

PRESCHOOL TRAINING OF EARLY MATHEMATICAL SKILLS

Attila Rausch

University of Szeged, Doctoral School of Education

Keywords: early mathematical skills; preschool education; early intervention

The development of early mathematical skills determines later school achievement and attitudes as well (*Duncan et al, 2007; Praet & Desoete, 2014*), and without basic numerical skills children start school with a serious drawback (*Jordan et al., 2009*). Therefore early interventions are important in mathematics instruction and they can have long lasting effects (*Sylva, 2009*).

In this study we present a preschool training program, called Mina and the mole, which is a well-designed instrument for early mathematics instruction based on an empirically tested developmental model (*Fritz, Ehlert & Balzer, 2013*). The training consists of 6 consecutive modules with 27 training sessions, sessions introduced with a story followed by different learning tasks and exercises (*Gerlach & Fritz, 2011*). The aim of our research was to adapt the Mina and the Mole program into the Hungarian context and to test its effectiveness on the development of early mathematical skills and to examine its impact on additional cognitive domains (e.g. relational reasoning or deductive reasoning).

223 five and six years old preschoolers participated in the study. After the pre-test 53 low achiever children were selected by their counting and basic numeracy performance. Control groups consisted of 170 children (low, medium, and high achievers). The training program lasted for 20 weeks, and sessions were coordinated by kindergarten teachers in groups of 8-10 children. The effectiveness of the training was measured with the DIFER (Diagnostic System for Assessing Development, Cronbach $\alpha=.92$), test battery that assesses key skills for school readiness (e.g. counting and basic numeracy, relational reasoning, deductive reasoning, comprehension of relations; *Nagy et al., 2004; Csapó, Molnár & Nagy, 2014*).

The effect size of the training program was $d=.092$ on counting and basic numeracy. There was no significant difference between the experimental and the control group of low achievers on the pre-test, while on the pre-test the performance of the experimental group was significantly higher ($t=2.04$; $p<0,05$). We measured significant development on other subtests of DIFER, however none of them were significantly higher than that of the control groups.

At the end of the program we interviewed the kindergarten teachers about their experiences of the training sessions. They highlighted the benefits of design, the consecutive structure, and the storyline, furthermore, they had some remarks to improve the instrument.

Results show that the Mina and the mole mathematical training program can be effective on developing basic numeracy skills in Hungarian context as well. It is a practical educational tool for kindergarten teachers to foster low achiever children. The experiences of this research will be used to develop more playful learning instruments to promote successful school entry.

This research was supported by the European Union and the State of Hungary, co-financed by the European Social Fund in the framework of TÁMOP 3.1.9-11/1-2012-0001 'Developing Diagnostic Assessments' project.