

# STEM FOR SCHOOLS

Program Impact Report  
2015 – 2019



**the university  
for the real world®**





# Foreword

QUT's STEM for Schools Program has been running since 2013 and is committed to inspiring the next generation of STEM (science, technology, engineering and mathematics) leaders.

We provide meaningful STEM experiences for Year 7 to 12 students regardless of background, gender, academic level or location.

The Program delivers fully funded on-campus workshops, events and professional learning across STEM disciplines to help schools understand the importance of STEM skills and the broad range of future study and career opportunities STEM offers.

The future of employment is changing rapidly and as a result, it has been predicted that 75% of the fastest-growing occupations will require STEM-based technological

skills. Furthermore, university graduates will need to have a range of transferable skills and an entrepreneurial mindset to be agile in the global economy.

An essential feature of our program is our talented STEM Student Ambassadors from diverse backgrounds, as well as our Alumni and Industry partners who inspire, lead and connect with program participants across all our activities.

The STEM for Schools Program is part of QUT's university-wide STEM High School Engagement Strategy which is also strongly aligned with the Australian Chief Scientist's directive to attract and retain students in STEM degrees.

In 2019 STEM School Engagement Strategy across QUT was named international Gold Award winner of the K-12 category (kindergarten

to Year 12) at the prestigious Reimagine Education Awards.

Ongoing monitoring and evaluation of the program has been conducted to measure its impact, and ensure quality to our partners.

This report outlines STEM for Schools' unique approach to engaging high school students and influencers across our activities striving for continued relevant and quality content and delivery which provides real-world STEM engagement.

We are grateful to all our partners – students, teachers, parents, QUT staff, and industry partners who contribute to our aims in inspiring the next generation of STEM leaders.

**The STEM for Schools team  
QUT**

# Our STEM Strategy

## How STEM for Schools is helping build a future with STEM

Our unique approach to engaging school students and their teachers that goes far beyond the classroom. We inspire, connect and lead to grow the next generation of STEM leaders in Australia.



### Developing student aspiration about the power and possibilities of STEM

QUT's STEM for Schools Program engages high school students across a diversity of background, gender, academic level and geographical location. Our leading combination of cross-disciplinary, project-based and hands-on learning experiences become a catalyst that brings the STEM curriculum to life – both in and beyond the classroom.

Our program connects students in multiple ways with world-leading university STEM facilities, Student Ambassador peers, real-world industry partners and ground-breaking STEM research.

These practical, hands-on and inspiring connections enhance the relevance and importance of STEM in students' future career choices.



### Building teachers capability and confidence to deliver STEM in schools

QUT's STEM for Schools Program is founded on the principles set out in the National STEM School Education Strategy, aligned with the global focus on STEM literacy, and mapped to the national curriculum.

We also support teachers' passion for real-world STEM learning, equipping them with additional knowledge and tools to positively influence their students' attitudes to STEM.

Partnerships with teachers and our QUT academics ensures the Program is at the forefront of innovative STEM teaching and learning, actively shaping the national STEM curriculum, and directly inspiring students through hands-on education.



### Engaging students in dynamic journey to develop 21st century skills for the real-world

QUT's STEM for Schools Program leads the way in creating real-world STEM opportunities for school students.

