IN THE TERRITORY

SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS

STEM

IN THE TERRITORY
STRATEGY 2018–2022

NORTHERN TERRITORY GOVERNMENT
The Strategy is a response to the National STEM Schools Education Strategy (2015). It aligns the important work undertaken across sectors in supporting schools to increase the prominence of STEM education.

This Strategy builds on the collaborative work and the priorities to achieve the vision of engaging students in STEM learning so they can become innovative, agile and self-motivated thinkers ready to meet present and future challenges. Additionally, the Strategy acknowledges the STEAM (science, technology, engineering, arts and mathematics) initiative implemented in select schools as an approach to encourage a broader range of young people to consider STEM.

The Strategy encompasses a shared understanding of STEM as being the integration of the Australian Curriculum learning areas of Science, Mathematics and Technologies with Engineering content that provide a balanced program of learning through practical experiences supported by explicit teaching.

Through inquiry-based learning, students will work collaboratively on authentic and contextualised challenges. Using skills from the General Capabilities, students are challenged to think and reflect critically, creatively and ethically in order to produce a product or solve a problem.

A complementary document to be available shortly—STEM Schools Matrices: a tool for guiding the implementation of STEM education in Northern Territory (NT) schools—supports and guides schools in the implementation of the Strategy.

In building relationships and partnerships with industry and a range of stakeholders, we will continue to enrich the educational experience and future pathways of our students.

The Strategy demonstrates our ongoing commitment to providing education that has a contemporary and innovative curriculum and places priority on ensuring our students enter the workforce with the knowledge, skills and dispositions required to be successful.

Ralph Wiese
Chair

Message from Northern Territory Board of Studies Chair

I am pleased to present the STEM in the Territory Strategy 2018–2022 (the Strategy), outlining the deliverables, evidence, actions and timeframes that will guide the implementation of the strategy.
Our context

A focus on STEM education is critical to ensuring all young Territorians are equipped with the necessary STEM skills and knowledge they will need to succeed (modified from Education Council, 2015).

STEM in the Territory is a commitment to aligning work across all schools to the objectives established in the National STEM Action Plan and to implementing and supporting a range of initiatives that will assist students to develop skills essential for emerging industries.

An additional focus on arts within the Territory allows schools to expand their students’ educational experiences in the area of science, technology, engineering, arts and mathematics.

The Strategy is aligned to the Education NT Strategy 2018–22 Action Plan’s commitment of a strong public education that gives every child and student an opportunity to engage, grow and achieve.

The Strategy supports the focus areas of:

» community engagement
» differentiated support for schools
» school leadership
» quality teaching
» data and accountability.

The key outcome is to achieve teacher and student excellence in STEM education. Ongoing work will include:

» build teacher capability to strengthen STEM education
» increase student engagement in STEM education
» ensure all young people in the NT are equipped with digital and coding skills
» expand enterprise education and innovation programs so students receive advice and training in emerging industries
» implement professional learning opportunities for teachers and trainers in STEM education and pedagogy
» develop transversal skills in young people in the NT by supporting quality STEM education opportunities.

Schools implementing STEM will be guided in their process with the complementary document, the *STEM Schools Matrices: a tool for guiding the implementation of STEM education in Northern Territory schools*. This document is underpinned by five domains that are informed by the National School Improvement Tool published by ACER (Australian Council for Educational Research). The five domains are:

» Planning for STEM Engagement
» Using Data to Improve STEM Growth
» STEM Teaching and Learning For Student Achievement
» Effective STEM Leadership
» Strategic STEM Partnerships.
Goals and Outcomes

The Strategy is in alignment with the actions and goals of the National STEM School Education Strategy (Education Council, 2015), and the Education NT Strategy 2018–22 Action Plan (Department of Education, 2017).

GOAL 1
Ensure all students finish school with strong foundational knowledge in STEM and related skills.

01 Increased student STEM ability, engagement, participation and aspiration.

02 Increased teacher capacity and STEM teaching quality.

03 Provision of STEM education opportunities within school systems.

04 Effective partnerships with tertiary education providers, business and industry.

05 A comprehensive and strong evidence base.
OUTCOME 1

STEM IN THE TERRITORY:

Priority Areas

1. Supporting a focus on STEM in early childhood education to build early curiosity for science and technology, and the importance of foundational numeracy skills.

2. Recognising the primary and middle years as critical periods when students begin to cement their aspirations for and confidence in STEM.

3. Supporting a focus on the development of higher order computational, problem-solving and creative thinking skills through the rollout of the Australian Curriculum on technologies, including a deep engagement with coding.

4. Encouraging the uptake of online learning materials linked to classroom practice to support the development of students’ problem-solving and reasoning skills, which are at the core of mathematical thinking, scientific literacy and a deep engagement with coding (Education Council, 2015).

Increased student STEM ability, engagement, participation and aspiration (Education Council, 2015)
1. Equip all students in the NT with coding skills as an emerging essential literacy.

