Computer Science in the school curriculum: issues and challenges

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Aims

The aims of this study have been to:

1. Identify the differences in approach and the importance of various factors that affect curriculum design and implementation across nations.
2. Identify an internationally agreed range of skills and understanding that should be taught and developed in the computer science curriculum.
3. Identify the issues emerging from different national priorities and approaches to the teaching of computer science

Methods and Analysis

Methods

The method has involved an on-going review over the past two years of:

a) a wide range of published national and international studies of the issues regarding the teaching of computer science and the needs of society as influenced by IT;
b) the national curricula for Computer Science and Informatics in a range of countries;
c) Expert group discussions at Edusummit2015, at subsequent IFIP meetings and on-going email debates to interpret and synthesize the findings.

Analysis

The ongoing analysis of policy and research documents has been conducted to identify the challenges and consequent recommendations which face all countries in the successful adoption and implementation of Computer science in the curriculum

Results

The results of this two year study have identified a range of approaches to teaching Computer Science in Schools from teaching it as a separate subject to attempting to teach it as an integral part of other curriculum subjects.

Analysis of the core components of the Computer science curricula by the international team identified Computational Thinking as a foundation for Computer science learning and additionally as a significant component across many traditional curricula subjects as shown in Figure 1.

The review of national policy priorities and the impact of industry needs confirmed the indisputable requirement for the Computer Science Curriculum in any country that it should be taught as a separate subject as shown in Table 1.

One of the constraints for curriculum design identified by the review is the need to introduce, early in the curriculum, all three major types of knowledge: concepts, propositions and know-how because these knowledge types are dependent on each other. There is as yet no consensus about the importance of more general intellectual practices such as persistence in working through problems and tolerance for ambiguity as well as the importance of collaborative learning and group work.

Conclusions

The results of this two year study have identified key questions which policy makers, researchers and practitioners need to consider when designing a Computer Science Curriculum for future generations of learners in a technological world.

- What is the range of skills and understanding that should be developed in Computer Science?
- Are such skills and understanding necessary for everyone?
- At what age should Computer Science education commence?
- What pedagogical approaches are likely to be appropriate?

References
