Education Council

STEM Partnerships Forum Report

Response

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Introduction

The STEM Partnerships Forum was established by Education Council in 2017 as the first collaborative action under the *National STEM School Education Strategy 2016-2026* (the National Strategy). The aim of the Forum was to facilitate a strategic approach to school-industry partnerships to develop the engagement, aspiration, capability and attainment of students in STEM.

Education Council endorsed the National Strategy in December 2015 to support a long-term change agenda aiming to ensure that students have a stronger foundation in STEM and are inspired to take on more challenging STEM subjects. All jurisdictions are actively involved in supporting the National Strategy. In addition, some state and territory governments have a STEM strategy at a broad level or for their school education system. Non-government school systems and schools also operate a range of STEM initiatives.

The STEM Partnerships Forum was chaired by Dr Alan Finkel AO, Australia's Chief Scientist, and included members drawn from the schooling, vocational education and higher education sectors, as well as industry leaders. The Australian Government, along with the Australian Capital Territory, provided secretariat support. The Forum undertook a substantial consultation process across Australia, including meeting around 150 stakeholders and receiving 53 written submissions.

Education Council would like to thank the Forum members for their work, and acknowledge the considerable expertise they brought to bear in developing the comprehensive and informative report, *Optimising STEM Industry-School Partnerships: Inspiring Australia's Next Generation.*

The report put forward 10 recommendations around four key areas to improve the quality and impact of school-industry partnerships in STEM education:

a. Understanding impact and outcomes

b. Teacher professional development

c. Solving real world problems through STEM careers

d. Optimising school-industry partnerships.

These recommendations, along with those from other major national reviews, informed the development of the National School Reform Agreement between the Australian Government and all states and territories. The National School Reform Agreement, signed in November 2018, contains several reform initiatives that address the Forum's recommendations, for example the establishment of a Unique Student Identifier (recommendation 9). All jurisdictions are actively involved in scoping and implementing these national reforms.

Further information about the national response to the each of the report's recommendations is provided below. Some states and territories also provided additional information about relevant activity at the jurisdiction level.

Recommendation 1.

The Australian Government in partnership with state and territory governments and industry associations should collaborate to develop a more detailed understanding of future workforce needs, including vacancies and the skills required of employees both in STEM specific areas and areas where STEM skills are valued. The research should:

a) consolidate and validate existing work and labour market data and identify information gaps,

b) have the potential to be regularly updated as a time series to identify trends,

c) identify the role of employers in contributing to on the job training of graduates, and

d) clarify the optimum balance between enterprise skills, digital proficiency and the need for STEM discipline specific content knowledge in the present and future workforce.

National actions

Education Council recognises the need to improve our understanding of current workforce needs, future employment opportunities and what skills our young people will need.

Two initiatives under the National School Reform Agreement have the potential to improve our collective understanding of future workforce needs and ways in which the school education system can better prepare school leavers.

Establishing a National Evidence Institute is one of the eight national priorities in the National School Reform Agreement. Education Council will consider the scope and remit of the Institute in 2019. A review of teacher workforce needs of the future is also one of the eight national priorities in the National School Reform Agreement. This may include development of a strategy to analyse future teacher workforce needs in areas that would benefit from a nationally coordinated response.

At a national level, the Australian Government's Labour Market Information Portal contains projected five-year employment growth figures by region, industry, and occupation; monthly vacancy reports by region, occupation and skill level; and results of employer surveys which provide information on regional labour market challenges (lmip.gov.au).

Job Outlook consolidates information about Australian careers, labour market trends and future employment projections (joboutlook.gov.au). There is work underway to build on the type of information available for individuals, employers and tertiary education and training providers. The Jobs and Education Data Infrastructure (JEDI) project has developed a data engine that brings together data from multiple sources including labour market and education and training data sets. Phase two, which is under development in 2019, involves working with employers to develop a classification of contemporary skills, so that advice about jobs and labour markets can focus on skillsets, rather than single occupations.