2. Develop students’ higher-order computational, problem-solving, reasoning and creative thinking skills via the engineering design process.

3. Support schools to develop whole-school approaches to the curriculum, assessment and reporting to the Australian Curriculum: STEM disciplines.

4. Support schools to establish processes that ensure students are able to access advice and training in emerging technologies.

5. Provide all children with age-appropriate access to quality learning environments, natural settings and inquiry-based learning.
Increased teacher capacity and STEM teaching quality
(Education Council, 2015)

Priority Area

1. Continuing to support schools to access specialist teachers in mathematics, science and technology (Education Council, 2015).
Establish a baseline to develop ICT capability, giving teachers opportunity to increase their capabilities in digital literacies.

Implement the Australian Curriculum in STEM disciplines, Digital Technologies and the General Capabilities.

Develop a strategy to attract, recruit and retain specialist teachers.

Establish a STEM professional learning community and STEM Schools Matrices to support teachers and schools in STEM implementation.

Provide a program of events to build teacher competency in STEM pedagogy, coding and the General Capabilities.

Provide professional learning opportunities to implement STEM in the early years.
Provision of STEM education opportunities within school systems (Education Council, 2015)

Priority Areas

1. Improving the integration of statistical concepts, data analysis and problem-solving skills into school programs, consistent with the Australian Curriculum and in recognition of the impact of technology and big data on the types of STEM literacy today’s students require.

2. Extending student performance in STEM through initiatives such as virtual classrooms, extension courses and early access to university courses (Education Council, 2015).
1. Promote STEM education, programs and resources.

2. Develop and sustain partnerships with national program coordinators and other key stakeholders and experts.

3. Implement regular opportunities for teachers and trainers to be upskilled in Digital Technologies and Australian Curriculum: General Capabilities.

4. Promote and support professional learning in association with external partners and professional associations.

5. Support and advise schools to maintain their currency with technology.
Effective partnerships with tertiary education providers, business and industry (Education Council, 2015)

Priority Area

1. Work with the tertiary education sector to improve communication to secondary students about the level of school STEM study needed to successfully complete STEM-related courses at university and in vocational education and training (Education Council, 2015).
Investigate opportunities and strategies to expand education services to operate in newly emerging industries.

Extend enterprise education and innovation programs within schools.

Introduce training in coding to primary and secondary schools.

Facilitate partnerships and programs to provide schools access to STEM-related courses at university and in vocational education and training.

Partner with external stakeholders to promote STEM-related initiatives with schools.
A comprehensive and strong evidence base
(Education Council, 2015)

Priority Area

1. Establishing a culture of evaluating programs and initiatives to help build an evidence base for what works to improve STEM outcomes in Australian contexts and for particular sub-groups: in particular girls, low SES (socioeconomic status) and Aboriginal students (Education Council, 2015).
Consolidate system-wide data analysis consisting of achievement, attendance and perception data.

Publish and share case studies demonstrating successful STEM programs.

Develop awards for STEM in the Territory for:
» educational facilities or research
» educators
» students.

Develop resources to support families and caregivers to encourage children’s curiosity in STEM in the early years.
Glossary of key terms

Capabilities: encompasses knowledge, skills, behaviours and dispositions. Students develop capability when they apply knowledge and skills confidently, effectively and appropriately in complex and changing circumstances, in their learning at school and in their lives outside school.

Coding: the process of programming to develop and implement written instructions or the arrangement of data to enable a computer program or application to perform a task.

Digital literacy: the ability to use information and communication technologies to find, evaluate, create and communicate information, requiring both cognitive and technical skills.

Digital Technologies: the branch of computer science or engineering knowledge that deals with the creation and practical use of digital or computerised devices, methods and systems.

ICT capability: involves teachers and students learning to make the most of the digital technologies available to them, adapting to new ways of doing things as technologies evolve, and limiting the risks to themselves and others in a digital environment.

Schools: refers to regional teams from Alice Springs, Darwin, and Katherine and their strategic and consultation plans.

STEAM, Science, Technology, Engineering, Arts and Mathematics: an initiative implemented in select schools as a approach to encourage a broader range of young people to consider STEM.

STEM: discrete disciplines of knowledge identified as being crucial components in newly emerging industries.

STEM education: the teaching of the disciplines within the STEM umbrella and the cross-disciplinary approach to teaching that increases student interest in STEM-related fields and improves a student’s transversal skills.

STEM literacy: relates to a student’s ability to understand and apply concepts from science, technology, engineering and mathematics in order to solve complex problems.

STEM in the Territory: initiatives to support schools, teachers and students to maintain their currency in STEM.

STEM pedagogy: the science of STEM teaching. A combination of concepts in education, such as inquiry, investigation and design processes coupled with open-ended task design, enabling a student to demonstrate transversal skills.

Transversal skills: skills such as the ability to think critically, take initiative, problem solve and work collaboratively. Skills that are relevant for individuals as citizens and in employment in today’s varied and unpredictable career paths.
References

