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Mind the step! Simple constructs in primary programming are not that simple

New computing education – often starting in the lower primary years – embraces programming as a key instrument of computational thinking. National curricula usually set ambitious requirements for primary computing education, listing essential computational constructs and processes to be mastered by primary pupils (e.g. use sequence, selection, and repetition in programs; or design, write and debug programs that accomplish specific goals...). While the research findings within our recent ScratchMaths project suggest that the intervention which we developed is a viable strategy to meet the expectations of national curricula in years 5 and 6, the question remains how to implement them in years 3 and 4 (i.e. with the age group of 7 to 10, depending on educational system).

There are numerous portals and on-line resources claiming to have the answer to that question. Our main concern, however, is that those resources and the expertise behind them often originate from after-school experience, secondary or higher education practise or individualised home “edutainment” – focusing on isolated flashes of learning, often neglecting complexity of important basic computational concepts and processes, failing many advantages of primary education.

In our present research and development, we strive to better understand what distinguishes after-school programming environments and approaches (in the code.org style) from systematic and appropriate pedagogies for lower primary computing. In the keynote we will present our emerging approach for transforming so called “basic” computational constructs into thoroughly constructed and iteratively verified sequences of small activities which the pairs of pupils – and then the entire class – try to solve and explore, envisage and discuss, compare, share and explain... in the sense of our ScratchMaths 5Es pedagogical framework. We will explain why we decided to develop new series of programming environments that give years 3 and 4 pupils the opportunity to build deep understanding of so called essential computational constructs in appropriate progression.

About speaker

Ivan Kalaš is a professor of Informatics education (Computing) at Comenius University, Bratislava, and since 2013 a visiting professor at UCL Institute of Education, London. His professional interests include development of constructionist interfaces for early computing education and research in the field of the impact of digital technologies on learning.

Ivan is a co-author of several programming environments for children, including Comenius Logo, Imagine Logo, Thomas the Clown and RNA (Revelation Natural Arts) adopted by thousands of schools, home and abroad. He is also an author or co-author of several books and textbooks on children programming and informatics, which have been published in several languages and countries in Europe and elsewhere. He has been active in several national and international policy efforts and initiatives. Ivan represents Slovakia in the IFIP Technical Committee for Education. From 2008 to 2013, he was a member of the International Advisory Board of the Microsoft Partners in Learning initiative. From 2014 till 2016 he was a member of the UCL ScratchMaths project, focusing on the development of innovative programming content and corresponding pedagogy for English pupils aged 9 to 11.