Educating pre-service teachers in programming for schools Block-based programming initiative in the teacher education program

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Keywords: pre-service teachers, block programming, revised curriculum, micro:bit

The poster and its environment

The proposed poster presents the block-based programming experiences of the pre-service teachers with their first introduction with programming at university-level education. Our aim is to report the results of the impact of programming workshops on the professional development of pre-service teachers and how this initiative is helping them to become better future teachers. A very positive and impactful learning response from them is a highlighted part of this research. In the last decades, computer technology has changed our society dramatically. The school-going elite of today is meeting and interacting with information technology almost everywhere. Recently, many European countries have introduced basic programming in their national curricula in view of the increasing and futuristic importance of information technology. As a part of the "Digitalization Strategy for Basic Education 2017-2021" (Education & Research, 2017), the Norwegian Ministry of Education has introduced programming (coding) in different courses at primary and secondary school levels. The school year 2020-2021 is the first year with this revised curriculum in Norway. Competence goals for programming in mathematics have been introduced at all levels in primary and lower secondary school in the revised curriculum (Utdanningsdirektoratet, 2020a).

Challenges and collaborative work

The challenges associated with this inclusion in the revised curriculum (LK20) in schools and in the teacher-education institutions are manifold. It is natural for the schools and teacher-education institutions to reflect this reality. In the present research, our focus will remain on the measurements and actions taken by the Nord university and its partner university in their teacher-education program for pre-service teachers. The Nord University is collaborating on a joint research project, improving Teacher Education in Mathematics (iTEM), with the Technical University of Liberec (TUL) in the Czech Republic. One of the main goals of this research is to investigate the perceptions held by pre-service teacher at Nord university in Bodø campus and at TUL Czech Republic towards the use of the block-based programming with micro:bit. Micro:bit is a pocket-sized programmable device that helps the students to get more involved in the world of coding (programming). It targets the young people´s inspiration to be creative with digitalization and develop fundamental skills in Science, Technology, Engineering, and Mathematics (STEM) (Sentance et al., 2017).

Planning and discussion

To help and improve the students' learning skills through programming instruction, it is important to provide appropriate activities and tasks (Popat & Starkey, 2019). We designed and presented activities on micro:bit in the workshops conducted at different levels in teacher education program at Nord University Norway and at TUL Czech Republic. We targeted one of the learning goals from LK20 (Utdanningsdirektoratet, 2020a) related to the programming in the Norwegian revised 7th-grade mathematics curriculum in schools and designed activities that transform the micro:bit into a digital dice. Students performed guided instructions and made a digital dice. Subsequently, students recorded the data on shaking the micro:bit as they do conventionally with a normal cast of dice. To achieve this goal, students learned the art of algorithmic thinking and the basic skills of the programming such as defining the variables, working with loops, understanding of basic logic, and implementing a build-in math module with built-in feature. The feedback of the participants was recorded via an online questionnaire. The contents of this poster are mostly related to the responses of the participants on their experiences with programming. Most of the pre-service teachers who attended the workshops reflected that the micro:bit is a useful tool to develop algorithmic thinking, easy to use, and enjoyable to work with in relation to both its programming environment and problem-solving capabilities. A sizable percentage of teacher-students showed a keen interest in block-based programming with micro:bit and expressed that they learned a lot because of these workshops. Furthermore, they expressed great interest in using the micro:bit in their future teaching programs in schools. It is worth mentioning that few of these students who were writing their research reports in their third-year study program at Nord university designed the micro:bit tasks and presented them in schools during their teaching practice period due to high demands on programming from school sides. Key findings of this research work will be presented in the poster.

Acknowledgment

The authors would like to acknowledge the project iTEM (improve Teacher Education in Mathematics), EHP-CZ-ICP-2-018 for this research work.

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