




Brisbane Catholic Education
teaching • challenging • transforming

DESIGNING FUTURE FOCUSSED LEARNING


Brisbane Catholic Education Position Statement on STEM Education

SHARED UNDERSTANDING OF STEM

STEM is a term used to refer collectively to the learning and teaching of Science, Technology, Engineering and Mathematics, in a transdisciplinary way through problem solving around big conceptual ideas. The national strategy on STEM, focused on two broad goals, sets the agenda for STEM learning and teaching in Brisbane Catholic Education schools:



**Ensure all
students finish
school with strong
foundational
knowledge in
STEM and related
skills**



**Ensure that
students are
inspired to
take on more
challenging
STEM subjects.**

CATHOLIC PERSPECTIVE ON STEM: Three themes are foundational to a Catholic view about learning and teaching in STEM: Christian anthropology; epistemology and cosmology.

CHRISTIAN ANTHROPOLOGY:
A foundational question for learning in STEM relates to beliefs about the human person as co-creator with God of a hope-filled vision of life. A Catholic view of Christian Anthropology is centred on the person of Jesus, and is reflected in a STEM curriculum that is characterised by creative responses to complex problems; collaborative and relational approaches to learning and positive action for, and in, the broader community.

CATHOLIC EPISTEMOLOGY:
Epistemology is concerned with the act and nature of knowing. A Catholic perspective on epistemology orientates STEM learning and teaching towards practical scientific and technological knowledge that is ethical and connects faith, life and culture. It also attends to the acquisition of knowledge, skills and positive dispositions as a life-long and life-wide enterprise.

CATHOLIC VIEW OF COSMOLOGY:
Cosmology relates to how we understand our place in the universe and the choices we make to live within the integrity of creation. A Catholic understanding of Cosmology, reflected in STEM learning and teaching, emphasises stewardship and sacramentality. Stewardship requires learners to take responsibility to cultivate creative solutions to complex problems of life and living. Sacramentality acknowledges God’s presence in the world particularly through human activity in service of the world.

THE NATIONAL AGENDA ON STEM

Science, Technology, Engineering and Mathematics (STEM) touch every aspect of our world, and the innovations that emerge from these fields underpin the global community. In Australia, the renewed national focus on STEM in school education aspires to equip all young Australians with the necessary STEM skills and knowledge to develop as problem solvers and critical and creative thinkers. Building capacity of teachers and learners in STEM-related learning areas requires strategic focus at the system, school and classroom levels.

STEM IN BRISBANE CATHOLIC EDUCATION SCHOOLS

STEM initiatives in BCE utilise the five areas of national action: increasing student STEM ability, engagement, participation and aspiration; increasing teacher capacity and STEM teaching quality; supporting STEM education opportunities within schools; facilitating effective partnerships with tertiary education providers, business and industry; and building a strong evidence base. To that end, Brisbane Catholic Education remains focused on STEM as it is understood within the National agenda and does not promote other derivatives (i.e. STREAM, STEAM).

The key priorities for establishing and sustaining high quality learning and teaching of STEM, while established through the National agenda, are enacted through the Australian Curriculum. A clear system strategic focus, informed school leadership, high quality teaching and engaged learners will result in the engagement, progress and achievement for all learners in STEM.

ASPIRATIONAL OUTCOMES OF A SYSTEM FOCUS ON STEM:

TEACHERS:

- Confident and effective primary and secondary teachers of STEM.
- Engaging teaching of STEM utilising transdisciplinary problem solving approaches.
- Designing learning experiences that respond to developmental phases.
- Building collaborative cultures that promote promising practices in STEM within and across schools.

SCHOOL LEADERSHIP:

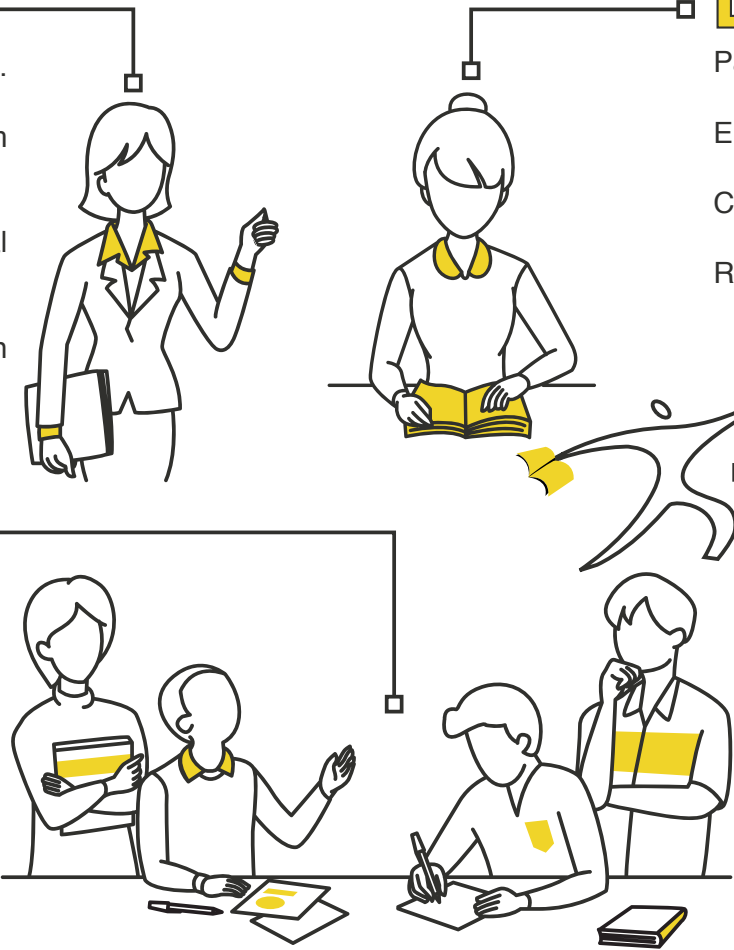
- Recognising and valuing the importance of STEM and modelling high expectations for all learners to engage with STEM.
- Promoting diverse pathways and careers that STEM can offer students now and into the future.

LEARNERS:

- Participating and achieving success in STEM through development of STEM skills.
- Engaging in STEM pathways and aspiring to work in STEM related fields post-schooling
- Choosing to study more challenging STEM subjects
- Reporting STEM subjects as exciting, challenging and linked to real-world situations.

SYSTEM DIRECTION:

- Evidence-based thinking that challenges schools to implement STEM within the broader system view of innovation for learning.
- Targeting professional learning that responds to system and school data.
- Improving capacity of system leaders and education officers to support schools in effectively leading and teaching the Australian Curriculum, specifically in the core STEM areas.
- Engaging with industry and education partners to better understand and promote STEM.
- Supporting teachers through tertiary study in STEM-related fields.
- Evaluating and refining system STEM initiatives focused on improving student learning outcomes.
- Developing collaborative STEM learning community utilising online and targeted resourcing.