State and territory actions

Vocational Education and Training courses are developed and updated through national Training Package and accredited course processes. State Governments are therefore reliant on those processes to adequately capture future industry skills needs, including relevant STEM competencies into qualifications and courses.

The Victorian Department of Education and Training regularly undertakes the Victorian Employer Skills Survey, a whole of economy survey that collects information from employers about the training

and skills needs of Victorian businesses. The results of this survey are published on the Department's website. The Victorian Skills Gateway is a website providing a one-stop-shop of Victorian vocational education and training to help find the best option for students. It provides information on relevant occupations, courses and training providers. It houses the Occupations Explorer, a tool that enables prospective vocational training students to explore over 500 training-related occupations and consider Victorian-specific labour market factors. Career Switch supports people who might be affected by retrenchment, or looking for a career change, identify occupations that build on the skills they have. Criteria used to identify potential careers include similarity of industry, field of study, skill level and wages of their current occupation. Skills Switch helps prospective students determine whether the skills they already have from a previous training qualification are likely to count towards a new course. This helps students be more informed about their choices of training and, through the Victorian Skills Gate, where to get it. Both Career Switch and Skills Switch are integrated with the Occupations Explorer on the Victorian Skills Gateway. The Victorian Department of Education and Training undertakes detailed supply-demand modelling and analysis to ensure that vocational training is meeting the needs of future employment demand. This supply-demand modelling is incorporated into regional documents called Jobs and Training Needs Reports that are utilised by TAFEs and other training providers when determining course delivery plans each year.

The Northern Territory's Economic Development Framework provides comprehensive Industry Development Strategies for key industries that cover innovation, technology, supply chain analysis, market analysis and development, workforce (including Aboriginal employment strategies) regulation and regional development opportunities. The Northern Territory Government will work with industry, research and educational institutions and the business community to encourage, drive and adopt innovation. This work will assist in identifying future workforce needs in the Northern Territory, including vacancies and skills required for STEM specific areas. The Digital Territory Strategy will establish a framework to maximise the opportunities of the digital age across the business, education, community, industry and government sectors. The strategy will support industries in the Northern Territory to drive innovative developments through Digital Partnerships grants programs, define future workforce skills needed in the Northern Territory and build partnerships between the education sector, digital innovators and industry to grow STEM education.

The Queensland Department of Education has established the STEM Industry Partnerships Forum to provide opportunities to collaborate with industry, university, government and education stakeholders. In 2018, five key industries provided a snapshot of their emerging technologies and workforce capability needs. Jobs Queensland presented extensive industry research on anticipating future skills.

The South Australian Training and Skills Commission (TaSC) conducts annual modelling of the qualification requirements for industry skills over the next five years to estimate the number of specific vocational qualifications required. A new initiative is the establishment of TaSC Industry Skills Councils (IAC) representing eight industry sectors. The purpose is to strengthen industry's voice in skills and workforce development, and to ensure that funding for skills and training aligns with industry priorities. Each of the IACs is producing a Workforce Roadmap for their respective industry sector that will provide a comprehensive analysis of workforce needs, recommended strategies to meet those needs, and will be used to inform skills and workforce policy. The South Australian Department for Education has also established the STEM Industry Advisory Group to provide strategic advice on STEM learning and industry, education and community partnerships.

Recommendation 2.

Education Council should review:

a) how the senior secondary system, including the ATAR, can incentivise students to study the most advanced and appropriate subjects; and

b) the impact on school teaching practices and student tertiary outcomes of universities having dropped prerequisites for courses or specialisations that require a strong foundation in mathematics.

National actions

Education Council supports the role of schooling to provide choice and flexibility in the senior years, and to facilitate multiple pathways into work, further education or training. Council has recognised that there is a need to explore whether current arrangements can be improved, to better prepare school leavers for life beyond school, whatever pathway they choose.

A review of senior secondary pathways into work, further education and training is one of the eight national priorities in the National School Reform Agreement. Education Council has agreed to establish a reference panel, and terms of reference, for a review of senior secondary education, pathways to work, further education and training and consideration of prerequisites for university entry. Education Council will agree to the terms of reference and panel membership for the review, to progress work in 2019.