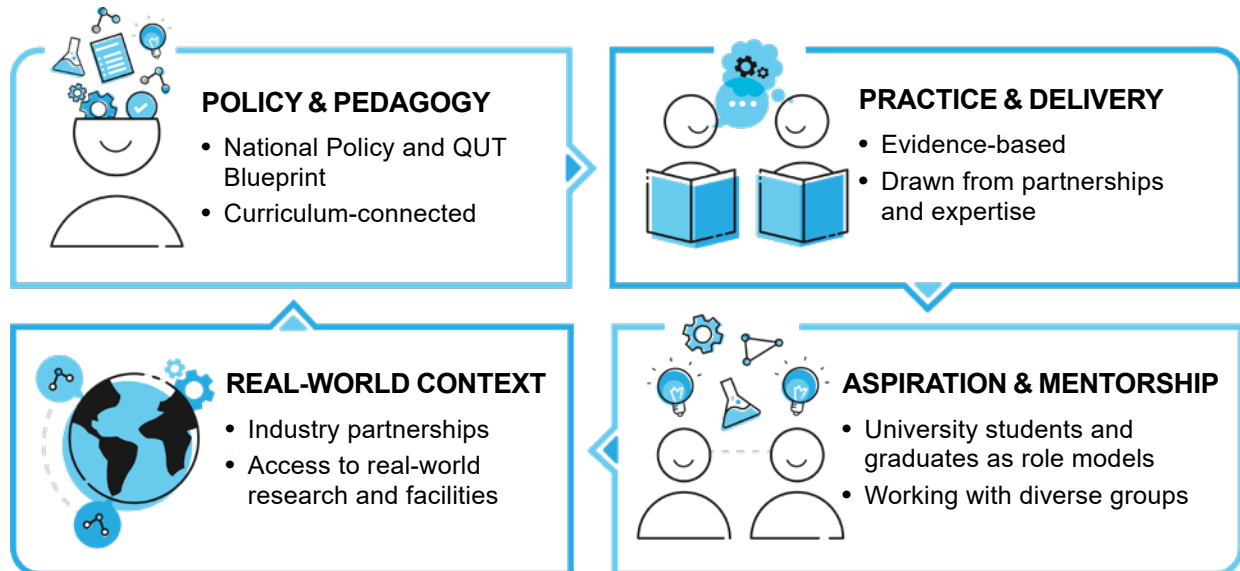
In partnership with QUT's overall STEM Engagement Strategy students experience STEM-related touchpoints from primary school through to secondary school thus increasing the accessibility of university.

We encourage students' curiosity about STEM and its study and career pathways. The dynamic range of engagements students have across QUT exposes students to new knowledge. The real-world application of STEM builds on this curiosity and interest illustrating a wide range of STEM careers within their reach.



# Our Approach

The four pillars driving STEM education success



## POLICY AND PEDAGOGY

The STEM for Schools Program features curriculum-connected workshops for students and teachers underpinned by national curriculum, QUT's STEM strategy and the goals of the QUT Blueprint 6 which include concepts of creativity, entrepreneurship and innovation.

## REAL-WORLD CONTEXT

QUT's established and successful industry and community partnerships shape our core activities and connect our students to groundbreaking real-world research. The Program's events and engagement activities showcase a wide range of transdisciplinary study pathways and careers in exciting and innovative spaces.

## PRACTICE AND DELIVERY

Our approach is based on good practice and delivery which is evidence-based, flexible and relevant. The content meets the needs of our target audiences, drawn from expertise and partnerships both within QUT and through collaborations with our partners (teachers, academics and other specialists).

## ASPIRATION AND MENTORSHIP

Student Ambassadors from diverse backgrounds, and Alumni and Industry partners inspire, lead and connect with participants across all our events. Students are engaged across their education journey at critical touchpoints that influence a student's decision-making process about a future in STEM and studying at university.



