

BAR-ILAN UNIVERSITY

**Enhancing Spatial Perceptions and Linguistic among
Preschoolers: A Comparison between Technological
and Non-Technological Intervention**

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Abstract

The theoretical contribution of spatial perception skills to the development of concrete and abstract thought, alongside evidence gleaned from studies indicating that these skills can be improved in young children with typical development (Tzuriel & Egozi, 2010; Uttal, Miller & Newcombe, 2013) led to the construction of a variety of intervention programs aimed at nurturing these skills (Baenninger & Newcombe, 1989, Terlecki, Newcombe & Little, 2008, Uttal et al., 2012). A review of the characteristics of these intervention programs demonstrates that a small number of them continued beyond the span of a few weeks (e.g. Tzuriel & Egozi, 2010), and that only a fraction of these incorporated the use of technology (Uttal et al., 2012). There is consensus among researchers on the efficacy of the use of technological tools in educational environments. The use of technology has been shown to have a positive impact on children's learning (Caci, Chiazzese & D'Amico, 2013; Maor, Currie & Drewry, 2011; Parsons & Cobbs, 2011); Studies indicate that the child-robot interaction mediated by an adult advances a variety of skills from an early age (Coxon, 2012; Di Lieto et al., 2017; Kazakoff, Sullivan & Bers, 2013), and they point to the educational contribution in integrating these robots in curricular systems (Bers, 2008, 2010; Bers, Flannery, Kazakoff & Sullivan, 2014; Kazakoff, Sullivan & Bers., 2013). Nonetheless, there is only a scattering of studies on the development of spatial perception in children with the use of robotic technology (e.g. Keren & Fridin, 2014).

The objective of the present study is to examine the extent of improvement of spatial and language perception skills following the use of technological intervention, in contrast with non-technological intervention in preschool children with typical development.

The study was conducted in two preschools in central Israel. The group of children (N=48) was randomly divided into an experimental group and a control group. The experimental group was offered a technological intervention program for the development of spatial language and thought with the use of a Bee-Bot. The control group was offered an identical program for the development of spatial language and thought without the use of technology, but with the use of traditional means such as flashcards and worksheets. The intervention program was comprised of ten weekly hour-long sessions provided over the course of roughly three months offered to two

children accompanied by an observer – an educational mediator experienced in working with children, who operated in accordance with the structured protocol of the program.

The findings demonstrate that in terms of spatial perception skills, the technological intervention group showed an improvement in rotation ability, a distinct, significant sub-skill of spatial ability, in contrast with the non-technological intervention group. In terms of spatial language, the improvement was evident in three measures, one of each sub-category of language tests – production, comprehension, and imitation – among participants of the technological intervention program. These findings support the implementation of intervention programs to train and advance spatial perception and language skills.

In terms of the correlation between spatial perception and language skills, most spatial perception measures were found to be connected to most spatial language measures in accordance with the hypothesis that the higher the results in various spatial perception measures, the higher the measure of most spatial language skills. This support of the connection between the skills justifies the integration of tasks for the development and advancement of spatial language skills in spatial perception intervention programs.

The research results support the implementation of intervention programs for the development of preschoolers' spatial and language perception by integrating up-to-date technology with traditional measures. The recommendation is to continue to examine the impact of technology on the development of preschoolers' spatial and language perception.