STEM School Education Interventions

Synthesis report

June 2019

Contents

1. Introduction

i.   Background

The *National Science, Technology, Engineering and Mathematics (STEM) School Education Strategy 2016-2026* (the National Strategy) supports 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.[1]

The National Strategy acknowledges that there is significant effort already underway within all jurisdictions to lift student outcomes in STEM. A national focus on STEM education aims to better coordinate this effort and target the key areas where collaborative action can provide fresh momentum to improve student participation and performance.

The National Strategy sets out two high level goals:

Goal 1: Ensure all students finish school with strong foundational knowledge in STEM and related skills

Goal 2: Ensure that students are inspired to take on more challenging STEM subjects

There are 12 national collaborative actions identified in the National Strategy. The Australian Government is the lead agency for national collaborative action L, to **Share and synthesise research and evaluation findings** to identify successful STEM interventions and inform school practice. This national collaborative action aims to help establish a stronger evidence base that over time will improve our understanding of what works in Australian contexts.

For this project, the Australian Government, with partners South Australia, Victoria and Education Services Australia, sought information from all jurisdictions on STEM-related initiatives, with a focus on those that had completed or planned evaluations, and where available, the research and evaluation results.

The project aims to build an evidence base to guide policymakers on what approaches work best for different purposes and circumstances. There are many STEM initiatives in the education sector that are successful but this knowledge has not been shared with all of those who could benefit. There are opportunities to improve the way we share information and resources. In some instances, information is only accessible to users of a school system database or website.

The information in this report provides a summary of the initiatives nominated by jurisdictions including a description of the scale, target group/s and program objective; and information on how well the initiative has achieved its goals, including external evaluation data if such data are available. This allows readers to find initiatives that are relevant to the problem they are trying to solve and what sort of outcomes the initiative achieved.

National STEM Education Resources Toolkit

The Australian Government commissioned Dandolopartners International to develop a National STEM Education Resources Toolkit. The Toolkit will assist schools and industry to evaluate existing and future STEM initiatives and help users to establish new STEM initiatives and form school-industry partnerships.

The Toolkit has three functions: to describe current understanding of best practice in STEM school initiatives; to provide guidance for users who want to implement a STEM initiative in schools; and to provide guidance for users who want to evaluate an existing initiative.

The Toolkit will complement this report by providing the tools for smaller organisations to develop, implement, operate and evaluate their own STEM initiatives. Although a national approach is valuable for information gathering and sharing, it is also important that smaller scale organisations be empowered to evaluate their own programs and determine which approaches work best in their local environment.

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[1] All Education Ministers endorsed the strategy in December 2015. A copy of the strategy is available from the Education Council website at www.scseec.edu.au/site/DefaultSite/filesystem/documents/National%20STEM%20School%20Education%20Strategy.pdf.

ii.   Purpose of the report

The aim of this report is to share information about existing STEM initiatives, including evaluation findings, to establish a stronger evidence base to improve our understanding of what STEM initiatives work in Australian contexts.

Robust, critical evaluations of STEM initiatives clearly identify what is working and what impact initiatives have. Drawing on such information helps to improve efficiency and effectiveness and better assist future decisions. Sharing these findings within the education sector will provide stakeholders with a summary of outcomes and trends and raise awareness of achievements to date. Access to data and findings from evaluations provides an opportunity to learn and improve professional practice, and enables interested parties to be able to look further into particular initiatives. Information sharing may also help to avoid duplication of effort between jurisdictions.

This report is not a comprehensive list or census of all the STEM programs being delivered in schools in late 2018 (information provided is as available up to 6 December 2018). Neither does it make a value judgement on the quality or suitability of any of the initiatives. Rather, it is a collection of information that can be used by policymakers to guide future STEM policy and program decisions.

The main audience for this report is policymakers with responsibility for developing and/or implementing STEM initiatives in Australian schools.

It is not intended for direct use by schools themselves, since the initiatives gathered are generally at too large a scale for single schools to implement. Rather, schools will benefit as education authorities implement such initiatives, and develop new initiatives informed by this report. However, as an extension to this exercise it may be beneficial to undertake a similar information-gathering activity for initiatives at the scale of a single school or cluster of schools. The design of such an activity is outside the scope of this report.

This report focuses on school education. It does not cover early learning, higher education, or the post-school vocational education and training sector.

This report focuses on initiatives in the government school sector, and only briefly touches on the Catholic and Independent sectors. It may be valuable for a future version of the report to include more information from these sectors. Undoubtedly, the Catholic and Independent sectors run many valuable STEM initiatives, whose evaluations could provide important insights.

As noted in the *National STEM School Education Strategy,* there are multiple approaches to teaching STEM and improving student aspiration, engagement and performance. This report, and its associated list of initiatives, aims to provide an evidence base and information resource to help policymakers decide if there are existing effective approaches that would provide a good model for their own initiatives.

iii.   Definitions

The term 'STEM' can mean different things in different contexts. Under the National Strategy, STEM refers collectively to the teaching of the disciplines within its umbrella – science, technology, engineering and mathematics – and also to a cross-disciplinary approach to teaching that increases student interest in STEM related fields and improves students' problem solving and critical analysis skills. STEM sits within a broader foundational knowledge base and the teaching of STEM is a part, albeit important, of a balanced program of learning.[2]

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[2] *National STEM School Education Strategy 2016-2026,*
See also the discussion of the term STEM and related terms in the STEM Partnerships Forum Report, *Optimising School-Industry Partnerships*, http://www.educationcouncil.edu.au/site/DefaultSite/filesystem/documents/Reports%20and%20publications/Publications/Optimising%20STEM%20Industry-School%20Partnerships%20-%20Final%20Report.pdf

2. Overview of STEM Education in Australian Schools

i.   Sources of funding and policy direction for STEM school education

All schools and teachers in Australia operate under legal and regulatory requirements established by the six state and two territory governments. The Australian Government, while not having constitutional responsibility for schooling, supports national policy directions and provides funding for schools, along with state and territory governments.

The majority of Australian students are educated in government schools although approximately one-third of Australian students attend non-government schools, classified as either Catholic or independent. Similar proportions apply to the teacher workforce, with around two-thirds of teachers employed by state and territory governments. Non-government school authorities and principals employ the remaining one-third.[3]

There are broad commonalities between schooling systems. All students receive primary and secondary education, and all states and territories align their teaching with the Australian Curriculum and participate in the National Assessment Program. These national collaborative frameworks for schooling are agreed through the Education Council, which reports to the Council of Australian Governments (COAG). Representatives of the non-government schooling sectors participate in Education Council working groups and consultative mechanisms.

Funding for STEM initiatives in schools can come from multiple sources including Australian, state or territory governments as well as industry investment, universities, and professional representative bodies. This report focuses on initiatives funded by governments. However it also includes a limited discussion of initiatives in non-government schools and programs provided to schools by private organisations. A future exercise with a broader scope could examine such initiatives in more detail, their impact on STEM education and insights they may yield for future initiatives and policy decisions.

ii.   Issues in STEM education

The Australian school STEM landscape is varied.

Australian students' achievement in international STEM assessments such as the Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS) is generally high, however there are signs of stagnation and decline.[4]

Australia's science and mathematics scores in PISA, which tests 15-year-old students, are above the OECD average but have declined significantly, and Australia's international ranking has declined correspondingly. In TIMSS, which tests Year 4 and Year 8 students, Australia's performance has remained largely the same over time, resulting in a lower international ranking as other countries improve.

Students' participation in STEM subjects has declined in recent years, particularly in advanced subjects. Enrolment in intermediate and advanced year 12 mathematics subjects has declined in recent years, as has enrolment in year 12 science subjects.[5]

Performance, engagement and participation vary from place to place, school to school and student to student. Providing better information to policymakers about effective STEM initiatives may help to address declining performance, engagement and participation and allow policymakers to choose the type of initiative to suit their particular needs.