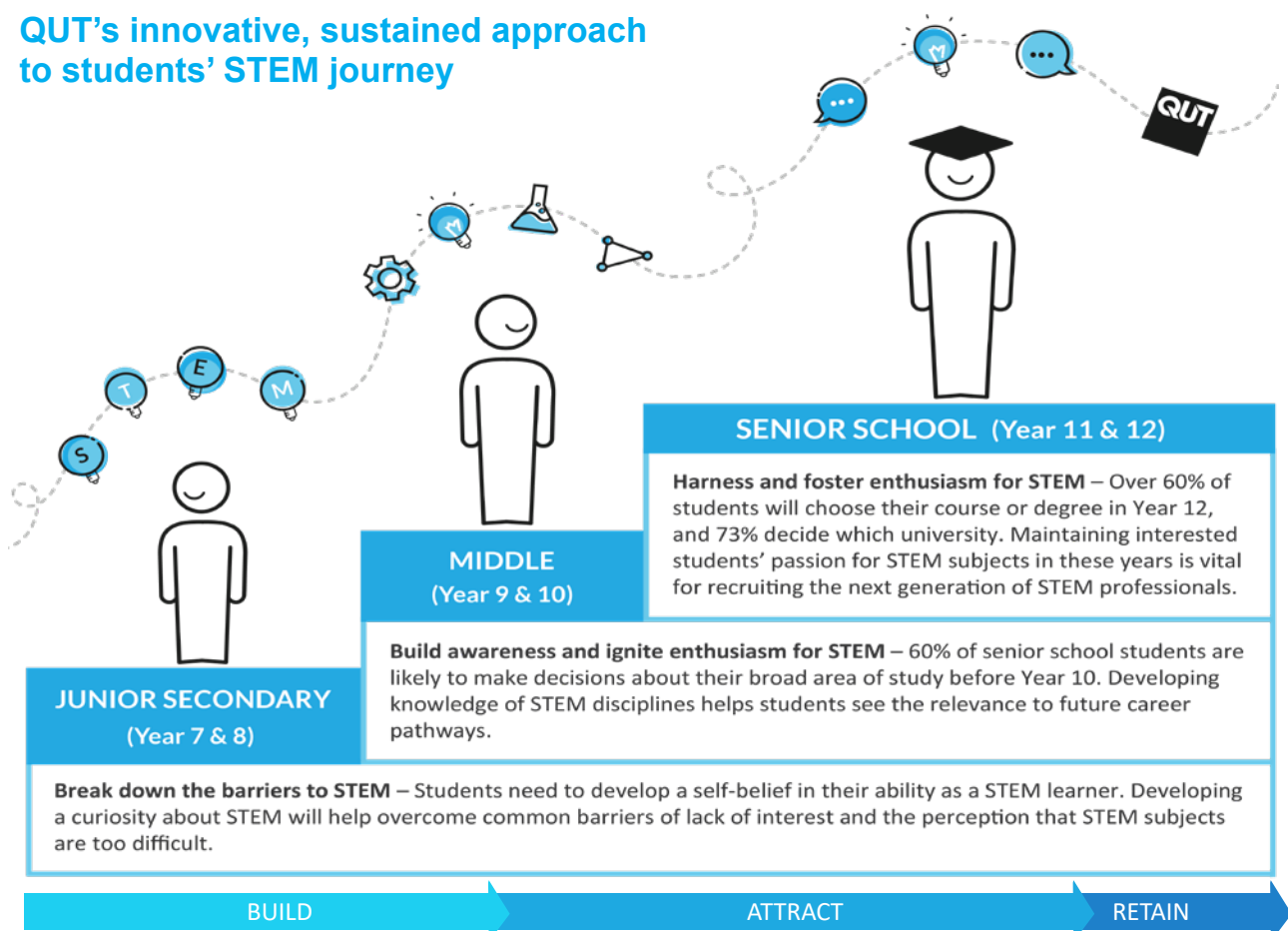
# Touchpoint Journey

True impact comes from students having several STEM-related experiences

The frequency and timing of STEM engagement activities has a significant impact on students' initial perceptions of STEM and students' decision-making process for subject selection. Universities play an important role in driving student interest in STEM subjects by offering multiple STEM-related experiences throughout their schooling.

A broader strategy of STEM engagement activities at QUT has specific activities targeted to primary school students. The STEM for Schools Program delivers a range of activities specifically targeting students from Years 7 to 12. These activities include curriculum-aligned workshops, awe-inspiring Cube experiences, and signature events aim to foster curiosity, challenge perceptions and be a catalyst for career exploration across a wide range of STEM study options and career pathways.

## QUT's innovative, sustained approach to students' STEM journey



# THE IMPACT

Between 2015 to 2019  
we have delivered...



**46%**

females attended  
STEM activities

Provided access to opportunities for  
students and teachers across Queensland  
and Northern NSW



**96%**

of STEM Camp  
students pursued a  
STEM degree

**84%**

STEM Camp students  
scored an OP 1-5



**2,935**

Teachers have engaged with  
the Program across all events

**83%**

First year STEM students  
said a QUT STEM activity

INFLUENCED



their decision to study a  
STEM-related degree

Increase of OP1-5 students studying  
Science and Engineering faculty degrees



7% 2018



30% 2018

24% 2017



FIRST  
PREFERENCES



BACHELOR OF  
IT



BACHELOR OF  
ENGINEERING



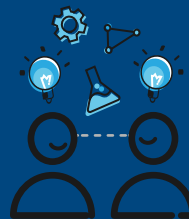
**50,094**

Unique STEM  
engagement  
experiences



**51%**

increased in participation of  
high school students and  
teachers over six years



**27,006**

students experienced

**995**

STEM workshops



**23,088**

students experienced

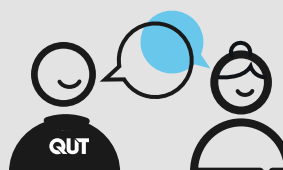
**745**

STEM events



**260**

Student Ambassadors employed  
to increase young people's  
engagement in STEM



**831**

schools have attended events  
with STEM for Schools



## PROGRAM ELEMENTS

# STEM Ambassadors

Each year, STEM for Schools selects and employs around 50 to 60 current undergraduate and postgraduate students as STEM Student Ambassadors who form an integral part of the delivery of the program. The Ambassadors act as role models and peer-to-peer mentors for high school students, inspiring the next generation about the possibilities of STEM. They engage directly with students in a range of activities, including facilitating workshops, delivering presentations and campus tours. By sharing their own passion for studying STEM, their journeys and their future career goals, Student Ambassadors break down the barriers to STEM, making it more accessible, exciting and aspirational to high school students.

