



STEM LEARNING

STRATEGY FOR DECD PRESCHOOL TO YEAR 12

2017 TO 2020



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For further details
about the DECD preschool
to year 12 STEM Learning
strategy, visit
www.decd.sa.gov.au/stem

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FOREWORD



“We know that 75% of the fastest growing occupations now require STEM skills and knowledge. It is critically important that we make sure that our children are learning the skills that they will need to fulfil these roles.”

Hon Susan Close MP, Minister for Education and Child Development

The South Australian Government is committed to making this state a place where people and business thrive.

Through our 10 economic priorities, government, business and the community are working to deliver sustainable economic growth, lift productivity and enhance South Australia’s ability to build, attract and retain businesses that prosper in a global economy.

South Australia also continues to develop the innovations and expertise needed to plan for our future in key areas that include food, water and energy security, climate change, disability reform and an ageing population.

As new technologies are designed and developed, we will increasingly rely on science, technology, engineering and mathematics (STEM) to solve emerging problems and develop and promote new ideas, solutions and products through entrepreneurial thinking.

STEM education has a vital role to play in achieving this.

To improve the performance of Australian students against international benchmarks and ensure the nation remains globally competitive, Australia’s chief scientist has called for a strong national effort in STEM education.

The Australian Government has set a national target that Australia will, by 2025, be listed in the top 5 OECD countries for our students’ performance in reading, mathematics and science. In 2015 education ministers endorsed a strategy with the national challenge of strengthening STEM education.

It is imperative that South Australian STEM education provides every student with the chance to develop the capabilities they will need, as our future innovators and problem-solvers. This is particularly important for students who are currently under-represented in STEM education such as girls, students from low-socio-economic backgrounds, and Aboriginal learners.

Hon Susan Close MP
Minister for Education
and Child Development

PURPOSE



In Australia, a 'STEM occupation' is not formally defined, but is considered to include a qualification in the fields of natural and physical sciences, information technology, engineering and related technologies, and mathematics.¹

The economic case for STEM is clear. Between 2006 and 2011 in Australia, the number of people in positions requiring STEM qualifications grew 1.5 times faster than all other occupation groups.²

Over the past 10 years, the number of people employed in STEM occupations in South Australia has increased on average by 2.3% per year compared with the state average annual rate of growth of 0.9%.³ It is a world-wide trend that the fastest growing industry sectors require STEM skills.

In the next decade, occupations such as biomedical engineering, network systems and data communications analysis will require tertiary qualifications in STEM fields.

Future innovation will require STEM-related knowledge, problem-solving, critical and creative thinking skills, and the ability to work collaboratively and solve emerging world problems. A 2015 Pricewaterhouse Coopers report noted that there is a growing need for the broad skills that are fostered through STEM education: "critical thinking and problem-solving, analytic capabilities, curiosity and imagination have all been identified as critical 'survival skills' in the workplace of the future."³

The state government recognises that the public education system must have the capacity to support children and young people to prepare for and respond to future needs and opportunities.

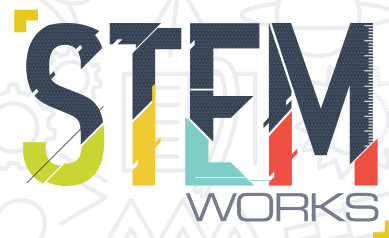
A modern education system does more than build knowledge. It also supports interdisciplinary learning, thinking and working, which draw upon several disciplines to identify a problem and develop new and innovative solutions in order to resolve an issue.

1. PwC, A Smart Move <https://pwc.docalytics.com/v/a-smart-move-pwc-stem-report-april-2015>
2. Australian Government, Office of the Chief Scientist, Stem Skills In The Workforce: What Do Employers Want? http://www.chiefscientist.gov.au/wp-content/uploads/OPS09_02Mar2015_Web.pdf
Information supplied by the Department of State Development, August 2016.
3. PwC, A Smart Move <https://pwc.docalytics.com/v/a-smart-move-pwc-stem-report-april-2015>

CURRENT STRATEGIC DEVELOPMENTS

“The government’s \$250 million STEM Works program will provide around 75,000 South Australian children with innovative and engaging learning facilities to help open their eyes to what is an exciting and dynamic area of study.”

Hon Susan Close MP, Minister for Education and Child Development



The South Australian Government has invested \$250m to provide new infrastructure for 139 schools to improve STEM learning in modern, flexible spaces.

The new \$100m CBD school due to open in 2019 will provide 1250 students with greater access to high quality secondary schooling, with a STEM and health sciences focus.

South Australia will improve STEM teaching and learning to ensure that public education – in partnership with industry – equips our children and young people to take their place in a changing, competitive and interconnected world.

All South Australians, regardless of where they live, should have access to the opportunities of the future. The state government is determined to provide every student with high-quality public education and the chance to be one of our future thinkers, innovators and leaders.

South Australia’s economic future is increasingly tied to our ability to connect to global markets and partners. For example, South Australia has a role to play in the innovation-led economic transformation that is already underway internationally, such as with China. Our relationship with France provides a platform to develop new technological innovation and employment opportunities.

Our public education system must ensure that graduates have the technical, cultural and language skills they will need to compete in the global employment market, and allow students to take advantage of the emerging opportunities in our state in areas such as defence and related industries, agriculture and food production and health sciences.

THE CHALLENGE AHEAD

“While Australia remains competitive in mathematics and science, international assessment data demonstrate that Australia needs to do more if we are to achieve sustained improvement in mathematics and science.”

Hon Susan Close MP, Minister for Education and Child Development

We need to ensure that more students perform in the top levels of educational achievement.

