

Mathematics Gaming in Early Childhood: Describing Teacher Moves for Effective and Appropriate Implementation

Alejandra Salinas
Boston University, USA

Chu Ly
Boston University, USA

EXECUTIVE SUMMARY

Use of technology and video games are highlighted as important mathematical practices as part of the Common Core State Standards (2010). However, research around technology use in early childhood classrooms, particularly the use of video games that target specific content, is sparse. This chapter briefly reviews the existing literature around these topics. Moreover, it describes the moves an expert teacher incorporates into her practice to effectively and appropriately integrate instructional video games as a tool for learning mathematics in a kindergarten classroom. Results of this case study indicate that when integrated appropriately, video games and the use of Interactive White Boards (IWB) can lead to an increase in children's motivation and engagement with learning mathematics.

BACKGROUND

Since the mid-1960s, research has supported the often self-evident decree that the quality of teachers plays a significant role in student learning (Coleman et al., 1966; Goldhaber, 2008). Although the definition of what it means to be a quality teacher varies, one that is consistently considered is a teacher's instructional practices (e.g.:Darling-Hammond, 2002; Rowan, Correnti, & Miller, 2002; Stronge, Ward, Tucker, & Hindman, 2008). In other words, the actions and decisions teachers take in the classroom affect student learning. Large-scale research indicates that a single teacher practice is not sufficient but that combinations of practices can lead to significant differences in student achievement and engagement (Chapin, O'Connor, & Anderson, 2009; Rowan, Correnti, & Miller, 2002). Rowan, Correnti, & Miller (2002) hypothesize that the key to improving the impact of U.S. schools on student learning "lies in finding situations in which many instructionally desirable conditions co-exist in classrooms and in situations where students experience such powerful combinations of instructional practice across their careers in school" (p. 23). Teacher moves, which we define as a specified set of instructional actions that teachers perform as part of their practice, therefore have the power to transform student learning. Although some teacher moves have been widely studied, such as those around promoting classroom discussions, (Chapin, O'Connor, & Anderson, 2009), teacher moves around the implementation of content-based video games in early childhood settings have not been studied in detail.

Due to recent technological advances, current research in education has begun to focus on the impact of technology on young children who grow up as *digital natives* (Zevenbergen, 2007). Since not all children have access to technology at home, a technology gap occurs between the *haves* and the *have-nots* beginning in early childhood (Gutnick, Robb, Takeuchi & Kotler, 2010; Warschauer & Matuchniak, 2010). Although somewhat controversial, research indicates that integrating technology use in early childhood settings allows all students to have access and experience with technology through the use of games and IWB with beneficial results (Gutnick, Robb, Takeuchi & Kotler, 2010; Jang & Tsai, 2011). With the rise of touch screen technology and the accessibility that it offers for users to navigate through programs, researchers are looking to see how such innovations might be used in early childhood classrooms (Northrop & Killeen, 2013). Moreover, this research has become more relevant in light of the Common Core State Standards which state that appropriate tool use, such as technology, is an important mathematical practice as early as kindergarten (2010).

One specific line of research investigates the effects of video games as an instructional tool on motivation and efficacy in young children (Gee, 2003). The available research supports the use of video games created for the purpose of supporting cer-

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