



THE UNIVERSITY
of ADELAIDE



CSER MOOCS DIGITAL TECHNOLOGIES

Closing the Digital Divide for Disadvantaged Students

adelaide.edu.au

EXECUTIVE SUMMARY

The Australian Curriculum: Digital Technologies presents a significant opportunity for the next generation of Australian children to develop skill and mastery in the design and creation of technology and to position Australia as internationally competitive.

In 2014, the University of Adelaide's Computer Science Education Research (CSER) Group recognised the need for teacher professional development in the forthcoming digital technologies curriculum. At the time CSER launched the first of four Digital Technologies Massive Open Online Courses (MOOCs) for Australian school teachers with a focus on Foundation to Year 6. Over time the program grew to include a further two MOOCs covering Foundation – Year 8, with extended focus on integrating the Digital Technologies curriculum into other areas including literacy and numeracy.

In 2016, CSER launched the 'Expanded rollout and support of the University of Adelaide Digital Technology MOOCs – *Closing the Digital Divide for Disadvantaged Students*' program, funded by the Australian

Government's National Innovation and Science Agenda (NISA). With this support, CSER was able to launch a fourth MOOC to cover Years 9–10. This expansion of the program has ensured free face-to-face professional development—as well as access to a Digital Technologies Lending Library, with its suite of teaching and learning resources—is now available for teachers working with students from Foundation right up to Year 10.

Since the commencement of the NISA funded *Closing the Digital Divide* program, the CSER Group has worked with over 30,000 Australian teachers to build teacher capacity and confidence in the Digital Technologies curriculum through CSER MOOCs, professional development workshops and the CSER Lending Library.

In June 2019, CSER with support of Google have launched two new MOOCs focussed on Teaching AI in the Primary and Secondary Classroom.



From left: Mt Isa School of the Air students using spheros; Pooraka Primary School students in South Australia using Makey Makey



BACKGROUND

Skills demand in the workforce is ever-changing and our future workforce will require people with a vast array of capabilities including critical and creative thinking, an entrepreneurial mindset and flexibility to learn and adapt to new work demands.

The Digital Technologies curriculum provides the foundations for critical and creative thinking, while also incorporating computational thinking, problem-solving and project management skills that will support young people to gain meaningful and relevant skills for their future.

According to the Foundation for Young Australians, **Technologists** will be one of seven key job clusters in demand¹. Of the 7 job clusters identified, Technologists have experienced the greatest job growth over a five year period and have strong future job prospects. Analysis of 4.2 million job advertisements over 2012 – 2015 indicated a 212% increase in demand for people with digital skills and 158% increase in demand for critical thinking.²

Teachers play a critical role in helping young people gain the relevant skills and competencies required for their future employment. The CSER Digital Technologies Education Program provides teachers with the critical skills and confidence necessary to support young people in this area.

Data from our MOOC registrations pre-course surveys indicates that many teachers feel they are not equipped with the knowledge and skills needed to implement the Digital Technologies curriculum. The CSER MOOCs are addressing this skill need and teachers are responding very positively to the online and face-to-face support.

In fact 90.1% of participants agree they are now more confident in designing and implementing Digital Technologies activities after participating in the program.

1. Foundation for Young Australians, The New Work Reality, 2018, p 21. www.fya.org.au/wp-content/uploads/2018/06/FYA_TheNewWorkReality_sml.pdf

2. Foundation for Young Australians, The New Work Mindset, 2017, p 3, accessed www.fya.org.au/wp-content/uploads/2016/11/The-New-Work-Mindset.pdf

