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Summary

This article explores the concept of computational thinking within computer science learning and in relation to other learning areas. The authors assert that because of its focus on analysis, computational thinking is not only suitable for computation but also the development of systems based on computation. The article discusses the spectrum of definitions of computational thinking from the narrow to the broad, and what separates it from other ways of thinking, namely the importance of algorithms in the skill set.

Analysis

The authors contend that the varying views of computational thinking have led to problems, particularly from a research perspective. Views tend to differ based on the breadth of applicability and the computational agents. This in part has arisen because of the recent and widespread uptake of computational thinking in school curriculum offerings worldwide, and as a consequence has brought with it varying interpretations of the term due to different socio-political environments.

However, the authors argue that there is a middle ground of consensus about the characteristics of computational thinking, namely, it is concerned with the development of systems that involve information processing and it is the focus on algorithmic solutions that differentiates this problem-solving approach from others.

The authors contend that computational thinking provides a whole new way of thinking that is applicable to a range of vocations because it provides a new lens for viewing and understanding the world, as well as new ways of working.

The article explores the fundamental elements of computational thinking, some of which are:

- algorithmic thinking, which involves giving key instructions using iteration, sequence and selection
- logical thinking, needed to develop and implement algorithms and for testing
- abstraction, the ability to manage complexity by thinking in multiple levels of abstraction (simplifying and hiding detail)
- generalisation, which involves taking a specific solution and creating a more general version applicable to a wider set of problems

- decomposition, which involves solving a problem by identifying its smaller parts that in turn can be solved separately
- evaluation. (The authors raise the point that there is no general consensus about evaluation being part of computational thinking, even though there is consensus that evaluation of a solution needs to take place.)

From a teaching/learning perspective, the authors argue that computational thinking will be best developed through repeated practice, working with real-world problems, taking into account the goals and needs of the stakeholders.

Reflection

The Australian Curriculum: Digital Technologies definition of computational thinking seems to take a 'middle road' approach to its meaning, and it encapsulates the key elements espoused by the authors. In the curriculum, computational thinking is defined as a problem-solving method that involves various techniques and strategies that can be implemented by digital systems. Techniques and strategies may include organising data logically, breaking down problems into parts, defining abstract concepts and designing and using algorithms, patterns and models. https://www.australiancurriculum.edu.au/f-10-curriculum/technologies/glossary/?letter=C

As educators, it is important that we encourage our students to consider the context within which computed solutions will function; for example, by asking questions about/looking at social and economic factors.

The article also acknowledges an understanding of the environment within which digital solutions will function, considering its social, economic and environmental environment.

The article also acknowledges that an understanding of the settings within which digital solutions will function is needed; its social, economic and environmental factors all need to be considered.