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[3] ABS Schools Australia 2017 data release. http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4221.02017?OpenDocument

[4] Thomson, S, De Bortoli, L & Underwood C, 2017, *PISA 2015: Reporting Australia's Results,* ACER; Thomson, S, Wernert, N, O'Grady, E & Rodrigues, S, 2017, *TIMSS 2015: Reporting Australia's Results,* ACER.

[5] Kennedy, Lyons and Quinn (2014), *The continuing decline of science and mathematics enrolments in Australian high schools,* Teaching Science vol. 60 no. 2

iii. Current STEM initiatives

As noted above, there are multiple approaches to STEM initiatives that aim to improve student aspiration, engagement and performance. Better guidance is needed for schools and teachers to determine which approaches work best for different purposes and student cohorts.

A list of nominated school STEM initiatives can be found at **Appendix A**, summarising the information provided by jurisdictions. For the complete provided information about each initiative, please see **Appendix C**, which has been published as a separate document. Australia's current school STEM initiatives vary significantly in type, target, goal and scale. They might seek to connect students with STEM professionals, and in so doing inspire them to engage more deeply with the subject matter and continue their studies; or they might provide resources to help teachers deliver engaging and effective lessons. Some initiatives target students directly, while others seek to train their teachers, or engage their families and communities. The intended outcomes can vary too, ranging from initiatives that directly aim to improve students' STEM skills, to others that intend to increase student interest or broaden their aspirations, or some combination of the three. Whereas one initiative provides thousands of students with learning resources, another will seek to engage and inspire a hundred students to continue their STEM studies when they might otherwise have left the field.

All of these approaches are potentially valid and useful, are suited to different circumstances, and can often be used in conjunction with others. The goal of this paper is not to rank different approach types against one another, but to provide a resource that will allow policymakers to see examples of best-practice initiatives that could be useful to inform policies or programs in their own jurisdictions.

iv. Examples of evaluated STEM initiatives

The table below provides examples of evaluated STEM initiatives, based on information provided by jurisdictions up to 6 December 2018. A summary of evaluated initiatives is provided at **Appendix B**.

Project	External Evaluation findings
Queensland Department of Education's STEM partnerships and collaborations with Wonder of Science (University of Queensland) support professional development for teachers, engage students in STEM learning and share resources.	The Wonder of Science independent evaluation found that the program promoted a strong STEM culture, was widely implemented and was successful in building teacher capacity.
Thinking Maths (SA), a professional learning program for Year 6-9 mathematics teachers, aims to deepen understanding of mathematical concepts (in the Australian Curriculum: Mathematics) and evidence based effective pedagogies. The program was extended to Years 10 and 11 in late 2018 and a Masterclass program for Year 6-9 graduates to support them to lead learning in the field.	The largest statistical impact is on teachers' pedagogical content knowledge (Effect size: 0.70), as well as their professional identity and self-efficacy (ES: 0.61). Most teachers (92%) reported that Thinking Maths had an impact on their teaching practice that would last; their understanding of mathematics had improved (86%), their use of effective instructional strategies increased (91%) and it helped them to increase student engagement (87%). An impact equivalent to +2 months additional learning gain in Primary students' achievement.

Project	External Evaluation findings
The STEM Learning Project (WA) delivers a range of innovative STEM teaching resources that align with the Western Australian Curriculum. The resources support teachers to teach STEM in an integrated way from Kindergarten (Foundation) to Year 12 and have been developed with input from Western Australian school teachers.	99% of the teachers and school leaders felt the workshops were informative and valuable and 89% of the participants indicated that the workshops were very successful in equipping them with strategies for teaching STEM. Participants in trial schools rated the modules and the resources as highly effective. Smaller "starter modules" were suggested where schools did not have enough time to implement whole modules. The close alignment of the resources with the Western Australian Curriculum was important to the teachers.Teachers in primary classes were more willing to implement the modules. A number of teachers asked for more support. The teachers valued meeting and working with other teachers and suggested that this could continue in a community of practice model. The project has made a good start to giving teachers the strategies and skills to plan and deliver integrated projects in STEM.
Teacher Development Schools in WA deliver practical, school-based professional learning opportunities for teachers and school leaders to learn directly from the successful practices of others enabling expertise to be applied and shared across schools.	A key finding in the success of the professional learning support is the use of expert practising teachers to deliver the professional learning. 88% of participants indicated the professional learning provided sufficiently or considerably improved their curriculum knowledge. 66% of participants indicated they had changed practice in their classroom as a result of attending the professional learning.
The Marine Industry School Pathways Program (WA, SA and NSW) provides defence and allied industry work placements and traineeships; University Engineering summer schools, Robotics pathways, Integrated Cross-curricula STEM programs; defence industry incursions, excursions and career expos, professional learning for school staff and STEM initiatives with a focus on Indigenous and female participation.	Increase in the proportion of students participating in STEM courses and programs in SPP schools; increase in the proportion of students engaged in STEM pathways to Defence and Marine industry careers in SPP Schools.
Primary Connections (a national initiative) provides primary teachers with comprehensive curriculum and professional learning resources that link the teaching of science with the teaching of literacy. Focuses on developing primary students' knowledge, understanding and skills in both science and literacy, through an inquiry-based approach.	The University of Technology Sydney's independent evaluation found that Primary Connections had strong brand recognition, was widely implemented and was successful in building teacher capacity.

Project	External Evaluation findings
STEM Professionals in Schools (a national initiative) partners teachers with STEM professionals to enhance STEM teaching practices and deliver engaging STEM education in Australian schools.	Since 2007 this program has had three independent evaluations. The most recent evaluation in 2015 found that it is highly effective in terms of its scale of operation and there are significant benefits for students, teachers and STEM professionals.
Science by Doing (a national initiative) provides comprehensive online science resources that are freely available to Australian teachers and students in Years 7 to 10. Science by Doing includes curriculum units and professional learning modules and offers a practical way of implementing the Australian Curriculum: Science.	The most recent independent evaluation, completed by the University of Technology Sydney in 2018, found that Science by Doing resources have a positive impact on student learning science and teachers consider Science by Doing as an excellent teaching resource.

3. Evaluations of STEM School Interventions

i. *Key characteristics of the initiatives*

The list at **Appendix A** is not a complete list of STEM initiatives. It is a selection of the STEM initiatives operating in Australian jurisdictions, self-nominated by contributing jurisdictions in late 2018. Contributors were asked to include, in particular, any STEM initiatives with a completed or planned evaluation.

The list demonstrates the wide variety of initiatives that are currently being implemented in Australia. Broadly, they fit into a number of categories, noting that this is not a comprehensive list, and that the boundaries between these categories are not hard and fast. Some initiatives fit into more than one category, and some categories have overlap between them. This is simply a useful way of generalising the types of initiatives in place.

The categories are:

Targeted at teachers/schools:

- Teacher professional learning
    - Initiatives to improve the way that STEM is taught. They range from general training to ensure that teachers fully understand and feel confident with the content, through to more specialised programs that aim to help teachers to integrate STEM subjects or present them in new and challenging ways.
- Teaching resources
    - Initiatives to provide teachers and schools with resources that can guide and/or supplement their STEM-related lessons.
- Appointing "Mentor schools"
    - High-performing schools share their best practice teaching methods and programs.
- Industry/school partnerships
    - Encouraging and supporting partnerships between schools and industry, especially to help with students' career skills and education.
- Scholarships
    - Encouraging teachers to take up STEM learning courses or encouraging STEM professionals to become teachers.