CSER MOOCs DIGITAL TECHNOLOGIES PROGRAM

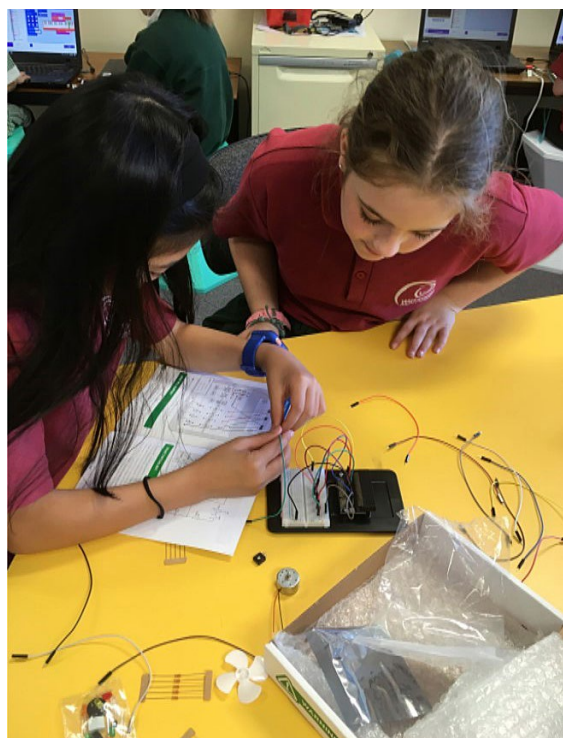
There are three major aspects of the NISA supported CSER MOOCs Digital Technologies Program:

CSER MOOCs

“The world is changing. I need to get on board and make a start on my own learning. I may be apprehensive and not confident but [the CSER Project Officer] showed me that I am more than capable. The children and I will learn together. I have also taken the step and started the online course after much procrastinating.”

South Australian workshop participant

MOOCs or Massive Open Online Courses are a scalable and effective delivery method for reaching participants across Australia. CSER has six MOOCs offering teachers the opportunity to build confidence in implementing the Digital Technologies curriculum in their schools.



Foundations-6 Digital Technologies: Fundamentals MOOC

Introduces the fundamental concepts of the Digital Technologies curriculum including algorithms, data representation and visual programming. No prior knowledge is necessary. Useful for all teachers of all year levels to understand where students are starting from.

Foundation-6 Digital Technologies: Extended MOOC

Explores how programming can be integrated into other subject areas such as English, Science and Mathematics – where students become creators.

Years 7-8: Next Steps MOOC

Uses a project-based approach to implementing classroom projects, with a focus on app development.

Years 9-10: Explore!

Uses a project-based approach to game development, working through data requirements, design, implementation and testing.