The Australian Government has accepted recommendations to improve the transparency of higher education admissions, as advised by the Higher Education Standards Panel (an expert statutory advisory body established under the *Tertiary Education Quality and Standards Agency Act 2011)*. From 2019, all higher education providers will set out their admissions information in a similar way, so it will be easier to understand and compare. Key features include of the new approach include:

- admission criteria and processes will be clearly explained using consistent terminology
- information targeted to the needs of different types of applicants, including school leavers
- more reliable information about the Australian Tertiary Admission Rank (ATAR) needed for admission to courses, where relevant (Overall Position in Queensland)

As one of the national collaborative actions under the *National STEM School Education Strategy 2016–2026,* Victoria is leading work to explore increasing enrolments in advanced STEM subjects. All jurisdictions are involved in this collaborative action. The Victorian Curriculum and Assessment Authority (VCAA) ran a cross-jurisdictional survey for this action in 2018. Outcomes of the survey regarding effective approaches to encourage students to enroll in 'Advanced STEM' courses showed:

- 100 per cent of the respondents rated 'reduction in HECS' as 'useful' or 'very useful'.
- 87.5 per cent of the respondents rated 'scholarships' as 'useful' or 'very useful'. A further 12.5 per cent were 'neutral'.
- 75 per cent of the respondents rated 'advanced standing' as 'useful' or 'very useful'. A further 12.5 per cent were 'neutral'.
- 75 per cent of the respondents rated 'prerequisites' as 'useful' or 'very useful'.
- 50 per cent of the respondents rated 'bonuses' as 'useful' or 'very useful'. A further 25 per cent were 'neutral'.
- Only 12.5 per cent of the respondents rated 'scaling' as 'useful'. A further 50 per cent were 'neutral'.

State and territory actions

Queensland has introduced a new senior assessment system, the new Queensland Certificate of Education (QCE) system, which commenced for students entering Year 11 from 2019. In addition, Queensland's existing Overall Position (OP) tertiary entrance rank will be replaced by a new Queensland ATAR, which will commence for students completing Year 12 from 2020.

In South Australia, there are a number of initiatives to increase the uptake of science, mathematics and digital technologies subjects. Between 2014 and 2018 there has been a minimal increase in the quantum of students undertaking Specialist Mathematics and a decrease in the number of students completing Physics, Chemistry and Mathematical Methods.

Recommendation 3.

Education Council should develop minimum national requirements for teacher professional learning, a portion of which should include relevant, discipline specific professional learning from an accredited provider, that must be satisfied in order to retain ongoing registration as a primary or secondary teacher.

National actions

The National Strategy acknowledges that quality teaching is the key to lifting student engagement and performance, and that teachers need to be equipped with the skills and confidence to support STEM learning.

The need to support teachers throughout their careers is reflected in the report of the National Review of Teacher Registration, *One Teaching Profession: Teacher Registration in Australia*, released on 20 September 2018. Recommendation 3 specifies:

"To support professional learning, amend the 2011 National Framework for Teacher Registration to:

- require that along with a record of standards referenced professional learning, teachers include reflections on this learning and its application
- **explicitly specify that maintenance of proficiency against the *Australian Professional Standards for Teachers* includes up-to-date discipline-specific knowledge and skills relevant to their deployment and the curriculum they are expected to teach**
- explicitly state the option available for jurisdiction-based requirements to be applied in the professional learning undertaken by teachers
- acknowledge that teachers will focus on areas in the *Australian Professional Standards for Teachers* identified in their performance and development process."

A copy of the report is available at www.aitsl.edu.au/teach/national-review-of-teacher-registration.

Education Council has agreed that the Australian Institute for Teaching and School Leadership (AITSL) will work with jurisdictions to develop an implementation plan for all of the Report's recommendations.