Targeted at students/families/community:

- Learning/information resources for students, parents and the community
  - Providing a suite of resources for students, parents and the community to better understand STEM and its potential, provide information on STEM-related events and other related topics.
- Extension programs for gifted students
  - Programs to help gifted students reach their full potential.
- Extra-curricular learning and engagement programs
  - Out-of-class programs to provide students with new skills and understanding and increase their enjoyment of STEM.
- Grants for student and school projects
  - Grants to facilitate schools and students to undertake projects that will give them real-world-applicable skills related to STEM.
- Camps
  - Intensive learning in the form of a several-day camp. May be targeted at underrepresented groups.
- Scholarships
  - Encouraging students, particularly those who are underrepresented in STEM, to further their STEM education.
- Science/STEM fairs and competitions
  - These differ from many other initiatives in that they do not attempt to improve students' skills and knowledge directly; rather, they create an environment in which STEM skills and knowledge are valued and rewarded. The limited evaluation information available for these initiatives suggests that they can be very successful in improving students' engagement.

Although initiatives run by the Catholic school sector are not included in this report and the associated list, a small sample of initiatives provided by the sector shows that similar categories are covered.

Overall, the initiatives cover both the 'supply side' of STEM education, i.e. helping teachers and schools to improve the way that they teach STEM, and the 'demand side': helping students directly.

Scale of initiatives

Limited information has been provided on funding for the initiatives listed, but where information is available, the initiatives vary in cost from tens of thousands of dollars through to tens of millions. Similarly, the reach of the initiatives varies from relatively small, involving tens of students and/or teachers, through to very large, involving tens or hundreds of thousands of users across a state, territory or the entire country. There is, then, a wide variety of options for different budgets – recognising that different circumstances call for different approaches. A large-scale (state, territory or nationwide) initiative might achieve excellent results, but then so might a much smaller, targeted initiative.

Currency of initiatives

Most initiatives in the list started relatively recently – in 2016 or later. The oldest, where information is available, began in 2003. The list focuses on initiatives that have been in operation in the period after 2010. The comprehensiveness of the evaluations conducted varies.

ii. *Findings and analysis*

Evaluations

Many of the initiatives do not have completed evaluations available for analysis, so it is difficult to draw conclusions about the value of each initiative and the areas where there may be room for improvement. However, the vast majority of the evaluations that are available show that the initiatives have been very successful in meeting their objectives. For the most part, changes that have been recommended and

implemented have been minor tweaks to delivery. This indicates that the initiatives have been working well and improving as they progress. Although there are a number of caveats, such as the data being very limited, that not every initiative is suited to every situation or to scaling up, and that different locations will undoubtedly have different challenges with implementation, it is encouraging to see that Australian STEM initiatives are generally having very positive effects.

A high proportion of the initiatives in the table at **Appendix A** are relatively new – from 2016 or more recent. This means that their full evaluations have not been completed. As noted, some evaluation data is available, which is mostly very positive. However, it would be useful to revisit these initiatives in future years, once the evaluations are complete. This will allow for the collection of a larger body of evaluation information to assist in high quality decision-making by policymakers when they develop and implement new and/or modified STEM initiatives.

Strength of evaluation evidence

The scale of this exercise means that it is not feasible to conduct an analysis of the quality of the evaluations that have been conducted. Additionally, in most cases, full evaluation reports have not been made public. Anyone seeking to assess the strength of individual evaluations should, in the first instance, contact the relevant person listed in the separate spreadsheet made available to jurisdictions to enquire about whether a copy of the evaluation report(s) and methodology is available. It is important to note that independent external evaluations are the gold standard for evaluating a program, to maximise impartiality of conclusions and recommendations.

4. Conclusion

More time is needed to determine which initiatives are successful

Given the relative recency of most of the initiatives on the list, and the small number of completed evaluations, at this stage it is difficult to say which initiatives are having a positive effect. It would be valuable to revisit these initiatives once they have been evaluated, to allow a more complete list of evaluations and lessons learnt to be compiled.

Similarly, where feasible and relevant, it may be useful to examine students' STEM achievement in the years following their participation in a STEM initiative. This approach will not be relevant for all initiatives – for example, there may be a desire to focus on improvements in engagement or participation, rather than achievement – but for some initiatives an examination of long-term effects on achievement could be very valuable.

Initiatives should be evaluated wherever possible, and the results made public

There are many STEM initiatives that have not yet been evaluated, and some that may not be evaluated at all. An even greater number will not be externally evaluated, which is generally the most reliable form of evaluation.

Evaluation should be very strongly encouraged. A best practice approach to evaluation is to build it in from the very beginning. A well-designed evaluation can show how well an initiative is performing, in terms of meeting both its output and outcome goals. Regular evaluation results can also help to improve an initiative while it is being delivered. Nobody can be expected to plan and run a program perfectly – a good evaluation will be able to find where an initiative is not performing as well as it could, and provide guidance on the changes that need to be made. Of course, sometimes an evaluation will show that an initiative is not achieving the desired results. This sort of result, although undesirable and often very disappointing, is equally valuable. Money that is being spent on an underperforming initiative can be redirected to another program that will achieve better results for Australia's youth.

One of the key goals of the National Strategy is to build a strong evidence base to improve the design of future programs and help schools and teachers make decisions about the initiatives that could best help their students. A more open sharing of information about the outcome of initiatives, including evaluations, is an important step in this direction. Ideally, evaluation results should be made public, or at

least available on request. It is important to acknowledge that no initiative is perfect, and evaluations contain valuable information that can be used to improve future programs and prevent mistakes being made more than once.

Recommendations for future revisions

It would be useful to revisit this collaborative national exercise on a regular basis, at an appropriate interval (perhaps every 2-3 years). This would allow an evidence base to develop, refreshed with updated information from the evaluations currently underway.

If there is demand, it could also be expanded in scope to include more non-government and smaller-scale initiatives – particularly those that have detailed research and/or evaluation data that is publicly available.

It may also be useful to create a similar list or database of initiatives at the school level. Such a project would give individual schools an easy place to search for and find initiatives that would be best suited for their size, budget and objectives. This would be in keeping with the approach of the Australian Curriculum, which provides guidance on the content that students should learn while giving schools freedom to choose the way that they teach their students.

Appendix A: Summary of nominated school STEM initiatives

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
Academy of Futures Skills	ACT	The Academy of Futures Skills (the Academy) will build science, technology, engineering and mathematics (STEM) discipline and skills across ACT public schools through the establishment of two hubs: one in Canberra's north and one in the south. The Hubs will support student outcomes through a focus on improved teaching and learning in STEM disciplines. The Hubs will also provide an enabling environment for teachers using the facilities to be supported and guided by experienced STEM pedagogical leaders in the delivery of innovative and challenging learning programs. The objectives of the Academy are to: • showcase and inspire innovation in ACT public education • build instructional leadership capability and enable excellence in futures-focused teaching and learning • activate deep learning in STEM disciplines, and develop students' transdisciplinary knowledge, skills, capabilities and dispositions • provide access to expert mentors for teachers and students, and industry partnerships for schools • improve student achievement in STEM-related disciplines and enhance STEM study and employment pathways for all students.	Teachers; Students; Families; School leaders; Industry/ community	Primary; Secondary	Large	Not yet complete

