



# #codingcounts

A discussion paper on coding and robotics in Queensland schools

# Our future

It is estimated that...



**60%**

of new jobs require skills held by 20 per cent of the workforce<sup>1</sup>

**50%**

of the world's entrepreneurs are between the ages of 25 and 44<sup>3</sup>

**75%**

of the fastest growing occupations require science, technology, engineering and mathematics (STEM) related skills and knowledge<sup>2</sup>

**40%**

of Australian jobs are at risk of being automated in the next 10-15 years<sup>4</sup>

# a message for Queensland



Our world is changing more rapidly than at any other time in history with the influence of technology spreading to touch every aspect of our lives. Queensland is well placed to take the next leap to respond to the global megatrends influencing the way we live, the way we work and who we are.

Our economy must adapt for Queensland to remain internationally competitive. Research shows the world of work is changing and many of today's jobs won't exist in the future. The *Foundation for Young Australians* has reported that 50 per cent of jobs in the future will require high level digital skills.



Our students are ready to engage in this exciting future. Microsoft surveyed students in the Asia Pacific region and found the majority of students saw coding as critical for their education and their future careers. The study reported that 85 per cent of students want to know more about coding and 75 per cent of students wanted coding offered as a core subject in their school.<sup>5</sup>

The Queensland Government will harness this enthusiasm to create opportunities for every student. Our schools are already using eLearning to create virtual classrooms and innovate teaching.

The *Advancing Education* action plan looks to the future of education. Coding and robotics are central to this future. We know we need to go further to make sure our students are the digital creators and innovators of tomorrow.

The Honourable Anastacia Palaszczuk MP  
**Premier and Minister for the Arts**

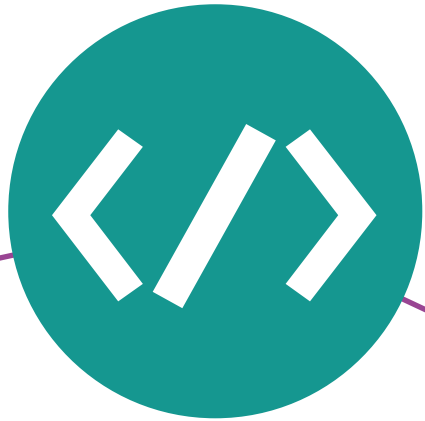
The Honourable Kate Jones MP  
**Minister for Education**

## We can't do this alone.

Every Queenslander needs to be involved in creating our future. We are interested in your views about how:

- students can be ready for the jobs of the future
- schools can innovate and engage in coding and robotics
- communities, training providers, universities, business and industry can get involved.

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# coding

*Coders change the world. They build new, amazing things faster than ever before. Anyone with imagination can learn to write code.*

*Jeff Wilke  
Senior Vice President Consumer Business  
Amazon.com Inc.*

*By making innovation and knowledge-based industries a key focus of this government, we are delivering a new era of opportunity for Queenslanders.*

*Annastacia Palaszczuk MP  
Premier and Minister for the Arts*

# every student can code

Technology is already part of every workplace and every home. Our students need to move from consumers of technology to creators of digital solutions to be successful in our increasingly digital world.

Simply put, coding is telling a computer what you want it to do through step-by-step commands. It requires technical knowledge of the programming languages of code. Just as our students learn a language like Mandarin or Japanese, all students need to learn the language of programming. If you can speak the language of code you can create the solutions needed for the 21st century.

We know that not every student will become a professional coder or computer programmer, just as we know that not every student will become a mathematician because they study maths.

Learning to code and applying it to real world challenges will help our students to be:

- critical thinkers able to solve problems
- team players
- designers of creative answers
- innovators and entrepreneurs.

**Coding is the new literacy and a 'must have' for every student.**

*In the 21st century, the challenge is to understand and harness data, information and knowledge. Computer programming is a necessary way of introducing students to these concepts.*

*Leon Sterling  
Pro Vice-Chancellor (Digital Frontiers)  
Swinburne University of Technology*



# robotics

*The global economy is changing. New technologies and smart companies lead. New industries and new sources of wealth are emerging. New skills are required for workers at all levels...*

