SUBMISSION

Submission to the Victorian Legislative Assembly Economy and Infrastructure Committee

Submission to the inquiry into student pathways to in-demand industries

1 August 2025

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.

Australia's workforce needs are evolving, driven by technological innovation and the net zero transition. Sectors important to Victoria's future economic growth include engineering, digital technology, health and community services, education and training, construction and infrastructure, renewable energy and clean technology, and advanced manufacturing – all of which require a strong STEM (science, technology, engineering and mathematics) foundation.

To meet these emerging challenges, Victoria can strengthen education pathways through primary, secondary, tertiary and vocational education. Robust STEM education from the earliest levels can prepare students with the foundational knowledge and skills needed for the future workforce. This is particularly important for groups underrepresented in STEM, such as women, Aboriginal and Torres Strait Islanders, and those from regional and rural communities. At a tertiary education level, greater coordination and alignment between education providers and industry can assist workforce development and reduce inefficiency. Improving accessibility of placements for in-demand industries such as engineering can also help counteract skills shortages. Additionally, the net zero transition presents a significant opportunity to ensure Victorians benefit through workforce participation.

ATSE makes the following recommendations:

Recommendation 1: Strengthen foundational STEM education skills in primary and secondary schooling by increasing resource provision, supporting hands-on STEM learning, and uplifting STEM educators.

Recommendation 2: Roll out the National Skills Taxonomy in Victoria to support coordination between vocational and higher education pathways, microcredential providers, industry and the workforce.

Recommendation 3: Coordinate with the Commonwealth Government to extend paid practical placements to high-demand fields including engineering.

Recommendation 4: Expand access to net zero education and career pathways, especially for women and those from regional and rural communities, at all levels of education.

Strengthening students' engagement with STEM

Developing foundational STEM education skills throughout primary and secondary schooling is essential to prepare students for pathways to in-demand industries. Mathematics, chemistry, and physics are vital for many of Victoria's fastest-growing occupations, including engineering, net zero technologies, health technologies and medical research, advanced manufacturing and artificial intelligence (State Government of Victoria 2024). However, only 10% of Victorian Year 6 students report that they undertake science lessons more than once a week. This is the lowest of any state, with Queensland leading at 45%. (Australian Curriculum, Assessment and Reporting Authority (ACARA) 2024). Victoria also has no requirements for Year 11 and 12 students to complete some form of numeracy education to receive their Victorian Certificate of Education (VCE). This stands in contrast to Queensland and South Australia, where the completion of a numeracy requirement, such as a general or applied mathematics course, is compulsory for students to receive a Certificate of Education (South Australian Certificate of Education Board 2025; Queensland Curriculum & Assessment Authority 2025). Increasing access to high-quality STEM education is challenged by a national shortage of qualified STEM teachers. Almost 40% of mathematics classes nationally from years 7 to 10 are taught without a teacher specifically qualified in the subject (Barker et al. 2024). Technology is also an area of concern in Australian schools, with digital literacy rates dropping and teachers increasingly struggling to implement the Digital and Design Technologies curriculum which provides foundational skills for engineering, information and communication technology (ICT), and electronics (Australian Curriculum Assessment and Reporting Authority (ACARA) 2023; Rolf et al. 2022). ATSE, together with the Royal Society of Victoria (RSV) and the Science Teachers' Association of Victoria (STAV), has proposed a four-pronged plan to increase Victorian students' engagement with STEM (Australian Academy of Technological Sciences & Engineering et al. 2025).

There is a need to enhance the status of STEM in the Victorian curriculum. The plan recommends enforcing the requirement for STEM education up to the end of Year 10 and developing incentives for students to continue STEM subjects in Years 11 and 12. ATSE also recommends adopting mandatory hours of core STEM subjects for foundational level students to Year 10, increasing STEM participation throughout primary and secondary schooling. This would also align Victoria with other states that implement mandatory core STEM subject hours such as New South Wales and Queensland. For example, New South Wales requires 400 hours of Mathematics and Science between Years 7 and 10, and 200 hours of Technology between Years 7 and 8 (NSW Education Standards Authority 2025).