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
Science Mentors ACT	ACT	Science Mentors ACT provides ACT public school students in years nine to twelve the opportunity to work with science and engineering professionals on extended student-driven investigations. Through Science Mentors ACT, students gain a genuine science and engineering experience. Through Science Mentors ACT, students work with STEM professionals in a field of the student's choice, develop experimental, analytical and evaluative skills specific to their chosen field. They gain experience and skills writing professional level science reports. This initiative is part of the Academy of Futures Skills.	Teachers; Students; Families; School leaders; Industry/ community	Secondary	Small	N/A
Principals as Numeracy Leaders	ACT	The aim of the PANL program is to provide principals and other numeracy leaders with the knowledge and understanding of both effective leadership for learning and the content knowledge required to focus such leadership on numeracy. Specifically the aims are to: enhance school leaders' efficacy in instructional leadership, enhance school leaders' knowledge of essential numeracy content and to assist in the design of whole school planning for numeracy improvement. Four professional learning modules run over two semesters.	School leaders	Primary; Secondary	Medium	N/A

Name	State/Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
Middle Years Mental Computation program	ACT	The Middle Years Mental Computation program was established through a project directed by Professor Alistair McIntosh in partnership with Tasmania and the ACT. This program aimed at assessing and improving the mental computation ability of students. The product is a resource (Mental Computation: A Strategies Approach, 2004) for teachers to assess student understanding and scaffold learning through a series of modules with explicit teaching of strategies for understanding and applying number. The professional learning has seven modules linked to the Australian Curriculum: Introduction and planning, addition and subtraction, multiplication and division, fractions, percentages, decimals, and ratio, and is currently delivered face to face.	Teachers; students	Primary; Secondary	Large	N/A
Information Technology Educators ACT (InTEACT) Canberra Girls Programming Network	ACT	The Canberra Girls' Programming Network runs free, hands-on programming workshops for girls in grades 4–12. Girls are introduced to a range of topics such as cryptography and games and code their own programs using the Python programming language. Events are run several times a year by volunteer local women studying or working in IT in industry, academia and government.	Teachers; Students; Families; School leaders; Industry/community	Primary; Secondary	N/A	N/A
Lake Tuggeranong College in partnership with the Department of Human Services	ACT	Lake Tuggeranong College has partnered with the Department of Human Services Chief Information Officer Group to be part of a work experience pilot. This is an eight week work experience program where students study CISCO IT networking and will work with the Cybersecurity section of DHS. This program has targeted young female students to do girls-only work experience in IT-based security. The pilot program will expand to include other schools.	Teachers; Students; Families; Industry/community	Secondary	Small	N/A
Count Me in Too	ACT (also National)	Count Me In Too is based on the Australian Curriculum numeracy continuum and has a focus on quality teaching practices. This initiative enables teachers to see the learning and developmental progression from K – 8 along the numeracy continuum.	Teachers	Primary	N/A	N/A

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
Science Educators' Association of the ACT (SEAACT) Science Fair	ACT	The SEAACT Science Fair encourages active involvement and interest by students in science both in class and beyond the boundaries of the classroom. It encourages students to undertake planned and controlled investigations in science and report their results in an appropriate manner and to apply these processes to scientific inquiry to topics of interest. The Fair then enables the community, including other students and teachers, to see project work completed by students in ACT senior secondary schools, primary schools, high schools and preschools. Entrants in this Fair can then gain entry to the BHP Billiton Science Competitions.	Teachers; Students; Families; School leaders; Industry/ community	Primary; Secondary	N/A	N/A
STEM Sells (CIT)	ACT	STEM Sells provides girls with opportunities to develop skills in 3D printing, electronics, robotics, web development. This program aims to provide greater opportunities and engagement for girls in years 7-9 through STEM-based projects over a ten week period. The program provides a safe and supportive environment to explore the creative real-world applications of STEM.	Students	Secondary	Small	N/A
Aviation Science program	ACT	Aviation Science program covering basic aviation theory as per the senior secondary Aviation Science and Navigation units accredited by the Board of Senior Secondary Studies (BSSS). As part of their assessment, students deliver a STEM project-based learning program to primary and high school students. The program also provides an opportunity for students to develop their general capabilities through the STEM practices and engagement with local students.	Teachers; students; families	Secondary	Small	N/A
ACT teacher scholarships program	ACT	The ACT Teacher Scholarship Program provides financial support to ACT teachers and school leaders within the Education Directorate to undertake further education, training and research aligned to current Directorate priorities that will lead to an improvement in student learning outcomes.	Teachers	N/A	Small	N/A

Name	State/Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
Stage 3 integrated STEM project	NSW	The Stage 3 Integrated STEM Project has adopted an integrated approach to teaching mathematics, science and technology in Stage 3 classrooms. The project aims to develop learning experiences through the use of project-based learning strategies and trial quality integrated STEM programs in schools across NSW. Teachers from 35 schools working either as individual schools or as communities of schools are involved in the project and will document their journey. Teachers will use design thinking methods to develop problems and find solutions, engaging their students in these processes as co-creators of the learning.	Students	Primary	Small	N/A
Stage 4 integrated STEM project	NSW	The Stage 4 Integrated STEM Project promotes an interdisciplinary approach to teaching science, technology, engineering and mathematics in Stage 4. Teachers engaged in cross-curriculum planning with a major focus on aligning syllabus outcomes and promoting higher order thinking through authentic project-based tasks. The unit of learning provided a guide for integrated teaching and learning, inquiry learning and design thinking.	Students; teachers	Secondary	Small	N/A
STEM Action School Mentoring Program - Secondary	NSW	NSW Department of Education has established seven STEM Action Schools at a high school level to mentor and share innovative STEM practice and programs with other schools. STEM Action Schools implement curriculum programs designed to develop students' foundational knowledge and skills in STEM subjects as well as skills of collaboration, critical and creative thinking and problem solving. A goal of this program is to facilitate experienced staff to lead a community of practice in the teaching of STEM.	Teachers; Schools	Secondary	Small	N/A

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
ME Program - iSTEM curriculum	NSW	In 2013 the ME Program in collaboration with local industry and STEM teachers at Maitland Grossmann High School developed the iSTEM curriculum. iSTEM is a student centred subject for students in Years 9 and 10 that delivers Science, Technology, Engineering and Mathematics (STEM) in an integrated way. iSTEM is a School Developed Board Endorsed Course (SDBEC) which has been approved by the NSW Education Standards Authority. It incorporates mechatronics, aerodynamics, engineering, 3D CAD/ CAM, aerospace and motion modules, iSTEM presents maths and sciences to students in ways that challenge not only their understanding of these key subjects but also their ability to manage projects and work in teams. It was initially taught in seven hunter region schools, but has now been rolled out to over 262 schools across NSW.	Students	Secondary	Medium	N/A
STEMShare Community program	NSW	STEMShare Communities is a coordinated program of STEM technology kits, teacher training, curriculum-linked learning challenges and an online community of practice, empowering schools to teach students the skills to solve the problems of tomorrow. It aims to raise awareness of the effective use of technology, to improve student learning and enable teachers to understand, experience and embed STEM technologies effectively into the teaching and learning cycle.	Students	Primary; Secondary	Large	N/A

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
STEM Industry Schools Partnership - SISP (STEM Share Partnerships)	NSW	This STEM initiative initially focuses on three regional areas: Cessnock, Orange and Goulburn. The main priorities for 2018 include setting up three regional communities of STEM practice, developing sustainable school/industry partnerships for STEM career education, providing professional learning for regional and remote schools, revising the Stage 5 iSTEM course, implementing a Stage 4 iSTEM course and developing a Stage 3 iSTEM course. Focus on primary school to high school transition is also embedded in the initiative.	Teachers; School leaders; Industry/ community	Primary; Secondary	Small	N/A
STEM Action School Mentoring Program - Primary	NSW	NSW Department of Education has established eight STEM Action Schools at a primary school level to mentor and share innovative STEM practice and programs with other schools. STEM Action Schools implement curriculum programs designed to develop students' foundational knowledge and skills in STEM subjects as well as skills of collaboration, critical and creative thinking and problem solving. A goal of this program is to facilitate experienced staff to lead a community of practice in the teaching of STEM.	Teachers; students	Primary	Medium	N/A
Rural and Remote Primary STEM project	NSW	The Rural and Remote Primary STEM Project has adopted an integrated approach to teaching mathematics, science and technology across K-6. The project aims to develop learning experiences through the use of project-based learning strategies. Teachers from 33 schools working either as individual schools or communities of schools are involved in the project and will document their journey. Three STEM action schools provided advice and support for the 33 schools.	Teachers; students	Primary	Small	N/A
Centre for Excellence schools	NT	Centres for Excellence cater for high ability government school students in Years 10, 11 and 12 who have a passion for learning in a specialist area.	Students	Secondary	Small	N/A