*Professor Ian Chubb  
Australia's Chief Scientist*



# coding in action — robotics

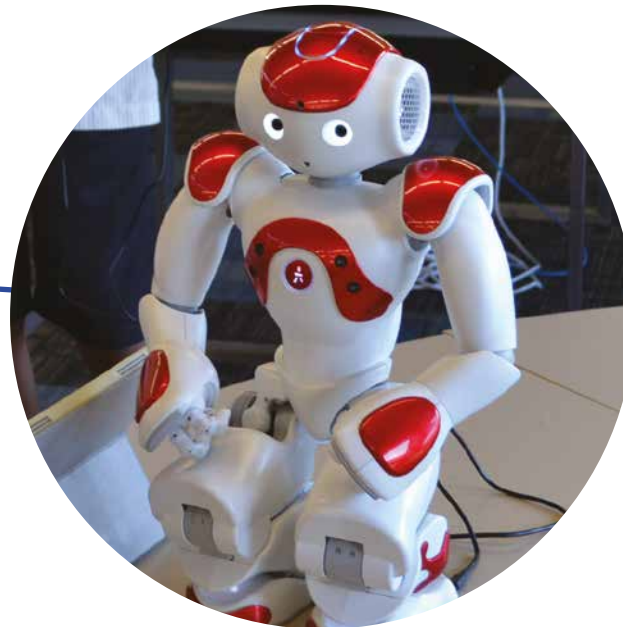
Every day robots are doing jobs in our workplaces such as dispensing medicine, milking cows, and building cars. Robots are a reality in areas such as medicine, manufacturing, agriculture and care industries.

Queensland is part of this evolution, with research in artificial intelligence happening in our universities and industry investing in research and development. For every student to be a successful participant in our new economy they will need a sound understanding of what robotics is and how it can be used to solve real world challenges.

Partnering with industry, universities and other education providers to give our students opportunities to engage in robotics at school will equip them to be the leaders and entrepreneurs of tomorrow. Robotics provides an engaging way for students and teachers to work together. Through robotics, students apply coding and creative thinking to solve problems and produce tangible outcomes.

*In 10 or 15 years, I think that robots will be as commonplace as smartphones, with personal robots that can help with everything from doing search-and-rescue operations to folding the laundry.*

*Daniela Rus  
Professor of Electrical Engineering  
and Computer Science and  
Director of the Computer Science and  
Artificial Intelligence Laboratory (CSAIL)  
Massachusetts Institute of Technology*



# schools

**100%**

of Queensland state schools will be teaching coding and robotics by 2020

**100%**

of Queensland state schools, individually or in clusters, will have active partnerships with industry or universities by 2020





# coding and robotics starts in schools

Around the world the movement to teach coding from the early years through to the senior years of schooling is gaining momentum.

The United Kingdom (UK) has introduced mandatory computer programming study for all students aged 5 to 16 years. UK students are being taught the principles of information and computation, how digital systems work and how to put this knowledge to use through programming.

In 2016, Finland will integrate coding across subjects for students aged 7 to 15 years. This move will support Finland's ongoing digital transformation and build a coding culture.

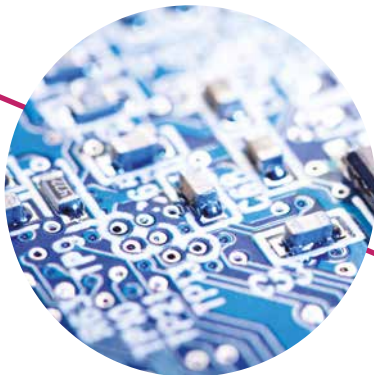
Queensland students will not be left behind. The Queensland Government is committed to making sure that every student will learn the new digital literacy of coding and have the opportunity to apply these skills through robotics.

Teachers and school staff are critical to making this happen. The Queensland Government is committed to supporting schools to innovate through professional development, curriculum resources and opportunities to engage with their peers and experts in the field.

Queensland is building a better future for every student by offering the new *Digital Technologies Australian Curriculum* from 2016 in state schools. This will see students in Queensland begin their digital literacy journey from Prep.

*The Australian economy is in transition and there has never been a more important time to invest in the programs that will equip students with the skills they need to secure the jobs of the future.*

*Ken Boal  
Vice President  
Cisco Australia and New Zealand*



# future jobs

*We are a team of game developers who produce game based applications for real world situations. Along with artistic skills, coding is key to our business future and enables us to deliver great solutions to our customers.*

*Karen Sanders  
Co-Founder  
Real Serious Games  
Queensland*



# jobs of tomorrow today

It is likely that the students of today will be working in jobs that don't yet exist. Technology is fundamentally transforming the world of work and generating new ways of doing business on a global scale.

Current jobs will change through technology, requiring skills in coding and robotics.

Factory floor operators are becoming advanced automation engineers, using digital skills for machine setup, monitoring operations and managing process flow to make products from cars to clothes to plastic goods. Sales and marketing jobs are requiring coding to analyse the vast amounts of data available about individual consumers to create personalised digital campaigns.

New jobs are emerging as technology integrates the digital world in every aspect of our life.

Cyber security experts, nano-technology developers, drone programmers and virtual reality designers are emerging in the fields of health, agriculture, education, law enforcement, engineering, mining and retail services. UX (user experience) designers are constructing customer digital interfaces to meet personal preferences and use data mining to anticipate future user trends. Coding skills are needed to program our cars, our smart homes and our lives through our personal wearables.