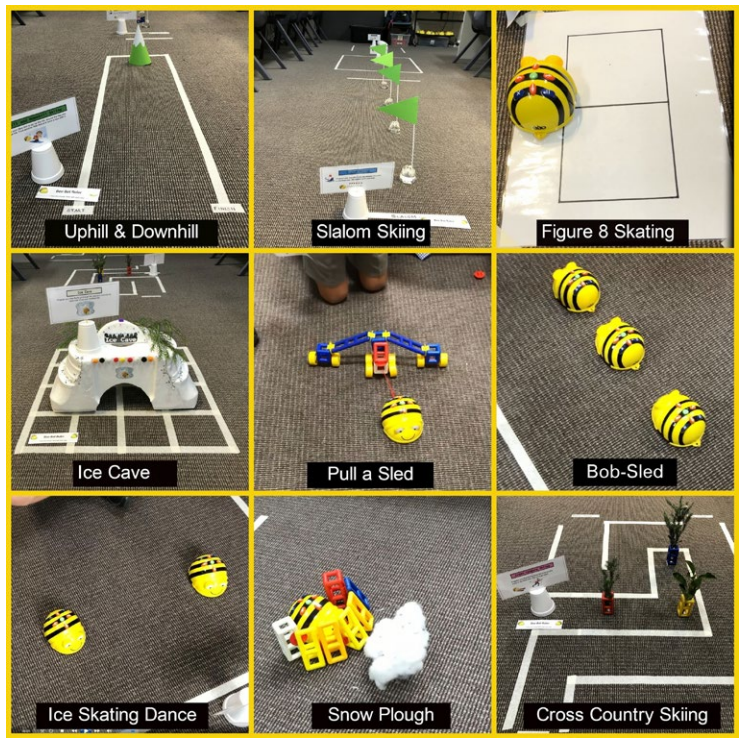
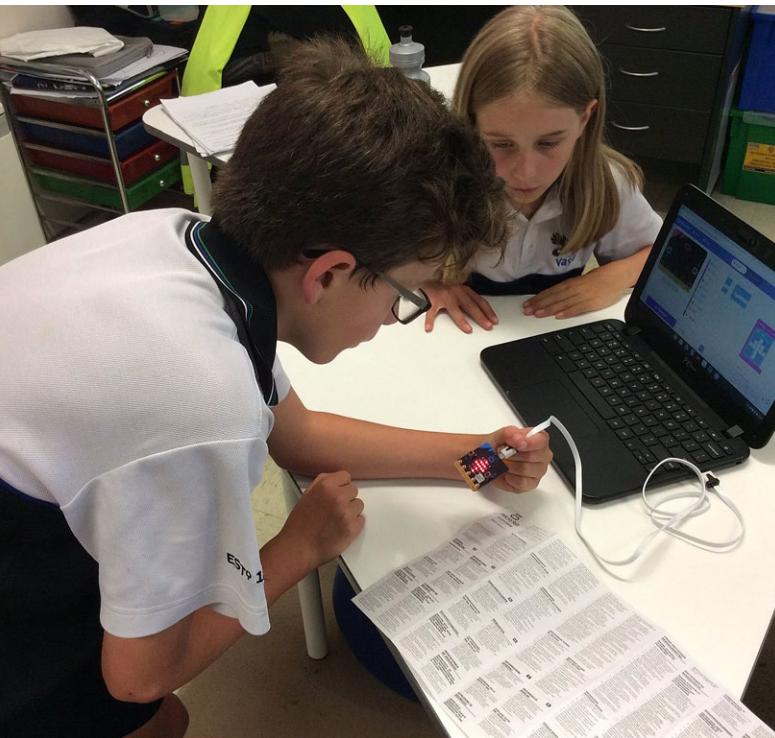
Teaching AI in the Primary and Secondary School Classroom

Two new MOOCs were launched in June 2019 to introduce schools to AI—including core concepts, history and evolution of AI, and the benefits, risks and ethical issues related to AI.

CSER MOOCs on USB

For schools that have limited internet connectivity, CSER provides MOOC content and related learning materials on a USB. We have provided over 700 USBs to schools across the country.





CSER Professional Development Workshops

“Digital technologies unplugged are beneficial and inexpensive. A great place to start to engage students in the curriculum.”

South Australian workshop participant

CSER have part-time project officers located in each State and Territory in Australia. Project officers have previously worked as teachers in primary and secondary schools within their jurisdiction.

Project officers offer workshops to suit the needs of the school, utilising CSER MOOC content to assist schools to implement the Digital Technologies curriculum. Workshops can vary from short introductory briefings to help schools register in the online course to major two-day immersive workshops.

Workshops often include hands-on opportunities for teachers to interact with robotics equipment, as well as low cost unplugged activities.

Since the commencement of the NISA funding in mid-2016, CSER project officers have run professional learning events with over 3900 schools—of which over 1500 are priority target schools in low socio-economic areas and schools with significant Aboriginal and Torres Strait Islander student enrolments.

*Clockwise from left:
Watsonia Primary School (Vic) students building micro:bits;
Vasse Primary (WA) students programming micro:bits;
St Roberts School (Vic) – Beebot Winter Olympics;
CSER’s Toni working with teachers*

CSER Lending Library

“Know that what you’re doing is marvellous and changing rural kids’ lives.”

Melanie Capper,
Principal, Dumbleyung Primary School, Western Australia

Schools can borrow from a range of library kits to help integrate digital technologies into their school. CSER library kits are available for all schools that have participated in the online courses or face-to-face workshops. Target schools in low socio-economic areas and schools with significant Aboriginal and Torres Strait Islander student enrolments are given greater priority to access the kits.

