Australian Catholic University creates lasting success through partnerships

About the organization

- http://www.acu.edu.au
- Publicly funded university with seven campuses and 32,000 students
- Home of Australia's largest teacher training program and one of the only training programs for CS teachers

What they wanted to do

- Create professional development resources for CS teachers-in-training in accordance with Australia's national technology curriculum
- Extend the impact of their program to reach a global audience
- Foster a strong community of CS teachers

Challenge

Today, an estimated 75 percent of Australian jobs in fast-growing industries, such as technology and healthcare, require skills in science, technology, engineering and math (STEM). In response to this need, the Australian government revamped its mandatory primary and secondary school technology curriculum in 2015.

Mandated technology curricula are successful when educators are prepared to teach concepts like computational thinking — the ability to confidently and logically process complex, open-ended problems in the classroom and in everyday life. Despite the need accelerated by the Australian mandate, few universities offer training programs for teachers to learn computational thinking (CT) and computer science (CS).

Another related challenge is a lack of community for aspiring and existing CS educators. Many primary and secondary schools only have one CS teacher, who might have responsibilities in other subjects, too. It's therefore crucial to connect educators with their peers at other schools so they can exchange lesson plans, trade ideas and discuss common challenges.

> "Google's funding allowed us to create comprehensive CS professional development resources and build an extremely valuable network of educators all moving toward the same goal of improving the quality of computer science education in Australian schools."
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> — Leanne Cameron, an Educational Studies lecturer at Australian Catholic University

Solution

ACU offers Australia's largest pre-service teacher training program and was early to recognize the need for better trained CS educators. In 2015, the university applied for funding from Google's educator grants program to develop a new compulsory course for all Bachelor of Education Primary School teachers. The open-source course trains teachers in Australia's new Digital Technologies Curriculum with a focus on CT and

What they did

- Developed compulsory courses for Bachelor of Education students to teach computational thinking and computer science
- Open-sourced the curriculum and frameworks in partnership with three universities to give other universities a strong platform to develop their own computer science education training courses
- Ran 9 hands-on workshops across Australia in 2016 to connect in-service teachers with existing resources from the broader CS4HS network, including CS Unplugged activities and Adelaide University's CSER MOOCs

What they accomplished

- Trained 1,600 computer science teachers annually in Australia, helping them feel more confident and excited to teach computer science

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CS educator grants

Educator grants enable computer science education experts to provide exemplary CS professional development for teachers. The funding focuses on three major growth areas for teacher professional development in computer science:

1. Facilitating the development and delivery of content that increases teachers' knowledge of computer science and computational thinking
2. Allowing educators to customize learning content to meet local needs and share best practices for engaging all students
3. Building of communities of practice that continue to support teacher learning throughout the school year

For more information on CS Professional Development, visit g.co/csedugrants and join our G+ Community.

CS. In 2016, ACU applied for educator grants to develop a second course, which trains secondary school teachers in the new curriculum and practice, and includes a scalable online delivery module.

ACU leverages the expertise of fellow grant recipients in Australia and New Zealand to amplify their work. Educator grants allowed ACU to bring Professor Tim Bell, founder of CS Unplugged, for hands-on workshops with teachers in Australia. CS Unplugged provides free activities that demonstrate effective ways of teaching CS and CT without a computer. ACU also works with Adelaide University, who developed MOOCs for K-8 teachers with local support from Google Australia, to create online communities for teachers. The communities provide a space for both pre-service teachers and those in the classroom to connect to share practical activities, inspiration and encouragement.

Benefits

Achieving exponential scale

By open-sourcing the pre-service training curriculum, ACU gives other universities a solid foundation upon which to create their own Bachelor and Master of Education programs. Workshops and "TeachMeets", informal meetings organized by educators for educators, leverage the work of partners like Adelaide University's MOOCs and Tim Bell's CS Unplugged to help scale education and professional learning without recreating workshop material and professional development resources.

Many teachers who participate network with other educators, creating a ripple effect of CS knowledge sharing. "Kathleen, who is a pre-service teacher, attended one of our course meetups because she wanted to learn basic technology skills," says Leanne Cameron, an Educational Studies lecturer at ACU. "Now, she leads workshops that support teachers who are enrolled in the MOOC."

Creating a network of computer science teachers in Australia — and beyond

ACU organizes networking and professional development events for hundreds of teachers across Australia who are dedicated to improving CS education in their local communities, and teachers often organize meetups on their own and exchange ideas on social media. "I follow over 600 educators on Twitter, and browse hashtags like #ozcschat or #ictensw for ideas and articles. I also participate in #aussieED chats, formal discussions organized by a professional development organization," says Kathleen O'Rourke, a pre-service teacher at Macquarie University who recently completed CSER F-6 Digital Technologies: Foundations.

Fostering a strong foundation in computational thinking

ACU's courses are designed to do more than teach a theoretical level of CS: they teach educators how to foster CT skills. "A lot of students are able to perform basic computer functions, but they don't know how to

apply computational thinking to real-world problems," says Cameron. Teachers are trained to help students develop this mindset.

Developing real-life problem-solving skills

The courses include practical assignments, such as the CS Unplugged activities. Teachers are encouraged to try different approaches to learning — for example, experimenting with small robotics, circuitry and other hands-on hardware. Early results from ACU's evaluation process show that teachers are more likely to use hands-on CS lesson plans in the classroom after they try these activities themselves. Lecturers and guest speakers emphasize that educators can be impactful in CS education without being an expert. It's much more important to employ a mindset of computational thinking: be curious, take risks and try new things.