## PRACTICE AND DELIVERY

QUT's STEM Ambassadors give students the opportunity to:

- see and hear first-hand how passionate real university students are about studying STEM and planning their STEM career
- work alongside these mentors solving real-world challenges in Program activities
- find out about the transition from school to university
- engage in meaningful and hands-on learning experiences that extend their STEM understanding.



## Impact



**99%**

Students who attended STEM Camp enjoyed working with QUT staff



**70%**

Students who attended QUT workshops viewed Ambassadors as inspirational



**89%**

Students who attended STEM Camp found Ambassadors extremely approachable



“ Being involved in delivering workshops at events is empowering for not only the school students, but also for us as ambassadors. It's incredibly inspiring knowing that what we're doing today is diversifying the future of STEM, our world. ”

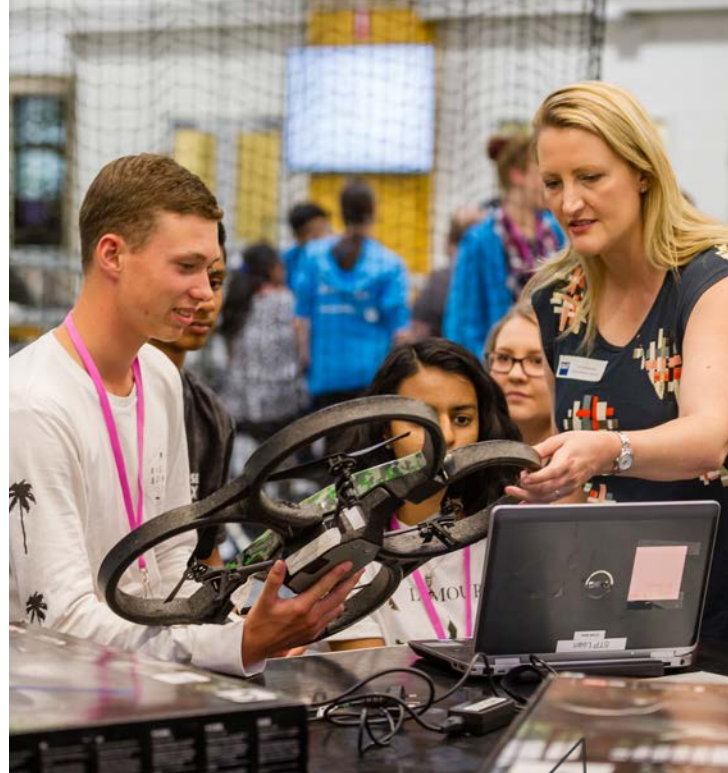
THIRD YEAR ENGINEERING STUDENT  
AMBASSADOR



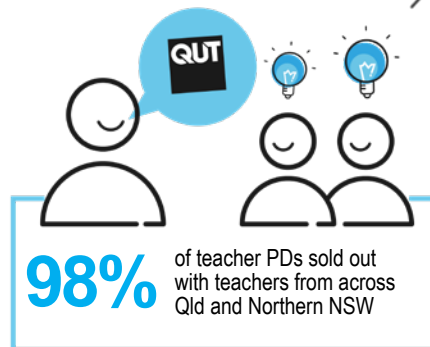
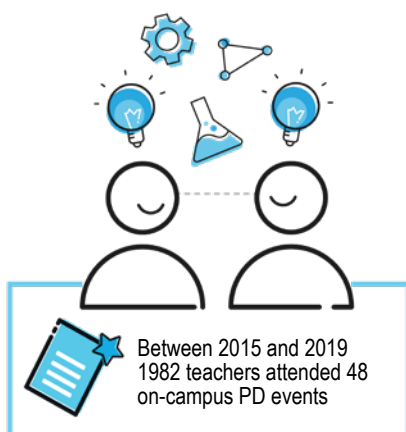
# Teacher partnerships

Teachers are an integral part of our Program development and are participants in a range of professional development opportunities throughout the year.

We work closely with STEM teachers through a regular community of practice, regular feedback mechanisms and employing teachers to co-design aspects of our program. These strategies ensure the Program meet the needs of schools, teachers, students and government; and that relevant curriculum and pedagogy drives the STEM for Schools Program.



