MERGA 44: Quick Reads
Mathematics Education Research Group of Australasia
MERGA 44 Mathematical Confluences and Journeys
Launceston, 3-7 July 2022

Mathematics and Coding: How Did Coding Facilitate Thinking?

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The new Digital Technology Curriculum (DTC) became mandatory for NZ primary-school aged children in 2020. However, research indicated that many NZ teachers would find implementing DTC challenging due to proficiencies such as coding (Crow et al., 2019). They indicated a gap in resources and advocated that teachers develop unique implementations, suitable for their school context. Coding, particularly with *ScratchMaths*, is identified as being influential on the development of mathematical thinking and the understanding of mathematical ideas (Benton et al., 2018; Calder, 2018). This paper reports on teachers' perceptions of students' learning as part of a project examining teacher practice and student learning when using *ScratchMaths* in their classroom programmes. The project used design-based methodology, incorporating video-recorded classroom excerpts; teacher interviews; and teacher analysis and review of their practice. The teachers identified the students' collaborative problem solving, using unplugged activities, and collaborating using explicit mathematical and coding language as ways to facilitate mathematical thinking.

The teachers consistently commented on how using *ScratchMaths* fostered a problem-solving approach as the students became immersed in collaboratively debugging their codes. Collaborative learning, going beyond the sharing of ideas to the ongoing negotiation of perspectives and meanings (Mercer & Littleton, 2007), was identified. The unplugged activities were valuable in terms of developing instructions or codes that designated actions, including movements, and were identified as developing students' thinking. The students' thinking and learning in coding were tied to their solving of both mathematical and coding problems, while the explicit language of both seems to have contributed to the communication of processes, concepts and solutions. At times, students became leaders of the learning.

There was mathematical conceptual understanding and thinking, including aspects related to the Geometry and Measurement strand of the NZ curriculum; angles and spatial perception, in particular. As well, the process the participants undertook facilitated thinking through the collaborative problem-solving it evoked, and the development of logic and reasoning as they debugged code, negotiated understanding, and responded to various forms of feedback. The teachers also recognized that their practice became more faciliatory, while their understanding of coding developed through learning with their students.

References

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