*The accelerating integration of digital elements into most work processes – coupled with growing employee digital dexterity – is leading to a world where every employee is a digital employee.*

*Gartner, 2015*



# partners



Intel is supporting the 'maker space' pilot with 28 state schools across Queensland integrating coding, physical computing, design and creative hands-on activities.



Through the Cisco Networking Academy, Queensland students have opportunities to participate in mentoring with Cisco experts and engage in the *Find Yourself in the Future* Program.



# next gen collaboration

Bringing coding, robotics and new-world thinking to our classrooms means we need to create and collaborate with industry and researchers in new ways. Our industry partners, training providers and universities are committed to working with our schools to develop capability and provide opportunities for students and teachers to learn through real world experiences.

Industry is providing practical resources to support the learning of coding and robotics. The journey has already commenced in Queensland schools. We need to extend the engagement of our students and teachers with the rich world of the technology community to inspire them to be the creators of Queensland's future.

Our partnerships with industry will generate real pathways for our students into the world of work and further study. These partnerships are providing opportunities for our teachers to increase their skills and for our students to see the link between coding and robotics and their future.



QUT's  
*STEM High  
School Engagement*  
program offers fully funded  
curriculum-linked workshops.  
Students and teachers learn to  
program robots using Arduino,  
Processing, RobotC and Python to  
skill them for their future careers.



Microsoft is  
working with state schools  
to deliver technology and  
industry accredited courses  
through the Microsoft IT Academy  
with students receiving credit  
towards their Queensland  
Certificate of Education.



# our plan

*Australia is on the cusp of a new but very different industrial revolution. Technology is going to dramatically reshape our workforce in coming years and the nation's ability to rapidly adapt to technological change, and even more importantly, innovate, will be paramount for job creation and our future economic success.*

*Professor the Honourable Stephen Martin  
Chief Executive  
Committee of Economic Development of Australia (CEDA)*



# the next wave — advancing education

Education is at the heart of creating Queensland's globally connected economy and community. Queensland schools are actively embracing this future by resourcing technology labs, investing in the skills of their teachers and igniting students' passion for learning using the technologies of coding and robotics.

Now it's time to go viral!

The Queensland Government is lighting up new opportunities for every student and teacher, no matter where they are, to get engaged in the digital future.

The next wave is about Queensland developing every student's digital literacy, skilling young coders, nurturing young innovators and creating young entrepreneurs.

## Fast-track Digital Technologies

Queensland will offer the new *Digital Technologies* Australian Curriculum from 2016 in state schools from Prep to Year 10.

Teachers will be fully supported in this implementation through targeted professional development, practical teaching resources and online communities of excellence to support innovation in teaching.

We will go further to develop expertise across our teaching workforce with scholarships for teachers to specialise in the teaching of coding and robotics.

## Start-up the Queensland Coding Academy

A coding academy will be established in Queensland. The academy will provide hands-on learning opportunities for students and teachers and an online presence, creating virtual classrooms to support innovation and collaboration

in teaching. The academy will work with industry and universities to develop valuable opportunities to link students to the real world of work and research.

The academy will expand the *Young Scholars* program across the state with an emphasis on students in regional and remote areas through satellite centres of excellence such as in North Queensland through James Cook University.

## Incubate the Entrepreneurs of Tomorrow

Queensland will fund opportunities for young entrepreneurs to pitch their ideas, work with industry to shape these ideas and develop business plans through the *Entrepreneurs of Tomorrow*. This initiative — part of our *Advance Queensland* investment — will focus on developing real world solutions to Queensland's challenges.

Expertise will be brought to state schools through a coding and robotics expert in residence program. The program will source entrepreneurs, innovators and leaders in the field to engage with schools, sparking the imagination and passion of students.

Student excellence will be celebrated through the Premier's *Creating Queensland's Future* coding competition. This competition, in collaboration with industry, will present students with coding and robotics challenges and provide opportunities to showcase student innovation across all years of schooling.

# #codingcounts

*I also think we need to have a serious conversation with the public about making sure our schools are teaching technology, robotics and coding. This needs to start in primary schools now.*

*Annastacia Palaszczuk MP  
Premier and Minister for the Arts*





# join the conversation

We need Queenslanders to join the conversation about coding and robotics and how we can support every student to be a successful digital learner.

We will be visiting communities across Queensland to have a conversation about our plan for education and the role of coding and robotics for our future.

Locations include Brisbane North, Brisbane South, Logan, Gold Coast, Sunshine Coast, Rockhampton, Townsville, Cairns, Toowoomba, Mackay, Ipswich, Maryborough, Bundaberg, Charleville, Roma, Longreach and Mount Isa.

Your feedback will inform our plan for the future of coding and robotics in Queensland schools.

Visit the website for details of stakeholder forums and more information about how you can connect and share your ideas.



Join the conversation at [www.advancingeducation.qld.gov.au/codingcounts](http://www.advancingeducation.qld.gov.au/codingcounts)





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