## Impact



“ Seeing how to use the products interactively and have a better idea of what is possible too engage more students . ”

TEACHER PARTICIPANT

“ All presenters and accompanying staff were available for questions and highly knowledgeable in their fields.”

## PRACTICE AND DELIVERY

Professional development gives teachers the opportunity to:

- enhance teacher capability and confidence in STEM learning experiences that increase the relevance and value of STEM for students
- foster increased collegiality within STEM teacher networks and links teachers to academic and industry partners
- enhances activity that is happening in the classroom with unique educational experiences with real-world applications.





# STEM for Schools Workshops

This comprehensive program of free, curriculum-mapped STEM workshops is designed for students and their teachers in years 7-12. Held in QUT's Science and Engineering Centre, each workshop brings together all four STEM disciplines to offer students hands-on, practical and highly engaging learning experiences. Students collaborate with each other, our Student Ambassadors and STEM experts to design, build, test and evaluate solutions to real-world problems.

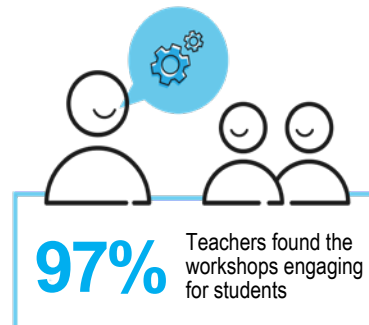
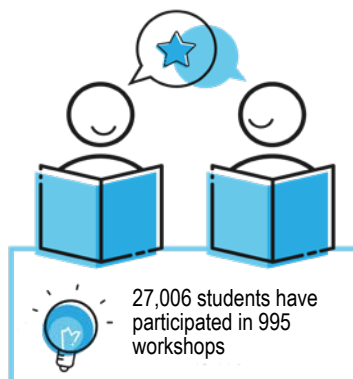
## PRACTICE AND DELIVERY

Our workshops provide students with opportunities to:

- engage in hands-on, practical learning experiences informed by curriculum as well as expertise of academics and industry specialists working in cutting-edge teaching and research
- enhance their STEM knowledge by applying it to design, build, test and evaluate solutions to real-world problems
- experience what it's like to be a university student with access to world class facilities
- interact and be inspired by our STEM Student Ambassadors
- discover study options and career pathways through these role models.



## Impact



## CASE STUDY

# STEM Workshops

### STEM workshop details

#### When

Held on 135 days a year during term time

#### Where

QUT's Gardens Point Campus, in a dedicated education space housed in the Science and Engineering Centre.

#### Who

An average of 22 students from Queensland and Northern NSW high schools attend each workshop

#### Costs covered

All workshop resources and materials supplied by QUT

#### What students loved most:

- the specific workshop activities
- opportunities to extend STEM learning
- mentoring by Student Ambassadors
- experiencing the campus and facilities
- Learning about STEM careers.

"This workshop is the best STEM workshop our school has ever attended. The students were highly engaged the whole time."

TEACHER, IPSWICH STATE HIGH SCHOOL



### Connecting students to a future in STEM through real-world learning experiences

The STEM for Schools workshops program comprises a series of fully-funded educational workshops that are mapped to the national curriculum. Groups of Queensland students and their teachers from years 7 to 12 attend either half-day or full-day STEM workshops that are based on current QUT research and undergraduate course work. The workshops are held in a dedicated educational space within QUT's Science and Engineering Centre, and each group can also choose to participate in a free 30-minute interactive experience at The Cube.

#### What students experience

The workshops focus on extending students' STEM knowledge by applying it to design, build, test and evaluate solutions to real-world problems. The students engage in hands-on, practical learning experiences informed by teachers and academic STEM experts and led by QUT Student Ambassadors. The activities are modelled on the way university-level content is taught, and include topics such as launching a virtual rocket, using robots in a variety of challenges, and analysing real data to learn about environmentally-friendly buildings.

#### Demand for workshops exceeding capacity


From 2015 to 2019, 995 curriculum-mapped workshops have been delivered to more than 27,000 high school students from 415 schools. Since 2016, the workshops have reached booking capacity by Term 1, with a large number of schools placed on a waiting list. In 2019 workshops were booked out before the end of Term 4, 2018.

The dedicated educational space housed in the Science and Engineering Centre on-campus has been instrumental to the success of the program by facilitating delivery and exposing students to an aspirational, world-leading learning environment.

