Lockwood, J. & Mooney, A. 2017, Computational thinking in education: *Where does it fit?* A systematic literary review. Retrieved from: https://arxiv.org/abs/1703.07659

Summary

This article provides a systematic literature review of how computational thinking fits into a school curriculum. The aim of the report is to provide educators with an overview of the current research in this field and the work that is being done in teaching computational thinking. The results show that there are a variety of ways in which computational thinking is being taught and applied, ranging from dedicated computational thinking subjects to one-off events. The research also showed a variety of pedagogy was being used; however, more work needed to be done on how to assess computational thinking skills.

The following review does not cover all aspects of Lockwood and Mooney's article.

Analysis

Key responses to the research question: Why is computational thinking important for educational institutions to incorporate into their curriculums? What benefits does computational thinking have? included:

- improved analytical skills
- better understanding that programming is about problem-solving and not just coding
- increased confidence towards programming by females
- that computational thinking is an early predictor of academic success (and general academic success).

The authors signalled that as research is in its infancy, the long-term benefits need further research. While acknowledging these limitations, the authors' reviews of research literature revealed that:

- a range of science subjects incorporated computational thinking content such as abstraction, algorithms, evaluation, design, visualisation.
- mathematics addressed topics such as data representation, recursion, types of algorithms
- English provided opportunities to include programming (Scratch programming) and multimedia (animations)
- algorithms were used to represent song lyrics and plots in plays and stories in Literature
- dance could use Alice programming to control and move a character

- in interdisciplinary programs, computational thinking topics such as visualisation, pattern recognition and generalisations were used in the early years, and that decomposition, algorithmic thinking and evaluation were used in Years 3–5. Critical thinking, abstraction and programming were being taught in interdisciplinary programs in Years 6–12.

The authors concluded that computational thinking can be taught and applied in a range of school programs and that its application brought benefits to student learning in different disciplines.

While limited research was considered for the early years (due to its unavailability) the authors concluded that:

- visual programming languages introduce students to programming in a user-friendly environment
- CS Unplugged activities were a popular way of teaching computational thinking concepts
- teachers need more guidance on how to incorporate computational thinking into their teaching and learning programs.

Reflection

This article highlights that the introduction of computational thinking is widespread internationally and that, as a generalisation, the key elements of computational thinking are common. This report illustrates a variety of ways in which computational thinking can be applied in many disciplines, and that many opportunities exist for cross-curricular programs. The article also highlights the need to provide further advice and resources to teachers about assessing computational thinking.