State and territory actions

In 2018, the Northern Territory undertook a review of the *Teacher Registration (Northern Territory) Act 2004* and Teacher Registration (Northern Territory) Regulations 2004 to strengthen and contemporise the legislation. The Teacher Registration (Northern Territory) Legislation Amendment Bill 2019 was introduced to the Legislative Assembly in February 2019. The proposed reforms provide that the Teacher Registration Board of the Northern Territory must develop or recognise a framework for the professional development of teachers, and that it is a condition of a person's registration or authorisation to comply with the requirements of the professional development framework. The framework must specify the type of professional development required and the minimum professional development a teacher must undertake. The changes to the legislation are intentionally future focused, capable of accommodating a nationally consistent approach to the professional development of teachers.

The Queensland Department of Education has developed online courses to support teachers to implement the new QCE system. The courses aim to build teacher capability and confidence in

subject-specific knowledge and contemporary approaches to teaching and learning for new syllabus subjects, including Digital Solutions. The department delivers discipline-specific knowledge and skills such as through the *#qldtechschools* initiative to fast track implementation of Australian Curriculum: Digital Technologies. All teacher professional learning delivered by the department is aligned to the Australian Teacher Professional Standards.

The Teachers Registration Board (TRB) of South Australia already requires that teachers include reflections on their learning and its application. The TRB focuses on areas in the Australian Professional Standards for Teachers, but the Board does not have access to individual teacher appraisals. The Board instead requires that teachers identify and explain their professional learning needs identified through the appraisal process, and demonstrate how they are remaining up-to-date with changes in their respective field/discipline. A key focus is maintaining discipline knowledge and professional standards against the Early Years Learning Framework and the Australian Curriculum.

Victoria's Primary Mathematics and Science Specialists (PMSS) initiative is relevant to this recommendation, although its model for upskilling teachers is not predicated on mandated professional learning and we do not support this approach for alumni of this program. PMSS upskills primary teachers in government schools to become mathematics or science education specialists. The initiative aims to:

- increase student engagement and achievement in mathematics and science
- increase teacher confidence and capability in teaching mathematics and science
- increase understanding of STEM (science, technology, engineering and mathematics)
- have a sustainable impact in schools beyond the life of the initiative's funding.

Throughout the two years of the program, specialists undertake intensive professional learning facilitated by experts in mathematics, science and educational leadership aimed at strengthening their capability to support school-wide improvement in mathematics or science education in their school.

In Western Australia, as in all jurisdictions, teachers must demonstrate ongoing professional learning in order to maintain registration. This professional learning is planned at the local level and informed by teacher, school and community needs and aligned to the teacher's performance management plan with their line manager. Professional learning delivered by the Department of Education is recorded on staff records through the Department's human resources management information system. Beginning teachers must also demonstrate they have achieved proficient status against the Australian Professional Standards for Teachers.

Recommendation 4.

Education authorities should support principals and lead teachers to engage with industry and other partners to develop and implement high quality, contemporary professional learning materials and teaching practices in mathematics, science and technology. These should include particular support for:

a) principals and other school leaders,

b) teachers working outside their main discipline, and

c) teachers in rural and remote communities with limited travel and broadband access.

National actions

The expertise of industry is a valuable resource to draw on to ensure schools and teachers keep up with the rapid technological developments and getting real world context about how subjects like mathematics and science are used in the workplace.

Responsibility for setting priorities for teacher professional learning sits with state and territory teacher regulatory authorities, government and non-government education authorities, schools and their leadership and teaching staff. There are many examples of high quality professional learning programs across the country, although accessibility outside of metropolitan areas can be a barrier.

As part of national collaborative actions under the National Strategy, Queensland is leading work to develop a professional learning exchange and online exemplar modules. During 2018, Education Services Australia provided options for suitable software to support a professional learning exchange, and Queensland developed a draft set of quality assurance principles. A working group met in October 2018, with one of the next steps to explore budget and funding options for any IT solution. There has also been investigation of suitable digital infrastructure to provide national access to online exemplar teaching modules. Work is underway to redevelop "How to teach Mathematics" and "How to teach Science" modules and to determine intellectual property and copyright issues. All jurisdictions are involved in this collaborative action.