In 2020, the program has expanded to additional spaces to accommodate demand and is exploring flexible options to deliver to regional schools.







"Very well presented. The Ambassadors were very easy to talk to and get to know. They gave us insightful knowledge about choosing our future careers."

YEAR 9 STUDENT

"I was able to learn about coding in a practical, hands-on way. I can now take this knowledge and continue learning about it in my own time and at school."

YEAR 12 STUDENT

97%

of teachers found the workshops engaging for students

94%

of teachers found the content useful for future classroom activities

85%

of students said they enjoyed the workshop they attended

92%

of students said they had learned something new

74%

of students would consider study at QUT

"This has changed how I feel about university. I definitely want to come here now."

YEAR 9 STUDENT



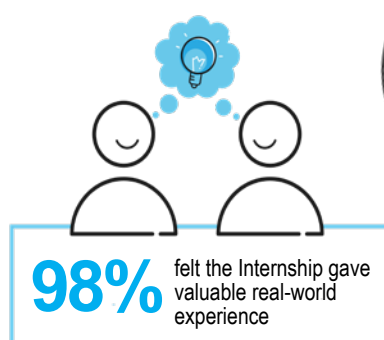
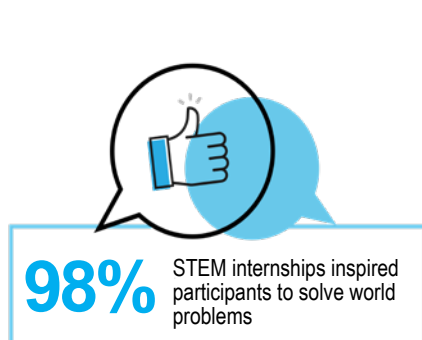
# High School Research Internships

QUT has a long history of delivering events that have played a vital role in developing positive perceptions about studying STEM. One of our signature events is our High School Research Internships Program which invites high-achieving Year 11 and 12 students to attend a unique opportunity to expand their skill-sets beyond the classroom and explore future career ambitions with like-minded peers.

The Internship Program is a week-long experience in our state-of-the-art facilities where students work in small groups on a research project of their choice based on the work of leading QUT STEM experts. As a research intern the students have the opportunity to work in current research projects under the mentorship of leading academics to produce work that can contribute to the future scientific discoveries. Students complete a short scientific paper and reflection on their experience and a final showcase event allows them to communicate their experience to their project team, peers, parents and teachers.

As an intern, students are treated like real QUT undergraduates, enjoying student campus life, accessing facilities and online resources to prepare them for university as a new generation of STEM leaders.

## Impact



“Being able to speak with researchers and their colleagues gave me a good insight into what I’d like to do as a career.”

YEAR 12 INTERN



## PRACTICE AND DELIVERY

Research internships give students the opportunity to:

- be a part of current research projects led by leading researchers to tackle real-world problems
- engage in exciting enquiry-based learning experiences that increase the relevance and value of STEM in everyday life
- understanding the range of possible career opportunities and expand their STEM skills and knowledge.

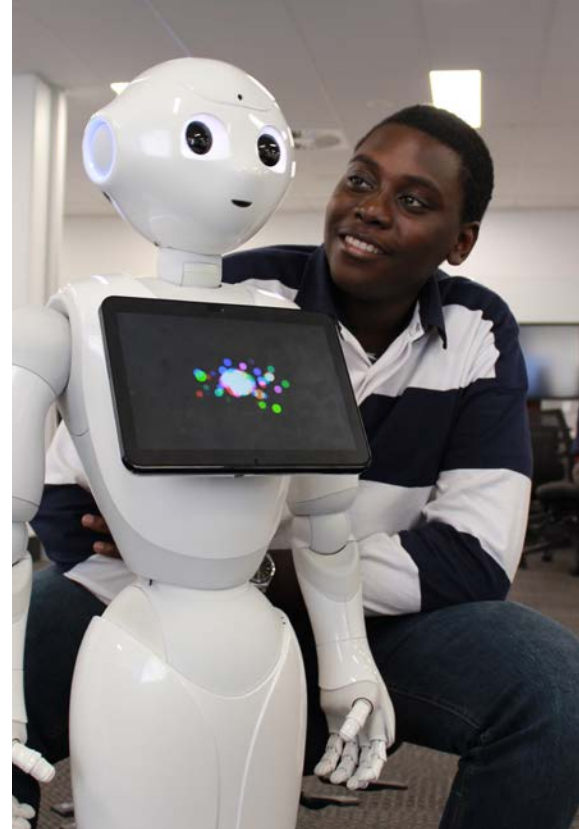


# STEM Camp

Since 2014 QUT's STEM Camp has been offering a unique opportunity for Queensland's brightest students, regardless of location, culture or background to explore their STEM study and career opportunities. The camp is held annually over five days in the September school holidays.

