INCORPORATING COMPUTATIONAL THINKING – SECONDARY MATHEMATICS TEACHERS' PERSPECTIVES

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THEME:

STEM, STEAM, STEMM, STEM+C and STEM+ education

BACKGROUND AND AIMS

Incorporating computational thinking (CT) in K-12 education has gained momentum in recent years. As part of a global curriculum reform to include CT and coding, the Ministry of Education in British Columbia (BC), Canada also introduced CT and coding to the K-12 curriculum in 2016. Coding is added as a suggested activity from Grade 6 to 12 in mathematics and is seen as a vehicle to teach CT. The curriculum describes CT as "a thought process that uses pattern recognition and decomposition to describe an algorithm in a way that a computer can execute" (BC Ministry of Education, 2016), based on Wing's (2011) influential work. This study explores how BC secondary mathematics teachers understand CT and incorporate it in their classrooms.

METHODOLOGY

This study was done using a qualitative, interpretive approach by surveying secondary mathematics teachers from 13 schools in two urban school districts in BC, Canada. Then three of the teachers participated in classroom observations and interviews. The survey questions, observation notes, and interview questions used Ruthven's (2009) Structuring Features of Classroom Practice Framework, which highlights working environment, resource system, activity format, curriculum script, and time economy.

RESULTS AND CONCLUSIONS

Results showed that most participating teachers did not feel confident about teaching CT, but they understood it as being about problem-solving skills, which include breaking down steps (decomposition), step-by-step thinking (algorithmic thinking), and pattern recognition. Many participants found CT most relevant to patterns and relations in mathematics, and some teachers connected CT to spatial reasoning and probability. Coding is not taught frequently but is sometimes incorporated in younger grades, primarily with block-based coding tools. Overall, teachers found CT and coding activities have the potential to support mathematics learning and elicit high-level engagement. The research suggests that, to encourage more intentional incorporation of CT activities, teachers would benefit from support of computer science educators, resources, and professional development opportunities.

REFERENCES

British Columbia Ministry of Education. (2016, June) *Computer Science 11.* BC's Curriculum. https://curriculum.gov.bc.ca/curriculum/mathematics/11/computer-science

Ruthven, K. (2009). Towards a naturalistic conceptualisation of technology integration in classroom practice: The example of school mathematics. *Education & Didactique, 3(*1), 131-149.

2022. J. Bobis & C. Preston (Eds.), Proceedings of the 7th International STEM in Education Conference (STEM 2022), University of Sydney, Sydney, Australia, November 23-26. University of Sydney.

Wing, J. (2011). Computational thinking—What and why. *The link magazine, 6*(1), 20-23. https://www.cs.cmu.edu/sites/default/files/11-399_The_Link_Newsletter-3.pdf