Name	State/Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
Extending digital skills challenge events to children in regional centres	NT	Children in regional areas will have opportunities to participate in digital challenges and learn new skills so they can succeed in the digital jobs market. Digital skills programs successfully delivered in Darwin are being taken to Territory regional and remote centres to reach more NT children. Digital solutions, drone programs, LEGO® League competition, Coding Camps and RoboCup Junior competitions programs are fun learning activities that excite and engage children and foster their natural interest in learning while gaining valuable digital skills.	Students	Primary; Secondary	Small	N/A
Build partnerships between the education sector, digital innovators and industry to grow STEM education and increase digital skills.	NT	The Department of Education will coordinate and pursue partnerships between schools and innovation orientated organisations to strengthen the focus on STEM skills for Territory school students and highlight opportunities that are available through digital jobs.	Students; School leaders; Industry/ community	Primary; Secondary	N/A	N/A
STEM Hub for schools STEM Hub	Qld	The STEM hub for schools website supports school staff to implement engaging STEM teaching and learning programs and foster student participation and achievement in STEM. The STEM hub brings together information, resources and advice for students, families and community members wanting to learn more about STEM.	Teachers; Students; Families; School leaders	Primary; Secondary	Medium	N/A

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
Entrepreneurs of Tomorrow school grants	Qld	116 state primary and high schools, including some clusters of schools, shared in 100 Entrepreneurs of Tomorrow grants. The schools or cluster of schools each received or shared in a $16,600 grant to nurture the next generation of digital entrepreneurs. Entrepreneurial skills are essential to drive innovation, productivity and global awareness. Schools used their coding, robotics and entrepreneurial programs to provide opportunities for students to create innovative digital solutions and to connect with industry expertise. Schools built students' entrepreneurial skills through real world experiences by inspiring them to be the creators of Queensland's future.	Teachers; Students; School leaders	Primary; Secondary	Medium	N/A
STEM Girl Power initiative including: Camp and Alumni Event	Qld	The STEM Girl Power Camp is an annual initiative of *Advancing Education: An action plan for education in Queensland*. The camp encourages girls to participate in STEM by engaging in a range of exciting STEM experiences and inviting them to inspire other students by being a STEM ambassador in their school and community. The camp coincides with the annual World Science Festival Brisbane. The STEM Girl Power Alumni Event is held in Semester 2 and celebrates the activities STEM Girl Power Camp students have undertaken in their schools during the year.	Students	Secondary	Small	N/A

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
Queensland Coding Academy	Qld	There are two related but separate websites. The Queensland Coding Academy is a resource developed to build teacher capability and support school implementation. It was developed in recognition that the Australian Curriculum: Digital Technologies contains content some schools may not have previously taught. It includes advice for school leaders, resources and links, teaching strategies, introductory activities, and unpacks the curriculum including key concepts. The QCA: Student supports differentiated teaching and learning of the Digital Technologies subject in the classroom. It includes practical activities for all levels of student ability. The website is a supplementary resource that can be used to support teaching the Curriculum into the Classroom (C2C) Digital Technologies' units. It is accessible by students and teachers.	Teachers; Students; School leaders	Primary; Secondary	Large	N/A
Premier's Coding Challenge	Qld	The Premier's Coding Challenge encourages student creativity and engagement in coding, and provides an opportunity to showcase and celebrate their innovation and achievements developing a game, animation or app to help friends stay safe and secure in a digital world.	Students	Primary; Secondary	Small	N/A

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
STEM virtual academies	Qld	The Queensland Virtual STEM Academy (QVSA) will deliver enrichment and enhancement programs focusing on current, real world STEM challenges and research. These programs will be developed and delivered by Queensland Academy for Science Mathematics and Technology or sourced from likeminded, quality assured partners and school centres of innovation or specialisation. The learning delivered by the QVSA is aligned to the Australian Curriculum and is designed to extend learning and challenge student interests and learning beyond the Australian Curriculum. The QVSA will use an innovative, real time, online learning platform to deliver programs and enable students to collaborate with other likeminded, highly capable STEM students.	Students	Primary; Secondary	Medium	N/A
Robotics for the future Lending Library	Qld	The Robotics for the future Lending Library provides access to Pepper, NAO robots and Sphero classroom kits from the Robotics for the future Lending Library to support schools to teach coding and robotics.	Teachers; Students	Primary; Secondary	Medium	N/A
Advancing STEM in Queensland's state primary schools	Qld	Advancing STEM in Queensland state primary schools is enabling primary schools to source the expertise they need in their local context from secondary schools, universities or industry and align this with their school improvement plan. The funding is also helping primary schools to access the resources they need and forge new partnerships to make STEM learning more active and engaging.	Teachers; Students; School leaders	Primary	Large	N/A

Name	State/Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
#qldtechschools	Qld	The #qldtechschools initiative has been developed to support Queensland state schools to implement the new Australian Curriculum: Technologies by the end of 2020. Participation in #qldtechschools will support schools to build teachers' capability to teach, assess and report on Digital Technologies and Design and Technologies.	Teachers; School leaders	Primary; Secondary	Large	N/A
STEM Teacher Symposium	Qld	The STEM Teacher Symposium aims to build a culture of evidence-based practice and to showcase the delivery of innovative and high quality STEM teaching and learning in state schools.	Teachers; School leaders	Primary; Secondary	Large	N/A
Department of Education, STEM partnerships and collaborations with Queensland Museum, World Science festival Brisbane	Qld	The department has developed partnerships and collaborations to support STEM professional development for teachers, engage students in STEM learning and share resources. World Science Festival Brisbane (WSFB) program includes dedicated educational programs that underpin Queensland Museum's commitment to support and foster STEM-literacy and inspire a love of science by showcasing the diverse career opportunities afforded by studying these subjects.	Teachers; Students; Families; School leaders; Industry/ community	Primary; Secondary	Large	Completed – see Appendix B

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
Department of Education, STEM partnerships and collaborations with Wonder of Science (University of Queensland)	Qld	The department has developed partnerships and collaborations to support STEM professional development for teachers, engage students in STEM learning and share resources. The Wonder of Science program will provide inquiry-based STEM experiences for schools and students. Wonder of Science programs support students in remote and rural areas.	Teachers; Students; School leaders; Industry/ community	Primary; Secondary	Large	Completed – see Appendix B
Department of Education, STEM partnerships and collaborations with CSIRO	Qld	The department has developed partnerships and collaborations to support STEM professional development for teachers, engage students in STEM learning and share resources. CSIRO's Education and Outreach has a team of professional educators across Australia which: - develop and provide high quality, innovative and authentic STEM education experiences to deliver positive impact for Australia; - deliver value through engaging and empowering opportunities for educators, industry, government and community; - work creatively and collaboratively to deliver high quality products and services and provide authentic learning experiences to all Australians; and - raise the awareness of CSIRO and Australian Innovation to drive economic, environmental and social impact for Australia.	Teachers; Students; School leaders; Industry/ community	Primary; Secondary	Large	Completed – see Appendix B

