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Using a Computer Science-based Board Game to Develop Preschoolers' Mathematics

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ABSTRACT

Past studies have shown that playing certain board games for only one hour can yield significant gains in mathematical learning. While there are variations in the types of structured play that children engage in, we see this as a particularly interesting area to explore to make play more meaningful and relevant to the child's growth. Few attempts have been made to measure the effects of a board game that is specifically geared toward sequential thinking (i.e., play that emulates the skills of a computer programmer). The present study provides the preliminary data to support further research on a larger scale, most likely to a broader range of ages and interventions. Ramírez-Benavides and Guerrero (2015) provide a summary of programming environments developed for children over the past 45 years. Of the 29 environments they list, only Robot Turtles is available for learning and teaching without the use of electronics. This is especially important when considering the poor and underserved peoples of the world. Consequently, research on the teaching of programming skills to young children has involved studies that require the use of electronics (Kazakoff, Sullivan, & Bers, 2013). With no studies on the teaching of programming outside of an electronic environment, our study is unique and adds to the knowledge base in a new way and improves the learning of children in topics related to the mathematics required in computer science. We set out to address the following questions: Does participating in the playing of a computer science based board game improve mathematical concepts related to future programming skills in children four years of age? What mathematical concepts are evident in children's play of a computer science board game? How can preschooler's arithmetic and geometry/spatial skills be improved? In the Appalachian region two day-care facilities were available to recruit participants. Measurement instruments include a parent survey and pre- and post-test measures of sequencing skills. We present early analysis as well as a discussion of future directions.