State and territory actions

The Queensland Department of Education supports teacher professional development through a range of initiatives including the STEM Industry Partnerships Forum, which provides the opportunity for a range of organisations to showcase industry-developed teacher and student learning materials and programs and leading edge technologies. Regional STEM champions work with principals, school leaders and teachers in clusters of schools in rural and remote contexts and the department actively encourages external providers of STEM professional learning to deliver to these communities. Since 2016, more than 3100 teachers have completed online professional development modules in seven STEM learning areas for beginning and non-specialist STEM teachers, developed in partnership with QUT and Griffith University.

In Victoria, the network of six Science and Mathematics Specialist Centres engage students and teachers in contemporary, authentic science, technology, engineering and mathematics learning.The Centres' programs are available to all Victorian students and their teachers. Programs can be:

- an on-site visit to the Centres
- participating in a virtual program
- having Centre staff come out and visiting schools through the outreach programs.

The Centres are for all Victorian students from prep–12 with priority given to rural/regional and disadvantaged schools. The Centres work in partnership with industry and universities, and collectively have provided inspiration to over 77,000 school students and their teachers.

Victoria also supports experiential approaches to learning through engagement with industry and employers. Victoria has established ten Tech Schools to give approximately one-quarter of all students across the state access to new high-tech STEM hubs and high-tech learning environments, with innovative education programs, linked with local industry, delivering real world learning to students. Each Tech School is locally driven and has a unique focus. Each is hosted by a TAFE or university and connected to the industries that have been identified as offering the greatest economic and job growth potential for both the local area and Victoria. In practice, students might be exposed to high-tech manufacturing, renewable energy, advanced health sciences or modern food and fibre processing. They are learning using the latest technology including robotics, virtual reality, 3D printing and industry-quality lab equipment.

In South Australia the Department for Education is partnering with Telstra to install a dedicated, high speed, fibre optic internet connection to 514 public schools (99% of schools), and alternative high speed solutions for the remaining rural schools where high speed fibre optic is not an option. A set of online resources is being developed to support leaders of STEM education to design and facilitate professional learning for principals, leaders and teachers. The program includes partnership with industry. In November 2018, the Department for Education launched the Entrepreneurial Learning Strategy to embed entrepreneurial teaching and learning within a range of learning areas including STEM. The department has also developed 'A Practical Guide to STEM School-Industry Engagement in South Australia' in consultation with the department's STEM Industry Advisory Group.

Western Australia continues to support Innovation Partnership schools and has introduced a new initiative under the State STEM Skills Strategy, STEM Enterprise Schools. Schools develop partnerships with community and industry and are guided to work together using disciplined innovation methods to develop innovative strategies to solve local problems. The focus of the STEM Enterprise Schools is collaborative development of engaging STE approaches that build pathways through schooling to post-school destinations with a STEM focus. Western Australia continues to fund the provision of STEM teaching and learning resources as well as face-to-face and online STEM professional learning.

Recommendation 5.

To support the delivery of VET qualifications in STEM fields in secondary schools, education authorities should collaborate with industry to help secondary school teachers acquire and maintain industry currency requirements in line with national standards, including providing industry placements and other professional learning opportunities.

National actions

The National Strategy recognises that in an environment of technological rapid change, maintaining up-to-date knowledge and qualifications in STEM industries is important, and often challenging, for teachers of these subjects.

Teacher employers – at state, territory and school level – work in a range of ways with industry to support real-world professional learning and provide contemporary knowledge of STEM for teachers.

The report of the National Review of Teacher Registration reflects the need for further attention in this area, at Recommendations 15 and 16*:*

- 15. Undertake work to implement greater alignment between teacher registration and VET qualifications for teachers who hold dual teaching and VET qualifications,
- 16. Teacher employers, teacher regulatory authorities and initial teacher educator providers collaborate to develop pathway programs to teaching qualifications that recognise the VET qualifications, prior learning and the experience of the VET trainer/assessor employed in schools under alternative authorisation to teach arrangements.

As noted above at Recommendation 3, AITSL is working with all jurisdictions to develop an implementation plan for these and other National Review of Teacher Registration recommendations.

State and territory actions

One way the Queensland Department of Education supports teachers to maintain industry currency requirements for the delivery of VET qualifications is through the provision of public liability insurance.