High-achieving Year 11 students throughout Queensland are invited to attend Gardens Point campus to accelerate their understanding of STEM through hands-on exposure to current research and innovation.

Students work directly with leading QUT scientists and STEM Student Ambassadors on a real-world research project. This fully funded opportunity is offered to 80 Brisbane students, and 80 regional and coastal students annually.

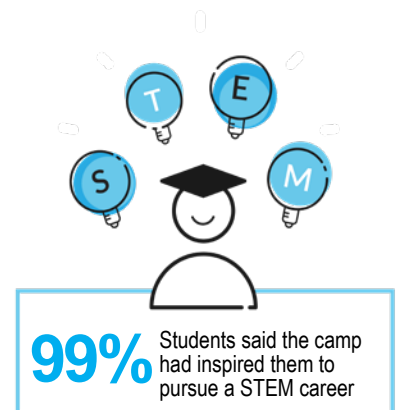
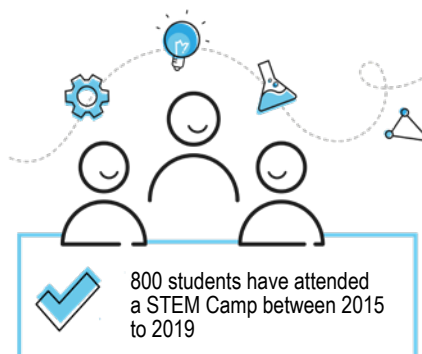
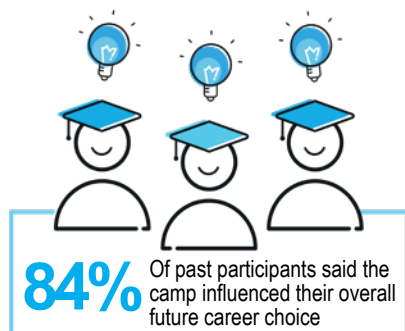


## Practice and delivery

The STEM Camp gives students the opportunity to:

- be mentored by QUT Student Ambassadors in exploring STEM pathways and career options
- collaborate with like-minded peers with similar interests
- extend their STEM learning and passion through real-world projects and presentations
- gain first-hand exposure to a leading university campus with dedicated STEM facilities.

## Impact







## CASE STUDY

# STEM Camp

## STEM Camp details

### When

Held over five days in the September school holidays

### Where

QUT's Gardens Point campus

### Who

160 students each year – 80 from local Brisbane schools, 80 from regional schools. Year 11 applicants must have achieved at least two VHAs in a Science, Mathematics B or C, Engineering Technology or Computer Science

### Costs covered

All travel, accommodation, meals and materials are covered by QUT

### What students loved most:

- meeting like-minded peers with similar interests
- being mentored by academics and Student Ambassadors
- undertaking real-world projects with leading academics and current students
- exploring the campus and facilities
- broadening their knowledge about future study pathways and careers.

## Inspiring Queensland's brightest students about a future in STEM

The STEM Camp is a fully funded, five-day event targeting high-achieving year 11 students from both regional and local Queensland schools. To address the shortage in the STEM pipeline, the camp offers an engaging and challenging experience for these students, regardless of location, culture, gender or background. Highly interactive and hands-on, it accelerates students' understanding of research and innovation in STEM, and magnifies their exposure to degrees and careers in STEM fields.

## What students experience

Students work on team-based challenges tackling global issues related to energy, food sustainability, the environment, information technology, biomedical advances and cyber-security. Each real-world project is led by a key QUT academic, giving students the opportunity to experience groundbreaking research as it happens within our world-class research facilities. The students must apply their collaborative, creative, entrepreneurial, investigative and problem-solving skills to address these challenges, and they are mentored throughout the five days by QUT Student Ambassadors.

## Overwhelming interest that keeps growing

First held in 2014, the Camp has become a high-profile and extremely successful annual event with a very high level of student satisfaction. In the last 5 years 800 students have attended a camp and in 2020 a conference style program will be added to expand the program to more students. This event attracts significant attention from government, industry and media, with visits from the Chief Scientist, Queensland and Federal Government Ministers and industry partners.





