Workshop on Unplugged Computational Thinking Activities

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Abstract. The workshop aims on unplugged learning arrangements on Computer Science (CS) that can be used at schools in all grades. The activities do not require computers ("unplugged") but everyday material that can be found in any classroom like paper, pencil, Lego and furniture. The goal is to inspire and involve the learners in such a way that they get an idea of CS concepts on a concrete operational level. Practical experience from unplugged activities may be a basis for a better and deeper understanding of theoretical concepts. The participants of the workshop perform, create and discuss game-like collaborative activities on CS covering main facets of computational thinking.

Keywords: computational thinking, unplugged activities, co-operative learning

1 Unplugged Activities and Computational Thinking

"Computer Science Unplugged" is well-known from Tim Bell et al. who created a set of cooperative activities to learn CS in a playful way. It has turned out that concepts like binary numbers, picture encoding, etc. can be understood even by young children [1].

Computational thinking is connected to problem solving. A task needs not to be computer-related in an obvious way. But the way of thinking during the problem solving process is typical for informatics. Solving problems that are in the domain of the learners is highly motivating and contributes to the development of computational thinking skills.

Benefits of CS Unplugged include:

- no need of (expensive) technical equipment,
- focusing on creative problem solving,
- concrete operational understanding of informatics concepts,
- no specific preknowledge required.

According to [3], the main facets of Computational Thinking are cognitive competences like abstraction, decomposition, algorithmic thinking, evaluation and
generalization. The authors emphasize the fact that finding solutions requires (and fosters) creativity, see [2].

1.1 The Workshop Activities

The workshop consists of four parts. After a short introduction, the participants have the opportunity to try out unplugged activities. Then they are encouraged to create their own arrangements or find variants or improvements of the given ones. At the end everybody presents her or his result and we discuss the involved educational theory. This is in line with the CS Unplugged philosophy.

Unplugged Activities We offer a collection of game-like activities (including some from [1]) and provide all needed materials. We suggest that the participants try out some of them in small groups or pairs. This will give the basis to create new variants and to discuss the educational effects and benefits.

Educational Reflection There are some issues that might be interesting to discuss: How can unplugged activities be integrated in school education? How does a pedagogical framework for unplugged activities look like? How are unplugged activities related to the aspects of Computational Thinking? How to organize unplugged activities? How to proceed after unplugged activities? Which Informatics concepts can be conveyed by unplugged activities? How to organize teamwork? How to involve creativity? How to assess the effects of unplugged activities?

The participants do not need to bring any computers, tools, etc. Everybody who is open new learning experiences is welcome.

References