In South Australia, the Department for Education operates the Pathways Programs with Industry, VET teaching and corporate sectors to develop relationships between industry and schools. The program provides 'Industry Currency' opportunities for teachers delivering VET. The 'Advanced Technology' program offers industry and tertiary placements for teachers to meet and learn from business leaders and entrepreneurs and world leading researchers about industry processes, methodologies and cutting edge research.

The Western Australian government has set the following target to increase STEM participation:

> *By 2024, have 85% of Year 12 students completing two or more STEM courses and/or STEM related vocational education and training (VET) qualifications (Our Priorities: Sharing Prosperity).*

The costs associated with delivering training to students mean that the majority of delivery of VET qualifications occurs in schools through third party arrangements, requiring teachers to meet the requirements to deliver qualifications, including maintaining industry currency. To ensure qualification delivery is future-focused, this support is essential.

Recommendation 6.

Governments and industry should work together to focus the narrative for primary and secondary students on how STEM skills and knowledge can solve real world problems. Having been motivated by real world problems, students should be introduced to the applicable subjects, skills and jobs that will afford them career flexibility as they contribute to meeting the needs of our future society. There should be particular effort to engage student cohorts under-represented in STEM fields.

National actions

As the STEM Partnerships Forum report identifies, industry has a role to play in building awareness of the application of STEM skills in solving real world problems, and in highlighting the breadth of STEM related careers. Young people are increasingly likely to have several careers and many different jobs over their working life. There is a need to change the way we talk about 'careers' to be more engaging and relevant to the real world problems young people might want to solve rather than about specific jobs.

Education Council has endorsed *Future Ready: A student focused National Career Education Strategy,* released by the Australian Government in February 2019. The strategy was developed in collaboration with a national group that brought together the voices of education, business and industry, parents and carers, career practitioners and youth.

The strategy focuses on improving career education in schools by:

- building teacher and school leader capability
- supporting parents and carers in their important role in these conversations
- encouraging collaboration between industry and schools.

Supporting resources including case studies that show innovative career education in practice will be developed in partnership with state and territory education departments, business and industry and career education groups.

State and territory actions

Research in the New South Wales 'Education for a Changing World' project emphasises mutually beneficial school-industry linkages which support schools to facilitate teacher professional development. It also reframes the utility of STEM skills toward solving real-world problems rather than just a pathway to certain professions. The New South Wales Mathematics Strategy includes a new mathematics Higher Schools Certificate course focused on the practical applications of numeracy for everyday life. This work will be implemented between 2018 and 2025, with 52 schools participating in a pilot of the course in 2019.

The Northern Territory Government's 2018 Top End P-Tech pilot program engaged high achieving Year 10 students with four industry partners. The 2019 program has expanded to eight industry partners and focuses on engaging young women, Indigenous students and students interested in a trade pathway in STEM related subject. The Northern Territory Government's sySTEMic Collaboration with Engineers Australia in 2018 enabled students at Taminmin College to engage in solving real world problems while achieving NTCET credits. The project is continuing in 2019 and will include four additional senior secondary schools.

The Queensland Department of Education is reviewing *Future Ready: A student focused National Career Education Strategy* to identify ways of aligning its career education priorities. Contemporary industry profiles, career pathways and role models are collated on the department's STEM Hub and are available to schools, students, parents and carers and community organisations.

The South Australian Department for Education has established a STEM Industry, Education and Community Advisory Group to promote best practice as it relates to how students' learning is connected with industry, education and community to support strong discipline knowledge and positive dispositions towards STEM. In partnership with DXC Technologies, the department has produced 'A Practical Guide to STEM School-Industry Engagement in South Australia'. The guide makes clear a range of benefits including for students a greater understanding of STEM real-world relevance and enhanced career aspirations and improved work readiness. Case studies of effective partnerships between education and industry have been produced and shared with all schools.

In Western Australia, schools are encouraged to provide career counselling and career development although it is not mandated in the Western Australian Curriculum and Assessment outline (Pre-primary to Year 10). Department officers will provide up-to-date labour market and career pathway information related to STEM, to school leaders, through planned professional learning events.