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
Step into STEM Teaching Scholarships	Qld	The Step into STEM Teaching Scholarships program offers support for accomplished, tertiary-qualified individuals to undertake postgraduate initial teacher education studies. The program is managed by the Queensland Department of Education (DoE) to assist state schools in attracting high quality professionals. Scholarship recipients receive generous financial support, guaranteed employment as a teacher in a Queensland state school and a range of additional assistance during their studies and transition from graduate to beginning teacher. Scholarship recipients who secure permanent employment with the Queensland DoE are required to fulfil a minimum service commitment of up to three years (dependant on category) full-time employment once their studies are completed.	Other - Tertiary-qualified individuals who are considering a career in teaching.	Other - Tertiary-qualified adults	N/A	Completed – see Appendix B
Year 7 and 8 STEM Collaborative Inquiry Project	SA	The Year 7 and 8 STEM Collaborative Inquiry Project brings together five school networks (minimum of one secondary school and four primary schools collaborate together) with industry and academic partners to collaboratively design, trial and evaluate innovative and evidence-informed approaches for STEM learning across primary and secondary schools. (In SA Year 7 are in primary schools). The project has worked with the University of South Australia to capture data and evidence to inform system-side leadership for improving year 7 and 8 continuity of learning, achievement and engagement. Teaching and learning resources developed by the project have been shared with all schools.	Teachers; Students; Families; School leaders; Industry/ Community	Primary; Secondary	Medium	Not yet complete
Thinking Maths	SA	A professional learning program for mathematics teachers of Years 6 to 9. Aims to deepen understanding of mathematical content and concepts (AC: Mathematics). Five face-to-face days over 6 months, presenters modelling effective pedagogical practices, encouraging	Teachers	Primary; Secondary	Large	Completed – see Appendix B

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
		reflective practice and student-focused, inquiry-based learning, through professional collaboration. The program was extended to Years 10 and 11 in late 2018. Also in late 2018, the program began trialling a Thinking Maths masterclass for up to 70 graduates to increase the capacity to design and deliver the Thinking Maths program.				
STEM 500 Primary Educators	SA	A professional learning program for 800+ primary school teachers (2 from each school with primary enrolments). The aim is to deepen pedagogy content knowledge in one of the STEM disciplines of science, technologies and mathematics; and to learn how to design and deliver cross disciplinary STEM learning in the primary years. The program consists 9 days of face to face training and 5 days release time to design STEM Learning within a local professional learning community. The program is delivered over 18 months.	Teachers	Primary	Medium	N/A
STEM Scholarship Program	SA	A $1m scholarship fund is supporting 107 students from under-represented groups (Aboriginal learners and low SES) to pursue advanced STEM subjects in Years 11 and 12. The scholarship fund covers any item, including tutoring that supports achievement in these subjects. Aboriginal scholarship recipients are given the opportunity to join the University of Adelaide's Karnkanthi Indigenous Education program that aims to build students' (years 10 to 12) confidence and capacity to pursue a university education.	Students	Secondary	Medium	N/A
Big Ideas in Number – Middle Years	Tas	A two day spaced professional learning program which introduces teachers and leaders of numeracy in schools to a range of teaching strategies and pedagogical practices to support a deeper understanding of "Big Ideas in Number" by their students.	Teachers; School leaders	Primary; Secondary	Small	N/A

Name	State/Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
Explicit Teaching of Number in Prep for LIFT schools	Tas	Two full day spaced face to face workshops that focus on key teaching strategies and resources to support the Big Ideas in Number, the role of the teacher for planning for intentional teaching in number, and the use of diagnostic tools for identification of and planning for student needs. For teachers at LIFT (Learning in Families Together) schools. LIFT provides opportunities for families to be actively involved in their K-2 child's learning.	Teachers; School leaders	Primary	Small	N/A
Middle Years Mathematics – Number and Algebraic Reasoning	Tas	A four-day program for numeracy/mathematics coordinators, coaches, specialist teachers and mathematics teachers to develop content knowledge and associated pedagogical skills in the teaching of algebraic reasoning from Years 5-9.	Teachers; School leaders	Primary; Secondary	Small	N/A
Amplify STEM Schools	Tas	Amplify STEM schools have been selected by the Tasmanian Department of Education to lead the way in STEM professional learning and integrated curriculum planning for Tasmanian primary and secondary schools.	Teachers; School leaders; Students	Primary; Secondary	Small	N/A
STEM Professional Learning - based on the STEM Framework	Tas	Various STEM professional learning programs ranging from Introduction to STEM, Leading STEM, Next Steps in STEM learning (for teachers that had engaged in the Introduction to STEM and Leading STEM programs) and Implementing STEM. All four programs are based on the DoE STEM Framework.	Teachers; School Leaders	Primary; Secondary	Medium	N/A
Teacher Development Initiative - Technologies Specialisation	Tas	Technologies Specialisation to support the teaching of the 'Technologies and Engineering' components of STEM.	Teachers	Primary; Secondary	Small	N/A

Name	State/Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
Primary Mathematics and Science Specialists	Vic	2 teachers from participating schools are trained in either mathematics or science over a two-year period. Professional learning is delivered by experts in mathematics, science and educational leadership, as well as by PMSS specialists from previous cohorts, to support the school-wide improvement of mathematics and science education in participating schools.	Teachers	Primary	Medium	Completed – see Appendix B
STEM Catalysts	Vic	(pilot initiative) 54 secondary teachers, from 29 schools, completed a Graduate Certificate in STEM Education. Catalysts came from very low SES schools. Catalysts were intended to come in pairs (one a curriculum leader, one an out-of-field teacher) – didn't always happen like this. Final evaluation due December 2018.	Teachers	Secondary	Small	Not yet complete
Victorian Maths Challenge	Vic	The Challenge provides a range of high quality, online, captivating mathematical experiences that young people in kindergarten to Year 10 and their families can participate in together.	Teachers; students; families	Early childhood; primary; secondary	Large	Not yet complete
Secondary School Software Suite	Vic	The Secondary School Software Suite provides broad-ranging, fun, interactive and up-to-date digital resources to drive student engagement, collaboration, communication and learning in secondary schools. The software supports teaching across the Victorian Curriculum F-10, VET, and VCE. As it is accessible on students' own devices, the software also helps reduce costs to schools and families. Wolfram and Stile software is provided as part of this suite to support STEM learning and teaching.	School leaders; teachers; students; families	Secondary	Medium	Not yet complete

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
STEM Learning Project	WA	The STEM Learning Project was established to deliver a range of innovative STEM teaching resources that align with the Western Australian Curriculum including the General Capabilities. The resources will support teachers to teach STEM in an integrated way from Kindergarten (Foundation) to Year 12 and have been developed with input from Western Australian school teachers. The project will include the delivery of: • 38 teaching and learning resources across Foundation to Year 12 • 16 online professional learning modules aligned to the teaching and learning resources • Statewide face to face professional learning The resources will be available to all Western Australian schools through the Department of Education Connect portal. Professional Learning workshops have occurred since 2016.	Teachers; School leaders	Primary; Secondary	Medium	Completed – see Appendix B
Teacher Development Schools (TDS)	WA	Teacher Development Schools (TDS) deliver practical, school-based professional learning opportunities for teachers and school leaders to learn directly from the successful practices of others. This enables expertise to be applied and shared across schools.	Teachers; School leaders	Primary; Secondary	Medium	Completed – see Appendix B

