ACT: Advanced Computational Thinking in the New Zealand Digital Curriculum





Principal investigators: Prof. Ricardo Sosa and Prof. Andrew Gibbons Research team: Emit Snake-Beings, Emma O'Riordan, Leanne Gibson, Keu Iorangi, Andy Crowe, Daniel Badenhorst, Sam Harris Project dates: January 2020 to March 2023

Project description

This study explores learner engagement with Advanced Computational Thinking (ACT) in the New Zealand digital curriculum. "Advanced" in ACT refers to an expansive, transdisciplinary, and future-looking understanding of computational thinking (CT). ACT promotes CT beyond narrow modes of problem-solving (abstraction, algorithmic thinking, and logical data organisation). The research team worked with the learning community in the Makerspace after school programme at Manurewa High School, exploring the life of the Makerspace environment and its contribution to the development of ACT. "Makerspaces are places where participants may work together to create and co-create knowledge and physical or digital products. A making environment provides the potential for cross-curricular connections, collaboration, creativity, innovation, and learning" (Mersand, 2021, p. 175).

Project aim

To identify and develop strategies for learning and applying computational thinking concepts and skills that contribute to critical, creative, and ethical uses of technology that positively impact society. For this project, the research question is: How do students and teachers experience engagement with an advanced level of computational reasoning that prioritises ethical, creative, critical, reflective, and community dimensions?

Why is this research important

For all learners, the creative and critical dispositions embodied in ACT emphasise empathetic, creative, and socially conscious decisions in the digital curriculum. The digital literacy embodied in ACT enables understanding of the adoption, application, and adaptation of digital practices and systems. Future generations that can engage in ACT will be better positioned to identify the complex affordances of emerging technologies for a sustainable future.

Key findings

- The makerspace community stimulates engagement with powerful ideas (Papert, 2020) through its emphasis on whanaungatanga and student-led learning.
- The makerspace presents opportunities to inform and shape ACT through the central function of 'making' for the growth of relationships, the freedom to explore, and the enjoyment of fulfilling making tasks in a shared environment.
- Design thinking as encouraged in makerspaces allows teachers and learners to see creativity as an ongoing and key component of learning. Similarly, they see ACT as an ongoing process constantly bursting out of prescription or predetermination.
- ACT emerges from collaborative, social, supportive and fun culture of spaces where learners share ideas with the confidence that they are in a safe space, and that their growth is supported. These dimensions form a necessary platform for the experiences of experimentation and creativity through a commitment to whanaungatanga and function as a significant pedagogy for ACT.

Implications for practice

The qualities of a makerspace learning community can support teachers in diverse settings and curriculum contexts. Students value their work and work best with ACT when there is a collective emphasis on and commitment to the social connections that support a safe space of trust. A rich makerspace community brings together people with diverse traits, experiences, and aspirations yet they have deep connections and mutual care. A commitment to epistemological pluralism – multiple and collective ways of knowing (Turkle & Papert, 1990) – transforms the teacher-student dynamic, the traditional view of expertise, and the assessment practices that encourage collaboration and group learning. PLD initiatives for ACT should tap into the teachers' interests, curiosity, expertise, and aspirations. Rather than learning to code, teachers can learn and practise a range of computational skills while they reflect upon the possibilities and limitations of working with digital technologies. In turn, they can welcome and foster learners' agency in the digital curriculum.

Hands-on active PLD supports teachers in the construction and reflective practice of making things (physical or digital) as a quintessential part of ACT.

References

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Research Partners

Manurewa High School Makerspace, Auckland University of Technology, and Manurewa Community of Learning

Contact details

Prof Andrew Gibbons:

andrew.gibbons@aut.ac.nz School of Education 90 Akoranga Drive Northcote Auckland University of Technology

Prof Ricardo Sosa:

ricardo.sosa@monash.edu https://advancedcomputationalthinking.org