"A PHENOMENAL experience providing me with invaluable insight into university, research and the application of what is studied in the real-world."

"I did research with one of the top researchers at QUT in biotechnology. He made me curious about this incredible field of science."

"The camp helped confirm that STEM was the right field for me to study. It was a great eye opener for university life and what QUT has to offer."

83%

Strongly agree: Did the camp influence your overall future career choice?

79%

Strongly agree: Did the camp inspire you to solve the world's problems?

80%

Strongly agree: Did the camp influence you to choose a STEM career?

99%

Strongly agree: Did the camp inspire you to continue studies into a STEM degree?

99%

Strongly agree: Would you recommend the camp?



# Partnerships

QUT has established strong and successful partnerships with a broad range of external stakeholders. Through QUT's wider High School Engagement Strategy the STEM for Schools program collaborates with a broad range of both internal and external stakeholders to enhance learning outcomes for participants.

We have strong internal partnerships with our Faculties, Research Institutes, our Public Precincts, our Widening Participation program, and our central Student Recruitment department. To provide real-world engagement we work closely with academic staff, researchers, post-doctoral students and of course our STEM Student Ambassadors to deliver content which draws on the latest teaching and research, and industry best practice.

Linked by our common goal of increasing students' understanding of, and interest in, STEM careers, the involvement of industry, government, professional association and community partners has ensured that QUT's strategy is underpinned by real-world applications.

## Practice and delivery

Collaboration with our key partners give students the opportunity to:

- be exposed to relevant and inspiring real-world STEM careers
- connect the concepts explored in our programs to real-world applications
- experience programs that are linked to current and future workforce requirements
- give students the opportunity to go beyond stereotypes and understand the breadth of STEM skills.



## Key partners and collaborators:

### Industry -

- We invite a variety of industry partners to our events and in the past this has included representatives from Aurecon, BDO, Boeing Defence Australia, Department of Transport and Main Roads, Hatch, Ernst and Young, Lendlease and Virgin Australia

### Government and community -

- Department of Transport and Main Roads, Education Queensland, Queensland Health, Office of the Queensland Chief Scientist, Office of Chief Scientist, Office of the Queensland Chief Entrepreneur, World of Drones Education

### Secondary Schools -

- Queensland public, independent and Catholic schools, Queensland Academies, Queensland Virtual STEM Academy



# Unique educational facilities

Workshops and Events are held in QUT's Science and Engineering Centre. The STEM for Schools Program has its own dedicated educational space for workshops.

The Centre's dynamic design encourages collaborative learning and problem-solving. The teaching space includes flexible classroom spaces with interactive lecterns and mobile workstations capable of working individually or screen sharing.

A key feature of the Science and Engineering Centre is The Cube – one of the world's largest digital interactive learning and display spaces dedicated to providing an inspiring, explorative and participatory experience of QUT's Science and Engineering research.

The Cube consists of 48 multi-touch screens soaring across two storeys. The Cube team work with STEM for Schools and leading academic staff across QUT to inform the content on The Cube. Environments are replicated at a real-world scale, allowing the public, as 'citizen scientists', to experience real project scenarios and explore big questions of the 21st century.

The STEM for Schools Program includes an optional 30-minute interactive experience at The Cube when high schools book a workshop. These interactive experiences are facilitated by Student Ambassadors and encourage students to discover, visualise and contribute to research projects featured on The Cube through guided activities.



## PRACTICE AND DELIVERY

Interacting with QUT's world-class facilities gives students opportunities to:

- explore university life on campus including access the unique teaching spaces and imagining life as a university student
- experience learning in innovative learning spaces dedicated to STEM education
- interacting with digital technologies and pedagogies through The Cube. Current STEM-related Cube projects include: Chem World, Code-a-bot, Dino Zoo, Physics Observatory, The Living Reef, and Wind Tunnel.





# STEM FOR SCHOOLS

## PROGRAM IMPACT REPORT 2015 - 2019

We acknowledge the Turrbul and Yuggera people of the lands on which QUT now stands, paying respect to their Elders, lores, customs and creation spirits. We recognise that these lands have always been places of learning and teaching.

We also recognise the important role all Aboriginal and Torres Strait Islander peoples play within the QUT community.

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This work is copyright. Insights and data in this report are drawn from survey datasets between 2015 - 2019, including events, workshop, STEM camp and teacher PD surveys; and Science and Engineering Faculty first year student survey (2015 - 2018).