Library kits come with lesson plan exemplars, developed by the CSER Team for a range of year levels, enabling teachers to use the kits straight away. Schools borrow a kit for one to two school terms, allowing them to use the kit across more than one class or to do longer term units of investigation with the equipment.

Access to equipment provided through the lending library is essential in overcoming anxiety associated with the introduction of this new technology-rich learning area. Teachers regularly share their experiences with us about how much enjoyment the students have had in engaging with the library equipment and the learning outcomes they have achieved.

The library kits available for loan include: Beebots, Ozobots, Makey Makeys, Spheros, Bluebots, Little Bits Arduino, Little Bits Rule Your Room Kits, micro:bits, Dash & Dot kits, Lilypads and iPads.

Kits are delivered at no cost to the school and include a reply paid delivery process. Kits have travelled to many remote and regional locations and schools are overwhelmingly positive about having access to such high-quality resources at no cost.

CASE STUDIES

Lake Bolac P-12 College, Victoria

In August and November 2018, CSER project officers visited Lake Bolac and surrounds and worked with a number of local schools. Students and staff at Lake Bolac participated in a hands on workshop and also borrowed a CSER lending library Mixed Kit to continue their learning.

“Thank you so much for the Mixed Kit, we really enjoyed having them and it opened our eyes to how teaching could be adapted to include Technology in most of our classes.

I really enjoyed the session that Celia and Toni ran with my class. We spent the next 5 weeks looking at, reading, making sense of and responding to the ethical dilemmas of self-driving cars.

It has been such a rich learning unit that relates to the students’ real world as many of the headers around here are autonomous. Even when I was ready to move on the students were still bringing me in articles from around the world and how people are dealing with the possibility of self-driving cars and their ethical dilemmas.

Who would have thought that an Ozobot, a texta and a piece of paper could have produced such a rich learning environment!!!!”

Trevor, Teacher, Lake Bolac P-12 College

Northern Peninsula Area State College – Injinoo Junior Campus, Queensland

Students and staff at Injinoo Junior Campus excitedly received a CSER mixed kit from the CSER National Lending Library. The school is a remote Indigenous community in Cape York, Queensland that caters for the educational needs of students from Injinoo and Umagico communities.

During a student free day, teachers participated in a workshop where they learned the basics of how to operate the devices, available resources to support implementation, and had an opportunity to get hands-on. Teachers went away thinking about ways they could incorporate the devices in the Digital Technologies curriculum to create digital solutions and engage students.

Thank you CSER for the wonderful resources. It prompted professional dialogue, more teacher confidence in forward planning the Digital Technologies curriculum, and the creation of engaging learning experiences for Injinoo Junior students.

Libby, Teacher, Injinoo Junior Campus

PROGRAM HIGHLIGHTS

30,000+ TEACHERS

PARTICIPATED IN CSER MOOCs OR FACE TO FACE WORKSHOPS TO LEARN ABOUT AUSTRALIAN CURRICULUM: DIGITAL TECHNOLOGIES

1,000+ EVENTS

CONDUCTED BY CSER PROJECT OFFICERS ACROSS AUSTRALIA IN REMOTE, REGIONAL AND METROPOLITAN SCHOOLS

9,000+ PRIORITY TEACHERS

TEACHERS WORKING WITH ABORIGINAL AND TORRES STRAIT ISLANDER STUDENTS AND FROM LOW SOCIO ECONOMIC SCHOOLS HAVE PARTICIPATED IN THE PROGRAM

1,200+ LIBRARY KITS

HAVE BEEN DISTRIBUTED ACROSS AUSTRALIA FROM NHULUNBUY TO KING ISLAND, TO BUNBURY, YULARA, THURSDAY ISLAND AND BACK

RECOMMENDATIONS

The CSER Digital Technologies Professional Development Program supports the Education Council's National STEM Education Strategy, and the five areas for national action, particularly Area 2: Increasing teacher capacity and STEM teaching quality.