Recommendation 7.

Education Council should consider and promote models of best practice to bring together schools and industry at scale and illustrate the potential benefits of adopting approaches across jurisdictions. Key elements of successful approaches include:

a) scalability,

b) a single point of contact for industry to work with a large number of schools,

c) integrated teacher professional learning,

d) real world context, and

e) alignment with the Australian Curriculum.

National actions

Building a strong evidence base is one of the key goals of the *National STEM School Education Strategy 2016–2026*, to help schools and teachers decide which approaches work best for different purposes and student cohorts.

Under the National Strategy, the Australian Government has been leading work with partners Victoria, South Australia and Education Services Australia to gather information on evaluation findings from a selection of current and recent STEM initiatives. Many of the programs identified by jurisdictions have features that align with the elements articulated in this recommendation. A report on the findings of this work will be prepared for publication in 2019, subject to agreement by Education Council. All jurisdictions contributed information for this project, which will help to improve the visibility and availability of information about existing programs.

State and territory actions

The New South Wales Department of Education is leading a STEM Industry School Partnerships (SISP) project. Devised with guidance from the National Strategy and the STEM Partnerships Forum report, SISP matches primary and secondary schools with region-specific industry partners and provides and builds a Kindergarten to Year 12 STEM education continuum, with an emphasis on the primary to secondary transition, and promotes pathways to STEM jobs for students across regional New South Wales.

The Queensland Department of Education has developed and trialled a research-informed tool that supports schools to work together, and with industry partners, to build teacher capability in discipline specific knowledge and authentic applications of student learning. Case studies are being gathered to identify and scale up best practice across the state. One outcome of the STEM Industry Partnership forum is a map of school-industry engagement in Queensland and how these instances are curriculum-aligned and fit-for-purpose. In 2019 the forum will investigate principles of evaluating the impact of school-industry engagement.

The South Australian Department for Education is operating the 'Year 7 & 8 STEM Collaborative Inquiry Research' project. Five school networks already connected with industry and academic partners will collaboratively design, trial and evaluate innovative and evidence based approaches for STEM learning across Years 7 and 8 (as students transition from primary to secondary school). The University of South Australia is collecting data to inform the potential state-wide scalability.

As stated above, Western Australia continues to support Innovation Partnership schools including the new STEM Enterprise Schools initiative. Schools develop partnerships with community and industry and are guided to work together using disciplined innovation methods to develop innovative strategies to solve local problems. Schools are mentored by experienced STEM innovation schools and the initiative is scaled in the second year as participating schools reach out to, and partner with, other schools.

Recommendation 8.

Education Council should establish a national online resource and provide a toolkit that brings together material to support schools and industry in designing, implementing and evaluating partnerships. The toolkit should:

a) consolidate and provide easy access to resources and guidance on industry-school partnerships,

b) showcase existing high quality, scalable partnerships in which industry can invest,

c) include intermediaries such as universities and TAFEs that can help schools and industry set up new partnerships and navigate regulatory frameworks,

d) assist in defining outcomes and evaluating and measuring the impact of partnerships,

e) provide guidance on curriculum alignment,

f) provide guidance on ways to engage under-represented groups, and

g) leverage existing platforms wherever possible.

National actions

As the lead jurisdiction for the STEM Partnerships Forum collaborative action under the *National STEM School Education Strategy 2016–2026*, the Australian Government commissioned Dandolopartners to develop a toolkit in response to this recommendation.

The toolkit brings together STEM education resources that can be used by schools, industry, not-for-profits and community organisations. It features a focus on partnerships between schools and industry, with guidance about how to make them work well. There is also a section containing principles and practical steps for evaluating STEM initiatives.

The evaluation principles encapsulated in the toolkit complement the work discussed under Recommendation 7. An online accessible version of the toolkit is being developed for publication in 2019. The timing is planned to coincide with the release of a report on evaluations that identify effective STEM education programs, as noted above.

