

From Play to Code

Preparing Young Learners for Coding with an Unplugged Board Game (Grade 4)

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Abstract

In the Swiss curriculum, fundamental programming concepts and Computational Thinking are not sufficiently covered in 3rd and 4th grade, leaving many students unprepared when programming is first introduced in 5th grade. The IMPACT project addresses this gap by developing an unplugged, game-based learning environment that introduces key programming concepts in an engaging and age-appropriate way. In this workshop, we present the current state of an unplugged board game designed to help 4th-grade students grasp essential programming concepts such as sequences, loops, conditions, and events. Developed using the Educational Design Research approach, the game has undergone iterative refinement through literature review, expert interviews, consultations with didactic experts, and classroom testing (n=161, 8 classes). First results show that students felt well engaged and teachers gave highly positive feedback on its age-appropriateness and value for programming preparation. The workshop will allow participants to experience the game firsthand and explore how it can be integrated into diverse classroom contexts. In addition, participants will gain insight into the underlying design principles and how iterative development supported both pedagogical quality and classroom feasibility. The workshop aims to share this learning tool with the wider community, collect feedback for continued development, and spark dialogue on unplugged approaches to coding in early education. The broader goal is to contribute to constructionist approaches by empowering learners to explore programming through hands-on, collaborative, and playful activities that build foundational skills and confidence.

Keywords and Phrases: Unplugged Programming, Educational Board Game, Programming Concepts, Game Based Learning, Computational Thinking, Primary Education

Scope, Motivation, and Background

Scope: The workshop introduces a pedagogical board game designed to prepare 4th-grade students for later programming instruction by targeting fundamental CT skills in a playful, unplugged way. It aligns with constructionist principles by encouraging exploration, iteration, and reflection through game-based learning.

Motivation: Our motivation for presenting this game at the workshop is threefold: first, we want to make the game accessible to the wider educational community. Second, as the game is still in development, feedback from participants will be especially valuable in optimizing its mechanics, enhancing learning outcomes, and adapting it



to different educational contexts. Third, we aim to engage with researchers in this field to explore collaborative opportunities, exchange insights, and further advance research on unplugged programming approaches in primary education.

Background: In the Swiss curriculum, there is a gap in grades 3 and 4 where neither Computational Thinking (CT) nor fundamental programming concepts are systematically introduced, leaving students unprepared for programming in 5th grade. To address this, the IMPACT project developed an unplugged board game for 4th-grade students, introducing key programming concepts in an accessible way (Huang & Looi, 2021; Curzon et al., 2019). Using an Educational Design Research approach (Plomp, 2013), the game was iteratively refined through a literature review, teacher interviews, expert evaluations, and classroom testing (n=161, 8 classes). This process ensured both pedagogical soundness and classroom suitability.

Gameplay: In the game, two to four players use command cards to navigate their game pieces across a board, collecting as many coins as possible (see figure 1 and 2). The game progresses through different levels, gradually increasing in complexity to reinforce CT skills in an interactive manner and introducing the students playfully to key programming concepts such as sequences, loops, conditions, and events.

Impact and Contribution: The game not only addresses a documented curricular gap but also serves as a tool for promoting equitable access to CT education. Teachers valued its simplicity and immediate usability, while students engaged enthusiastically with the tasks. By inviting the community to test and reflect on the game, the workshop supports theory-building around unplugged methods and fosters research-practice partnerships in early computing education. Future developments include measuring learning gains, offering professional development for teachers, and publishing the game as Open Educational Resources (OER).



Figure 1: Students programming their game piece with cards (left). Board game with coins and cards (right).

References

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