To date CSER has worked with over 30,000 teachers across Australia through our online and face-to-face services – however this represents only 10.7% of the Australian teaching population¹. With growing awareness of the importance of Computer Science and the Digital Technologies learning area across the States and Territories, we are seeing significant growth in interest in our program. Demand for professional learning and lending library kits is outstripping our ability to supply across Australia.

The support provided by our project officers and our National Lending Library program project officer roles are critical to reaching teachers in low SES, remote, regional and schools with high Indigenous enrolments. Participation from these areas has increased from 14% to 32% as a result of our professional learning workshops and teacher support. CSER funding ends in June 2020, however our job has only just begun.

Demand for library kits has outpaced our program availability since its inception. The library plays a critical role in reducing teacher anxiety in this new learning area. For schools with limited budgets, the library is critical in providing access to what would otherwise be unobtainable resources. The CSER library gives schools some reassurance that the equipment they are borrowing has been chosen by CSER for the rich learning potential it holds, as demonstrated by the accompanying lesson plan exemplars, in addition to the durability and re-usability of the products.

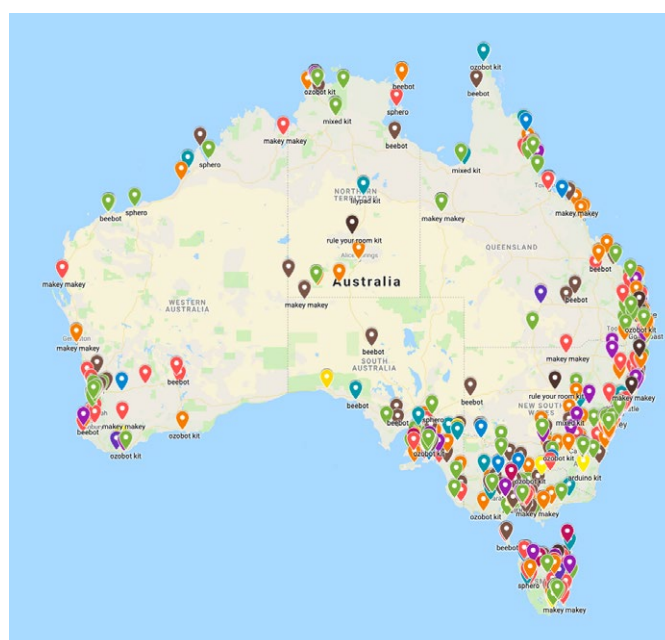
To ensure Australia remains internationally competitive, it is critical that Australian teachers continue to be supported in the ongoing implementation of the Digital Technologies curriculum. We seek support and further investment in the following areas:

- Continued funding for the existing CSER *Closing the Digital Divide* initiative to ensure more teachers learn the fundamentals of the curriculum through face-to-face and online professional development
- Ongoing support for the CSER Lending Library to enable more schools to access the rich learning experiences that come from using these tools

1. Australian Bureau of Statistics, (2019), 4221.0 Schools, Australia 2018, Table 50a: Number of In-school Staff by Function, Sex and affiliation, States and Territories, 2006-2018

Available at www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4221.02018?OpenDocument

Lending Library Kits have travelled far and wide across Australia, travelling on barges in the Northern Territory to get to remote communities, as well as by road and air across the country.



FOR FURTHER ENQUIRIES

Professor Katrina Falkner, Project Lead
CSER Group
School of Computer Science
The University of Adelaide SA 5005 Australia

ENQUIRIES cser@adelaide.edu.au

TELEPHONE +61 8 8313 2478

 csermoocs.adelaide.edu.au

 twitter.com/cserAdelaide

© The University of Adelaide.
Published August 2019 2451-39
CRICOS 00123M

DISCLAIMER The information in this publication is current as at the date of printing and is subject to change. You can find updated information on our website at adelaide.edu.au or contact us on 1800 061 459. The University of Adelaide assumes no responsibility for the accuracy of information provided by third parties.