State and territory actions

The Northern Territory Government is implementing an Economic Development Framework to build partnerships between schools and innovation oriented organisations to strengthen the focus on Science, Technology, Engineering, Art and Mathematics (STEAM). The Northern Territory Government will partner with private enterprise to implement training programs that create a stable, long-term workforce, including by better preparing Aboriginal people to enter and remain in the workforce. Under the Digital Territory Strategy, industry and government will work together to develop non-traditional and shared pathways to digital jobs through joint traineeship programs. This will assist the industry to meet anticipated future workforce demand and create more digital jobs.

Recommendation 9.

Education Council should prioritise and accelerate the introduction by 2020 of a national lifelong Unique Student Identifier to enable a more sophisticated analysis and understanding of student pathways and progress in Australia. Students will benefit from being able to share their educational records as they move between schools. The Unique Student Identifier would:

a) be developed with strict privacy controls to govern access to individual records and the ethical use of data for research purposes, in compliance with the Commonwealth Privacy Act 1988,

b) allow students to determine what information is shared, and

c) apply across all states and territories, all school levels, all school sectors (government, Catholic and independent) and all tertiary sectors.

National actions

A unique student identifier is already operating successfully in the Vocational Education and Training sector. A national number for school-aged children would ensure that every child who moves schools would be able to have all the benefits that they already receive through having a state number. It is not easy to move schools, and a national number would make it easier for the student, the parents and the new school.

A national number would also ensure that policy makers can build an effective evidence base to help understand how different cohorts of students progress through education, and what works in terms of improving their outcomes.

Introduction of a Unique Student Identifier (USI) is one of the eight national priorities in the National School Reform Agreement. Education Council has begun progressing work on the USI in 2019, and this will involve all state and territory governments and non-government education authorities.

State and territory actions

The Queensland Department of Education's Unique Student Identifier procedure has been developed to support Queensland state schools to implement the Australian Government's unique student identifier requirement for students undertaking vocational education and training.

Western Australia has introduced a unique student number (identifier) that is allocated to all students on entry into schooling and has been completed for 2019.

In Victoria, since 2009, all students in government and non-government schools, along with students below the age of 25 undertaking VET courses, have been assigned a Victorian Student Number (VSN). The VSN provides the capability to accurately detect patterns of student movement through, and departure from, the Victorian education and training system. It will greatly improve the collection and analysis of timely and accurate data about education in Victoria, so that future investment in education and training can be planned in a reliable manner.

Recommendation 10.

Education Council should accelerate efforts on the collaborative action under the National School STEM Education Strategy, to build "national reports to chart national change in a range of STEM data indicators." A suitable one-page dashboard would contain up to 10 indicators such as STEM participation and attainment (including for under-represented cohorts), VET and higher education enrolments, and graduate and employment outcomes.

National actions

Implementation of a USI may assisting in tracking student outcomes. The extent to which any USI system shares data on, or tracks, student outcomes is yet to be determined, noting data privacy is a key consideration for this reform.

In addition, the establishment of a National Evidence Institute (another of the eight national priorities in the National School Reform Agreement) may also contribute to enhancing reporting capability.

Under the *National STEM School Education Strategy 2016–2026*, New South Wales is progressing work to consult with jurisdictions on potential STEM data indicators for inclusion. This work has considered the data indicators noted in the STEM Partnerships Forum Report, tracking participation, attainment, university commencement, graduate outcomes and employment across a range of demographics (e.g. a focus on female education outcomes, low socio-economic-status cohorts and Aboriginal and Torres Strait Islander students).

The work is expected to be presented as a scoping paper to Education Council's Schools Policy Group in late 2019. All jurisdictions will be involved in responding to this collaborative action.

State and territory actions

South Australia is working on a data project that will monitor the state's higher education data and will include disaggregation by field of education (from which STEM information will be able to be extracted).

In Western Australia, the rate of Year 12 student completion of at least one STEM course and/or VET qualification is strong. As noted above, the Western Australian government has set a target of 85 per cent of Year 12 students completing two or more STEM courses and/or STEM related vocational education and training (VET) qualifications by 2024.