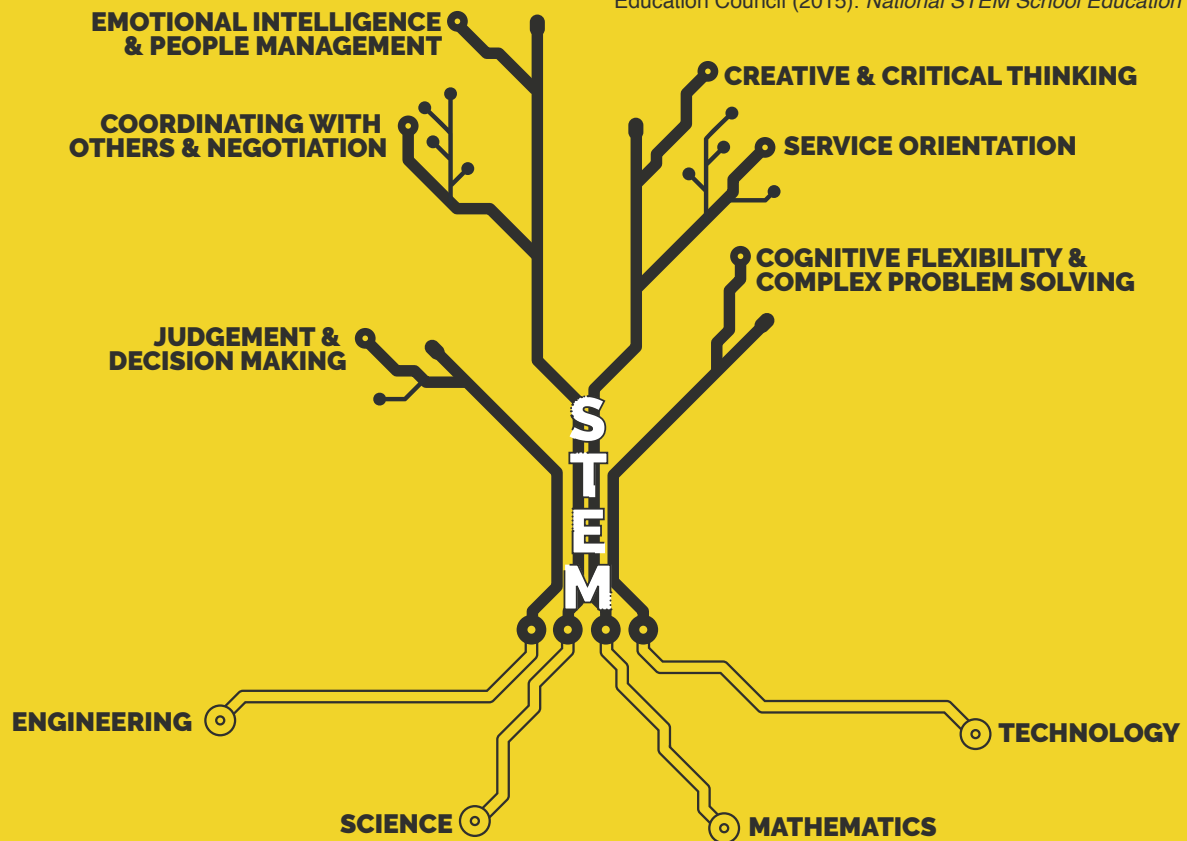


STEM in BCE is located within the Innovate component of the Excellent Learning and Teaching strategy and is aligned with BCE’s Goal for Learning and Teaching which challenges us, “to educate all to live the gospel of Jesus Christ as successful, creative and confident, active and informed learners empowered to shape and enrich our world”. For each year of the STEM strategy (2018-2020), a work plan based on Michael Fullan’s Coherence framework will be developed and used for the purposes of reporting to key stakeholders.

ENGAGING LEARNERS IN STEM:

Learning and teaching in STEM builds on students' curiosity and makes connections through the solving of real world problems in ways that are inquiry-based and directed to the achievement of deep understanding.

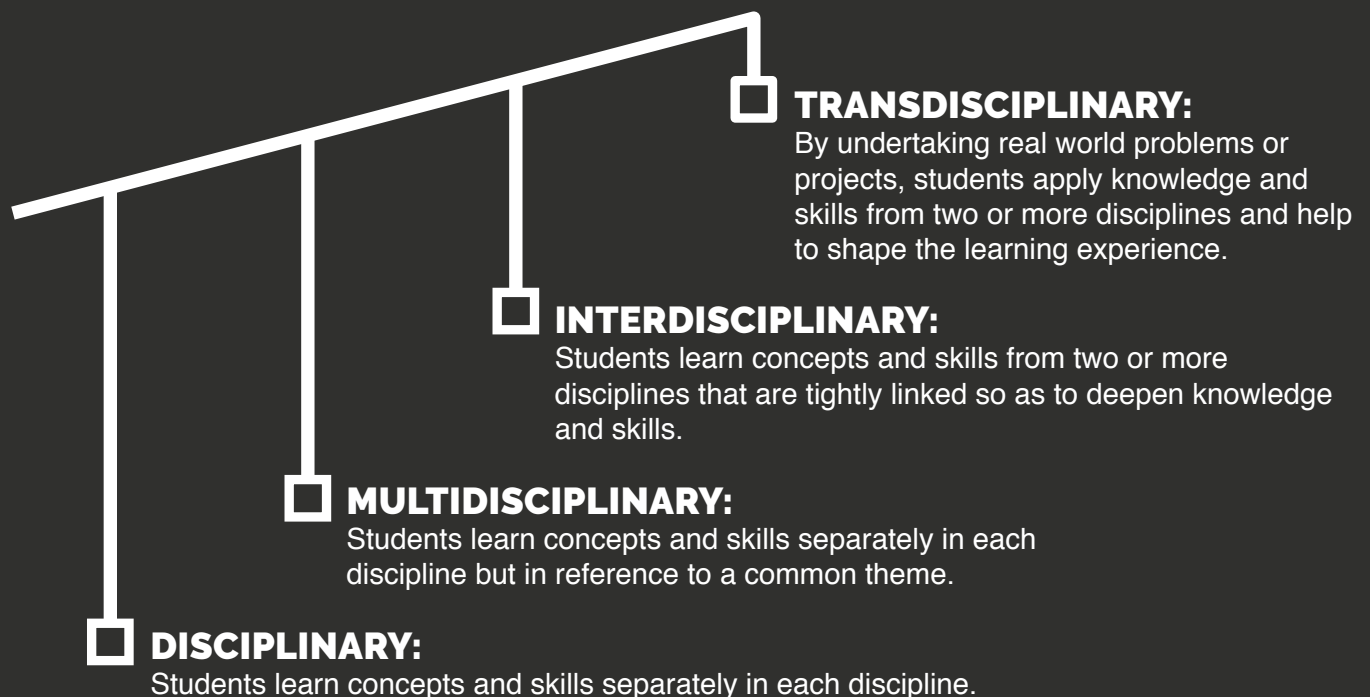
Education Council (2015). *National STEM School Education Strategy*



Adapted from World Economic Forum (2016). *The Future of Jobs*

MOVING FORWARD IN STEM:

The inclined plane of STEM learning describes different levels of engagement with STEM education. Each is valued for the contribution they make to STEM learning and build on each other to develop a comprehensive learning experience for students.



Vasquez, J., Sneider, C., Comer, M. (2013). *STEM Lesson Essentials* NY: Heinemann