D1 – GAME-BASED LEARNING ENVIRONMENTS IN MATHEMATICS INSTRUCTION

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Symposium Presentations

Training early mathematical skills: The Hungarian adaptation of Mina and the Mole

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Playful fostering of inductive reasoning through mathematical content in computer-based environment

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Training adaptive expertise with arithmetic problem solving in a game-based context

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SYMPOSIUM ABSTRACT

As technology is becoming more and more an integrated part of instruction, game-based learning nowadays mostly denotes digital game-based learning, disregarding other, more traditional types of play. Indeed, digital games can be powerful and motivating environments where players can interactively and freely explore subjects without the fear of failure (*Gee*, 2003). However, going digital does not always guarantee a better game (*Pásztor*, 2013).

Despite of the growing interest in using digital game-based tools for educational purposes, even recently conducted review studies fail to find conclusive evidence regarding the effectiveness of this medium (e.g. *Wouters* et al., 2013). One frequently raised issue in the domain is the lack of empirically tested educational digital games with strong theoretical background. Furthermore, many games fail to integrate educational aims with the core game features (*Young* et al., 2012). Failing to align game goals and learning goals leads to games where the educational content is separated from the game flow and becomes a necessary chore instead of meaningful part of the game experience (*Habgood* and *Ainsworth*, 2011). Finally, a further design problem is not using games to their full potential. In the domain of mathematics instruction for example, although digital game-based environments would allow the in-depth exploration of many complex subjects, up to date most games are still simple drill and practice environments which aim for calculation fluency (*Devlin*, 2011).

The aim of this symposium is to present three different game-based environments, one of them using more traditional and two of them using digital formats. The common aim of all three games is to trigger the development of complex mathematical skills, each targeting different age groups. Furthermore, from a design perspective the presented studies share the common interest to integrate the mathematical learning goals into the core structure of the games. The first study targets the development of a series of early mathematical skills in the context of a traditional game environment. Learning activities are embedded in an overarching story and aim to develop complex early mathematical skills such as the understanding of relations between numbers and operations. The second study adapts *Klauer*'s model of inductive reasoning in a novel computer-based context and aims to foster inductive reasoning strategies of elementary school students through playful and interactive tasks embedded in a mathematical content. The aim of the third study is to trigger the development of adaptive expertise with arithmetic in the context of an educational digital game where players discover relations between numbers and operations by working with various number-operation combinations and number patterns.