maximise retention of student teachers through this program, participants of this internship program will need to be supported by infrastructure and resources (such as reliable internet connection) comparable to those experienced by teachers training in metropolitan areas.

Recommendation 4: Develop and invest in a targeted paid internship program for undergraduate tertiary mathematics and computer science students, to expose them to regional, rural, and remote teaching career options that they may not have otherwise considered.

While such a scheme will be beneficial in the medium-to-long term, improvements in mathematics teaching in regional, rural, and remote areas is needed urgently. Forming a community of practice between educators will enable connection between geographically isolated teachers, enabling the sharing and identification of the most effective strategies to improve pedagogy in mathematics and provide additional opportunities for regional, rural, and remote students to engage with mathematics (and STEM more generally). This community-led initiative can provide feedback to governments, enabling the development of short, medium, and long-term solutions to current and future issues in similar STEM fields.

Recommendation 5: Establish a Regional, Rural, and Remote Mathematics Community of Practice, and consider the development of similar communities focused on other critical areas of STEM teaching.

In-Field Teaching

Teacher shortages in STEM contribute to school students' engagement, enrolment, and achievement in STEM, with significant flow-on effects to STEM careers and workforce. In mathematics – foundational for many STEM tertiary courses and careers – 38% of mathematics teachers nationally are out-of-field (Weldon, 2016), and 45% of secondary school principals report that maths and science classes at their school are being taught by out-of-field teachers (Wienk, 2020). Teaching 'out-of-field' should be minimised, with long-term planning to boost the supply for qualified STEM teachers. The National Teacher Workforce Action Plan must consider how to increase the supply of qualified STEM teachers over time, including to regional, rural, and remote schools. It is clear that radical change is needed. Strategies such as financial incentives for in-field STEM teachers should be considered as part of this strategy.

Recommendation 6: Include as part of the National Teacher Workforce Action Plan a long-term strategy to recruit and retain in-field STEM teachers.

Enriching STEM education with Traditional Knowledge and Languages
Traditional Owners and Traditional Knowledge can help to improve the way in which STEM is learned and taught. A model of education that places greater emphasis on traditional ways of doing and learning would greatly benefit both Aboriginal and Torres Strait Islander students and their peers. Furthermore, engaging in learning in traditional languages promotes inclusion and removes barriers to learning for students for whom English is secondary language. Examples of integrated learning that combine STEM with culturally appropriate, on-country and in-language, learning have been nationally recognised as paragons of STEM education (e.g. the Marble Bar Primary School's STEM program that won a 2022 Prime Minister's Price for Science). Programs like these are most effective when they are developed in consultation with the local community and adapted to local traditions and needs and must therefore be developed locally with the support of the local community. Further government investment in these programs will help to support teachers to engage with their local communities and provide a more enriching educational experience for students.

Recommendation 7: Invest in programs to improve and provide culturally appropriate and engaging delivery of STEM education for Aboriginal and Torres Strait Islander students, particularly acknowledging Traditional knowledge, and including teaching 'in language'. These should be developed in consultation with local Aboriginal and Torres Strait Islander communities.

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