- » The South Australian Strategic Plan Target 88 aims for an increase in the number of students who receive an Australian Tertiary Admission Ranking (ATAR) in advanced mathematics, physics and chemistry subjects (4,222 students in 2015 with a target of 4,569 by 2020).

We must also ensure that groups currently under-represented have the opportunity to participate in the future economy.

- » Women and Aboriginal people and those from disadvantaged backgrounds are currently under-represented in fields that use science, technology, engineering and mathematics (only 31% of girls in Australia are choosing to study degrees in science and engineering).

To meet this challenge, students will need to approach STEM learning with confidence and understand its strong impact on their future employment and contribution as leaders and citizens. They need highly engaged, well-qualified teachers who use quality teaching and learning approaches that encourage risk, innovation and problem-solving.

This strategy will strengthen the impact of designing learning and assessment through our curriculum and pedagogical frameworks; the Early Years Learning Framework, the Australian Curriculum, the SACE and the SA Teaching for Effective Learning framework.



Vision

Young South Australians, through their engagement in STEM learning are able to secure their place as forward thinkers, innovators, entrepreneurs, leaders and shapers of an adaptable knowledge-based economy and society.

Mission

South Australia's public education system develops graduates who understand the value of STEM to their future, who combine STEM knowledge with critical and creative thinking capabilities, and who are well connected to industry.

Objectives

By 2020 the state government will:

1. implement STEM learning from preschool to year 12, supporting children and young people to build their capability for critical and creative thinking
 2. develop and build systemic capacity to provide cutting edge STEM teaching and learning
 3. build dynamic partnerships between business, industry and schools to ensure learning is relevant and contemporary and builds greater career awareness.
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WHAT WE WILL DO

The DECD preschool to year 12 STEM Learning strategy will transform public education to enable students at every level of schooling to develop knowledge, skills and understanding in science, technology, engineering and mathematics and to apply that learning to shape their world. Students will experience these subjects and apply their skills in new ways using collaboration, problem-solving and inter-disciplinary thinking.

This significant shift will give each child and student in our public education system age-appropriate STEM knowledge and skills, using inquiry-based teaching and learning from preschool.



AREAS OF ACTION



We have identified 3 main areas for action:

1. Build expertise in STEM teaching and learning across all years of public education
 2. Engage students at all year levels in STEM education
 3. Develop systemic excellence in STEM education.
1. **Build expertise in STEM teaching and learning across all years of public education**
 - » 139 schools receiving STEM Works infrastructure upgrades will access tailored support to develop a STEM learning strategy for their school.
 - » By 2020 there will be 500 primary teachers with a STEM specialisation. To achieve this, a professional learning program will be designed in early 2017 and delivered to a trial cohort, evaluated by the end of 2017 and delivered to all remaining teachers in 2018 to 2020. All primary schools will be represented in the professional learning program.
 - » Preschool leaders and teachers will have access to new STEM teaching resources from 2017 co-developed by DECD preschool leaders and teachers.
 - » South Australian teachers will use a new approach to learning design, assessment and moderation for STEM education from 2017. Professional learning resources will be available from 2017.



A 'STEM play' initiative will be established within all DECD preschools from 2017 to 2020.

A STEM 'lead learning' initiative will assist teachers and leaders to improve STEM teaching and learning outcomes.

2. Engage students at all year levels in STEM education

- » A 'STEM play' initiative will be established within all DECD preschools from 2017 to 2020.
- » DECD will co-design career development approaches with teachers, school leaders, industry and tertiary institutions to increase student awareness of career pathways in STEM.
- » A number of individual initiatives will be developed to build student engagement with STEM learning through the STEM student ambassadors program and establishment of an Aboriginal Learner's Congress.

3. Develop systemic excellence in STEM education

- » A year 7 and 8 STEM collaborative inquiry project will design, trial and evaluate innovative STEM learning to support students with continuity of learning between primary and secondary school.
- » A STEM 'lead learning' initiative will assist teachers and leaders to improve STEM teaching and learning outcomes. This initiative will enable preschools and schools to be identified to design and provide statewide STEM professional learning.
- » Build on our existing network of STEM focus and advanced manufacturing schools and the Australian Mathematics and Science School to identify our most innovative and effective secondary teachers to inspire fellow teachers and increase students' interest in STEM learning.
- » An annual STEM leaders' symposium will be designed and held in collaboration with the Preschool Directors Association (PDA), primary and secondary principal associations, the South Australian Area School Leaders Association and the Australian Science and Mathematics School.

PERFORMANCE MEASURES TO BE ACHIEVED BY 2020

The actions set out in this strategy are ambitious. The Department for Education and Child Development will implement the components progressively over the next 4 years.

Build expertise in STEM teaching and learning across all years of public education

- » All schools with secondary enrolments will have a STEM career strategy, linked to local primary schools and supported by links with business and industry as appropriate.
- » Children and young people report greater engagement in STEM learning and critical and creative thinking.

Engage students at all year levels in STEM education

- » All schools and preschools will have a STEM learning focus.
- » 20% increase in the number of students who reach the Standard of Educational Achievement (SEA), particularly girls, students from low socio-economic background and Aboriginal students.
- » 5% increase in the number of students who participate in SACE Stage 1 and Stage 2 STEM subjects.
- » 15% increase in the number of students who receive an Australian Tertiary Admission Ranking (ATAR) in advanced mathematics, physics and chemistry subjects.

Develop systemic excellence in STEM education

- » All schools with year 1 to 10 enrolments use the new Standard of Educational Achievement (SEA) to measure STEM subject achievement and inform practice.
- » Leaders report greater confidence in their capacity to lead high-quality, innovative STEM practices.