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
DigiTech Schools	WA	For 2018 and 2019, seven DigiTech Schools have been established to support the implementation of the WA Curriculum: Digital Technologies. DigiTech Schools deliver practical, school-based professional learning opportunities for teachers and school leaders to learn directly from the successful practices of others. This enables expertise to be applied and shared across schools. Each DigiTech school received $44,000 and participated in an induction day on 12 and 13 February 2018. The DigiTech Schools are participating in the Teachers Can Code professional learning to build their own capacity to teach the more challenging aspects of the curriculum. DigiTech Schools also participate in the Innovation Partnership Schools program to develop innovative methods and practices in Digital Technologies.	Teachers; School leaders	Primary; Secondary	Medium	Completed – see Appendix B
Innovation Partnerships Program	WA	The STEM Innovation Partnerships program was established as a partnership between the Department and the Innovation Unit. The program focuses on the collaborative development of practices that increase engagement, participation and achievement of all learners. These partnerships are action-oriented and require participants to be prepared to learn and work together in a collaborative endeavour, for the benefit of students in their school, other schools, and every public school in Western Australia. Since 2016, 131 schools have engaged with the STEM Innovation Partnership initiative.	Teachers; School leaders	Primary; Secondary	Medium	N/A

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
Teachers Can Code (TCC)	WA	The Teachers Can Code (TCC) professional learning program is a Department of Education (Department) initiative to support the implementation of the Western Australian Curriculum: Digital Technologies. The program develops teachers' capacity to integrate Digital Technologies, including coding, into teaching and learning programs. ACA has been contracted to design, develop and deliver the TCC professional learning program. During 2018 and 2019, the ACA is training selected 110 TCC lead teachers to deliver eight primary and eight secondary TCC professional learning modules. TCC lead teachers are supporting other teachers to build their knowledge and expertise enabling quality implementation of the Western Australian Curriculum: Digital Technologies. Lead teachers' schools receive funds to support lead teacher participating and delivering TCC professional learning program. This funding covers ten teacher relief days for the lead teacher to attend the face-to-face workshops (six days); and plan and present a minimum of six modules of the TCC professional learning program in 2018 and 2019.	Teachers; School leaders	Primary; Secondary	Medium	Evaluation underway – for available information see Appendix B
Marine Industry School Pathways Program	WA; SA; NSW	Defence and Allied Industry work placements and traineeships; University Engineering summer schools, Robotics pathways, Integrated Cross-curricula STEM programs; Defence Industry incursions, Excursions and career expos, Professional development STEM capability of school staff, STEM initiatives which provide an increased focus on indigenous and female participation.	Teachers; Students; School leaders; Industry/ community	Primary; Secondary; Training and University	Medium	Completed – see Appendix B
STEM Enterprise Schools initiative	WA	As part of the State STEM Skills Strategy, the STEM Enterprise Schools initiative consists of: **STEM Professional Learning** During 2019, 60 STEM Enterprise Pioneer Schools are participating in the STEM Professional Learning program. In 2020, an additional	Teachers; School leaders	Primary; Secondary	Medium	N/A

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
		60 schools will commence their journey as STEM Enterprise Partner Schools. The program is supporting identified public schools with a low to mid ICSEA to implement whole-school approaches to STEM education and build capacity in STEM education practices. It will bring together the school community, including parents, local industry and employers. Clusters of schools will focus on building pathways from primary to secondary to post-school that support students to take up STEM-related careers and build STEM capabilities. **STEM Mentoring Program** The STEM Mentoring program is supporting the primary and secondary schools participating in the STEM Enterprise Schools program, to implement whole-school approaches to STEM education and to build their capacity in STEM education practices. The program is promoting the sharing of STEM education classroom expertise and innovation practices. STEM Mentor Schools will have implemented programs that foster students' curiosity towards STEM, shared effective STEM pedagogy, exemplified innovative practice for student engagement in STEM and demonstrated successful leadership. Mentee schools will be mentored through a range of face-to-face and online mentoring opportunities to develop and implement a whole-school STEM education improvement plan.				
Primary Connections: Linking Science with Literacy	National	Primary Connections provides primary teachers with comprehensive curriculum and professional learning resources that link the teaching of science with the teaching of literacy. Focuses on developing primary students' knowledge, understanding and skills in both science and literacy, through an inquiry-based approach.	Teachers	Primary	Large	Completed – see Appendix B

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
reSolve: Mathematics by Inquiry	National	reSolve: Mathematics by Inquiry provides teaching and professional learning resources that support teaching mathematics through inquiry-based methods and help students learn mathematics in fun and innovative ways. reSolve: Mathematics by Inquiry resources target students from Foundation to Year 10 and are freely available to all Australian teachers.	Teachers	Primary; Secondary	Large	Completed – see Appendix B
Coding across the Curriculum initiative (Digital Technologies Hub and Code Club)	National	Provides a scope and sequence, lesson ideas and assessment materials to support teaching DT. Resources are in a searchable repository. Resources are provided to support inclusive teaching practices. Materials are included for students and families. Materials are a mix of providing access to resources that already exist and those that are purpose developed for the Hub. An active professional learning network is fostered through newsletters, social media, conference presentations and webinars.	Teachers; Students; Families; School leaders	Primary; Secondary	Large	Completed – see Appendix B
Summer Schools for STEM (Curious Minds)	National	A hands-on extension and mentoring program to ignite girls' passion in STEM. Around 60 girls who have demonstrated potential participate in a six month program, including a summer school, follow-up activities and winter school, each year.	Students	Secondary	Small	N/A
ICT Summer Schools (digIT)	National	A series of summer schools that target Year 9 and 10 students from groups that are under-represented in STEM and engage them in digital technologies and related careers. digIT gives students the chance to attend a digital technology-based summer school, accompanied by five months of mentoring and a follow-up residential school.	Students	Secondary	Small	Not yet complete

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
STEM Professionals in Schools	National	STEM Professionals in Schools partners teachers with STEM professionals to enhance STEM teaching practices and deliver engaging STEM education in Australian schools. Flexible partnerships enable students and teachers in both primary and secondary schools to: • support delivery of the Australian Curriculum • understand how STEM skills and knowledge are applied in the real world • introduce them to emerging STEM innovations and potential career paths • provide them with student mentoring opportunities • connect with industry to understand workplace expectations and aspirations.	Teachers; Students; STEM Professionals; Business/ Industry	Primary; Secondary	Large	Completed – see Appendix B
Digital Technologies Massive Open Online Courses	National	The University of Adelaide's Digital Technologies Massive Open Online Courses (MOOCs) provide free professional development for teachers on the Australian Curriculum: Digital Technologies, and free access to the latest digital technologies equipment through a National Lending Library.	Teachers; Students	Primary; Secondary	Large	N/A
Digital Technologies in Focus	National	Digital Technologies in Focus, delivered by the Australian Curriculum, Assessment and Reporting Authority (ACARA), provides support for around 160 disadvantaged schools to assist them in implementing the Australian Curriculum: Digital Technologies, including access to specialist digital technologies and ICT Curriculum Officers. Formerly known as 'Supporting implementation of Digital Technologies (Peripatetic Initiative)'.	Teachers; Students	Primary; Secondary	Large	Not yet complete