The report recommends expanding high-quality professional development and resources for educators to support effective STEM teaching. There is a need to uplift STEM education statewide through support for teachers, including in regional, rural, and remote schools that often lack the resources of metropolitan schools. The report's third recommendation is to unlock more hands-on, experiential learning in STEM classrooms. Students can benefit greatly from experiential learning as a complementary teaching style alongside traditional methods. Implementation of specialised STEM programs, such as ATSE's STELR program, can offer a solution by providing equipment, curriculum resources and teacher support to encourage hands-on learning. Learning resources and professional development can support both in-field and out-of-field teachers to deliver engaging STEM education. Hands-on learning, such as with STELR's curriculum-linked sustainable engineering kits, also provides an opportunity for learners to develop transferable skills such as critical thinking and problem solving. Valuing the role of STEM educators contributes to making STEM more aspirational and attainable for Victorian students. ATSE, RSV and STAV's plan recommends awards for top STEM teachers and a public campaign to highlight science teachers.

In strengthening STEM education, it is crucial to promote equitable access across Victoria. STEM education performance and retention gaps between Aboriginal and Torres Strait Islander students and their peers have remained steady over the past 20 years (Department of Education 2024). Culturally responsive curricula, approaches and Traditional Knowledge can be integrated into STEM education as one way to increase engagement and attainment. Students from regional or remote communities have lower levels of STEM literacy than those from metropolitan areas (Australian Centre for Student Equity and Success (ACSES) 2025). Addressing these gaps is a social and economic imperative and will require a range of mechanisms, including targeted scholarships and programs, increased resource provision, and increased training and support for teachers to enable regional students to transition to tertiary education.

Recommendation 1: Strengthen foundational STEM education skills in primary and secondary schooling by increasing resource provision, supporting hands-on STEM learning, and uplifting STEM educators.

Aligning education pathways with workforce needs

The roles of education institutions are already well defined in Victoria. Schools primarily provide foundational abilities, TAFEs develop practical, job-ready skills, universities foster scientific understanding and professional training, and graduate research generates new knowledge. The challenge is that pathways between sectors are fragmented. Vocational and higher education institutions often operate independently, with a lack of alignment in credit recognition policies and course structures. Consequently, student mobility and the flexibility of education providers is limited (Jobs and Skills Australia 2025). This is a challenge to many emerging fields that would benefit from students being able to access both vocational and higher education. Better alignment between vocational and higher education will enable learners to move between systems to attain the skills and knowledge needed for their careers. Additionally, this alignment would assist in countering the perspective that vocational education is less important than university education; a belief that has led to critical skill shortages in many areas of vocational study (Walker 2019). This is despite 60% of Australian university students now being admitted via alternative pathways rather than directly by academic ranking (Pilcher 2018).

Improving the coordination of education and training institutions also offers an opportunity to coordinate with the needs of Victoria's major industries and produce industry-aligned graduates (Jobs and Skills Australia 2025). Dialogue between education providers, industry and government using a National Skills Taxonomy can help link curriculum design, training and career outcomes. (Jobs and Skills Australia 2024). Additionally, a National Skills Taxonomy can be used to communicate emerging skills needs while targeting translation barriers that have led to siloed stakeholder approaches. National Skills Taxonomy development is underway at Jobs and Skills Australia, having been recommended by ATSE and others in the sector (Australian Academy of Technological Sciences & Engineering 2022). Rolling out the National Skills Taxonomy in Victoria would improve connections between industry, education providers and jobseekers.

In-demand industries such as AI, data analytics, and clean energy are quickly evolving. Employees in these industries can benefit significantly from short-term training and qualifications. Microcredentials that are designed to develop job-relevant skills can help teach in a fast-moving space and be integrated into existing qualifications or stand-alone certificates (Galindo 2023). The National Microcredentials Framework can support the quality and recognition of microcredentials. Additionally, ATSE suggests a National Skills Taxonomy can assist in the translation of these credentials across employers, providers and learners. Singapore's SkillsFuture is an example of a framework that promotes lifelong training through credits,

career planning and industry-endorsed training (SkillsFuture Singapore 2025). Moving towards a shared understanding across stakeholders would support the effectiveness of microcredentials in equipping workers with the skills they need in these rapidly changing industries.