Name	State/ Territory	Description	Target audience	Target age	Scale*	External Evaluation findings
Digital Literacy School Grants	National	The Digital Literacy School Grants initiative is providing funding to 114 projects that support innovative ways of implementing the Australian Curriculum: Digital Technologies in schools. As part of the initiative, two competitive grant rounds were conducted, one in 2016–17 and one in 2017–18. 54 applicants received grants in Round 1 and 60 received grants in Round 2. All government and non-government primary and secondary schools and eligible educational institutions were eligible to apply.	Teachers; Students	Primary; Secondary	Medium	N/A
Australian Digital Technologies Challenges & Dive Into Code	National	Australian Digital Technologies Challenges are: - a series of free online teaching and learning activities (typically to run over 4-5 weeks as classroom activity) for students in Years 3 to 8 - aligned to Australian Curriculum: Digital Technologies - includes professional learning workshops for primary and secondary teachers across Australia. Dive into Code (previously known as Cracking the Code) offers a suite of shorter fun and engaging coding activities and challenges for students in Years 4 to 12.	Teachers; Students	Primary; Secondary	Large	N/A
Principals as STEM Leaders	National	The Principals as STEM Leaders research project will develop and pilot new approaches to support principals to provide high quality STEM leadership in schools. Principals as STEM Leaders will involve around 200 primary and secondary schools in the government and non-government sectors, covering rural, regional, remote and metropolitan areas.	Principals; School leaders; Teachers	Primary; Secondary	Medium	N/A
Science by Doing	National	Science by Doing provides comprehensive online science resources that are freely available to Australian teachers and students in Years 7 to 10. Science by Doing includes curriculum units and professional learning modules and offers a practical way of implementing the Australian Curriculum: Science.	Teachers; Students	Secondary	Large	Completed – see Appendix B

*Note: Initiative scale, for the purposes of this exercise, is defined as follows:

- *Small:* Less than each of 500 students / 200 teachers / 50 schools per year
- *Medium:* More than at least one of 500 students / 200 teachers / 50 schools per year and not state/territory/nationwide
- *Large:* State/territory/nationwide.

Appendix B: Summary of evaluations of school STEM initiatives

Name	External Evaluation findings
STEM partnerships and collaborations with Queensland Museum, World Science festival Brisbane	The Queensland Museum World Science Festival Brisbane (WSFB) independent evaluation found that the event offered: - opportunities for high performing and high potential students to directly participate in WSFB; - increased access for all students across Queensland and other states through curated streaming opportunities using the departments information technology (IT) platforms; and - teacher professional and capability development opportunities.
STEM partnerships and collaborations with Wonder of Science (University of Queensland)	The Wonder of Science independent evaluation found that the program promoted a Strong STEM culture, was widely implemented and was successful in building teacher capacity.
Qld STEM partnerships and collaborations with CSIRO	CSIRO is supporting the Queensland Department of Education in delivering on the Strategy for STEM in Queensland State Schools by assisting schools in building teacher capability, achieving excellence in STEM (lifting student achievement) and engaging more students in STEM (increasing student participation).
Step into STEM Teaching Scholarships	Since the program began in 2014 the scholarships have attracted and supported high-quality preservice teachers (undergraduate or postgraduate) in an initial teacher education programs, specialising in STEM curriculum for employment in high-priority, rural and remote Queensland state schools.
Thinking Maths	Largest statistical impact on teachers' pedagogical content knowledge (Effect size: 0.70), as well as their professional identity and self-efficacy (ES: 0.61). Most teachers (92%) reported that Thinking Maths had an impact on their teaching practice that would last; their understanding of mathematics had improved (86%), their use of effective instructional strategies increased (91%) and it helped them to increase student engagement (87%). An impact equivalent to two months additional learning gain in Primary students' achievement. Among a sub-sample of School Card holders, the students (both primary and secondary) of Thinking Maths teachers had two additional month's progress on PATM. Whilst year 8 students made expected learning gain, the data for the year 9 treatment group (271 students) indicates fewer months learning progress for these students. ACER has recommended further analysis of the constitution of this cohort due to the small sample size, to determine if it is representative of the state-wide cohort of year 9 students.
Primary Mathematics and Science Specialists	Significant and above average growth in student achievement in maths and science.

Name	External Evaluation findings
STEM Learning Project	**Professional Learning** Feedback on the professional learning workshops was very positive with 99% of the teachers and school leaders strongly indicating that the professional learning workshops were informative and valuable and 89% of participants indicating that the workshops were very successful in equipping them with strategies for teaching STEM. There was general support that project activities also provided for student development of the general capabilities. Analysis of the qualitative data suggested that participants valued the professional learning on developing questioning skills; a crucial part of developing critical and creative thinking. The SLP Team altered several processes regarding the type and the duration of the workshops in response to interim feedback. The implementation of shorter workshops should increase the numbers attending the workshops especially for secondary teachers. Towards the end of the interim evaluation period the ECU research and evaluation team was able to share video clips and photographs from three case studies with the SLP team. A selection of these clips and photographs have been successfully incorporated into PL workshops and module booklets. **Modules and Resources** Participants in the trial schools rated the modules and the resources as highly effective. There were suggestions for smaller "starter modules" where schools did not have enough time to implement whole modules. From the feedback it appears that providing resources that are ready to use will contribute to the success of the project. The close alignment of the resources with the Western Australian Curriculum was important to the teachers. **Phase of schooling** The year level and stage of schooling impacted on the implementation and the uptake of the modules. In the primary classes there was a greater willingness among the teachers to implement the modules. Primary Teachers are familiar with working across curriculum areas. The primary teacher appeared to be able to focus on facilitating higher order thinking when using the modules. In Secondary classes there is more subject based teaching and there seemed was not a clear pathway as to which teachers would engage with the modules. Timetabling issues made it difficult for teachers to implement STEM activities that worked across learning areas. **Ongoing support for teachers** A number of teachers asked for more support during the implementation in schools. The teachers valued meeting and working with other teachers and suggested that this could continue in a community of practice model with support from the SLP team. Other teachers commented that they felt they did not have the skills required for the technology based tasks like coding and game design. The findings of the interim research undertaken by the ECU evaluation team support the conclusion that the resources, videos and professional learning were highly valued by the teachers. The SLP has made a good start to giving teachers the strategies and skills to plan and deliver integrated projects in STEM.

Name	External Evaluation findings
Teacher Development Schools (TDS)	Feedback from teachers attending TDS professional learning shows the initiative continues to support teachers. The following observations from 2018 surveys are provided: - 78% of participants indicated the professional learning provided sufficiently or considerably improved their curriculum knowledge. - 68% of participants indicated they had changed practice in their classroom as a result of attending the professional learning. - 95% of participants indicated they were keen to attend further professional learning provided by a TDS.
DigiTech Schools	A key finding in the success of the professional learning support is the use of expert practising teachers to deliver the professional learning. Participants indicated the professional learning provided sufficiently or considerably improved their curriculum knowledge and impacted their practice in their classroom.
Teachers Can Code (TCC)	A key finding in the success of the professional learning provided by the Australian Computer Society support is the use of expert practising teachers to deliver the professional learning. 94% of the participants reported that the program has expanded their ability to meet the learning needs of students. 94% of participants reported that the program has had a positive change on their professional practice.
Marine Industry School Pathways Program	Increase in the proportion of students participating in STEM courses and programs in SPP schools; increase in the proportion of students engaged in STEM pathways to Defence and Marine industry careers in SPP Schools.
Primary Connections: Linking Science with Literacy	The University of Technology Sydney's independent evaluation found that Primary Connections had strong brand recognition, was widely implemented and was successful in building teacher capacity.
reSolve: Mathematics by Inquiry	Interim report findings - resources are high quality, though current awareness and uptake are somewhat limited.
Coding across the Curriculum initiative (Digital Technologies Hub and Code Club)	Report not yet publically available but has been provided to University of Adelaide, ESA and Code Club. The report indicates that the resource is useful especially for teachers new to DT and the resources are of high quality. Scope and sequence teacher resource especially well received.
STEM Professionals in Schools	Since 2007 this program has had three independent evaluations. The most recent evaluation in 2015 found that the program is highly effective in terms of its scale of operation and there are significant benefits for students, teachers and STEM professionals.

Name	External Evaluation findings
Science by Doing	The most recent independent evaluation was completed by the University of Technology Sydney in 2018. It found that Science by Doing resources have a positive impact on student learning science and teachers consider Science by Doing as an excellent teaching resource.