Engineering disciplines have both current and projected workforce shortages and failing to train more engineers will put state and national ambitions at risk (Jobs and Skills Australia 2023). A significant gap in Australia's education pathways is the lack of support for meaningful, work-based learning experiences before graduation (Jobs and Skills Australia 2023). Work-integrated learning enables students to consolidate their skills and knowledge and develop industry connections, and is also a requirement of engineering degrees. Financial requirements can be a significant barrier to placements for students. Delivering paid placements will enable more students to reduce financial hardship, complete their studies and enter the skilled workforce. Placement payments can also support more equitable participation, especially for students from rural or remote communities, who may struggle with the additional costs of relocation. The new Commonwealth Prac Payment demonstrates how the government can use financial incentives to support students to complete qualifications in high-demand fields. ATSE recommends expanding financial initiatives such as the Commonwealth Prac Payment for in-demand industries, including engineering (Australian Academy of Technological Sciences & Engineering 2024).

Recommendation 2: Roll out the National Skills Taxonomy in Victoria to support coordination between vocational and higher education pathways, microcredential providers, industry and the workforce.

Recommendation 3: Coordinate with the Commonwealth Government to extend paid practical placements to high-demand fields including engineering.

Supporting the net zero transition

The net zero transition will play a central role in both Victoria's and Australia's future economy. Victoria's emissions reduction targets of 75 – 80% by 2035 and net zero by 2045 will require technological and industrial transformation. The transition will create a growing demand for workers in renewable energy, smart systems, energy storage, and electrification. Australia will need an additional 85,000 workers by 2030 to support the construction, operation, and maintenance of renewable energy infrastructure, with at least 51% of these workers in national shortage occupations, including engineers, electricians and plant operators (Monaghan 2024). In Victoria, the energy workforce is projected to grow more than double the current industry size by 2040. Roughly two-thirds of these roles will require TAFE qualifications, with the remainder requiring university-level training (Invest Victoria 2025).

Education pathways into these industries are underdeveloped or invisible to students at the school level, demonstrating the opportunity to promote these pathways, which can be integrated with the development of STEM skills (Chang and Mann 2024). While environmental education has been a part of the national education agenda for 50 years, the energy transition offers renewed opportunities for stronger integration of sustainability across the curriculum (Gough et al. 2024) The Victorian Government has the chance to be a leader in promoting education on environment and sustainability. Regional areas will also be central to Victoria's energy transformation, from renewable gas and bioenergy facilities to major wind, hydro and solar farms (The State of Victoria Department of Environment, Land, Water and Planning 2021). Investment into regional workforce training hubs will be needed to ensure these communities are equipped to fill roles of projects, including offshore wind farms, solar farms and battery energy storage systems (Clean Energy Council 2023). At a school level, these career opportunities can be highlighted through experiential learning such as ATSE's STELR, which has a strong focus on renewable energy technologies. At a tertiary level, scholarship programs such as ATSE's scholarship program for women and non-binary people in STEM, Elevate, can assist diverse students access STEM education. Gender disparities are particularly glaring in STEM. Only 15% of people employed in STEM roles are women, despite their higher average academic performance (Department of Industry 2024). Elevate aims to address gender inequities through delivering scholarships, access to events and networking, mentoring and support to women studying STEM degrees. A more inclusive STEM education system will not only support gender equity in the workforce but can address critical skill shortages in many STEM fields by increasing the number of skilled job-ready graduates.

Recommendation 4: Expand access to net zero education and career pathways, especially for women and those from regional and rural communities, at all levels of education.

ATSE thanks the Legislative Assembly Economy and Infrastructure Committee for the opportunity to respond to the inquiry into Student Pathways to In-Demand Industries. For further information, please contact academypolicyteam@atse.org.au.

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