

# AN INVESTIGATION OF THE EFFECT OF PUZZLES ON PRESCHOOLERS' DEVELOPMENTAL AREAS

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## ABSTRACT

The aim of this study was to investigate the effect of puzzles on preschoolers' developmental areas. Two classes were chosen randomly among all the classes at an elementary school: one class (with 14 children) as the control group and one as the experimental group (again with 14 children). The data was collected by means of a 'Demographic Information Form' and a 'Preschool Developmental Evaluation Form' that measures children's developmental characteristics. Since the children's scores in 'Preschool Developmental Evaluation Form' did not show normal distribution, Mann-Whitney U Test was used to analyze the data. We could not find any significant difference between the pretest and posttest mean scores in both groups. However, the experimental group's post-test mean scores were found to be higher than mean posttest scores of children in the control group. These results suggest that puzzles as instructional materials can be effective in supporting children's developmental areas.

## UDC & KEYWORDS

■ UDC: 37.04 ■ Preschool education ■ Developmental areas (cognitive, language, psychomotor, social and emotional development) ■ Puzzle

## INTRODUCTION

The most important educational materials at preschool educational institutions and home environment are plays and play materials. Glassy and Romano (2003) stated that play and play materials have built a significant bridge over children and their communication with their families and other individuals. Children identify and evaluate what is happening in their surrounding and outside world through the medium of play materials. Play materials are the most valuable means for stimulating intelligence, senses and emotions; and developing the imagination and creativity of the child, as well as supporting physical, spiritual and social development. Play materials, educational materials provide child's learning through playing and accordingly helping them form some concepts and understand objects and events in a better way (Aral, Kandır, and Can-Yaşar, 2002; Daoust, 2007; Oğuzkan and Avcı, 2000).

Puzzles which are regarded as an educational material, support learning through playing; at the same time they make a positive contribution to the development of mental skills such as perception, recollection, resolution, making research, comparing, forming connections, watching over for details, visual distinction, envisioning, problem-solving, critical thinking, analysis, part-whole relationship, concentration, and observation (Aral, Kandır, and Can-Yaşar, 2002; Arslan, 2000; Chia, 2008; Çelik and Kök, 2007; Dodge and Colker, 1995).

While children are completing the puzzles individually they obtain some skills such as; following the puzzle instructions, carrying out the activity for a certain time and concentration. Whereas group work puzzles allow children interact with each other and give them opportunities to do the puzzle

cooperatively thus puzzles provide important attainments for their social development. Children doing the puzzle, joining the similar pieces together or trying to group the puzzle pieces according to their characteristics; ask questions and learn new and different words as they are listening to explanation carefully. These experiences help children develop age-appropriate vocabulary, start making grammatical sentences, express themselves in a fluent and meaningful way. Besides children feel the joy and happiness of achieving a task while dealing with the puzzle; therefore they present their emotions openly (Atalay and Aral, 2001; Dodge and Colker, 1995; Hurwitz, 2003; Oğuzkan, Tezcan, Tür, and Demiral, 1992). Conducted studies also showed that plays provided significant contribution to child's creativity (Chia, 2008), social-emotional development (Glassy and Romano, 2003; Glover-Gagnon and Nagle, 2004), physical development (Isenberg and Quisenberry, 2002), cognitive and language development (Owen-Blakemore and Centers, 2005).

Puzzles are effective instructional materials through supporting children's developmental areas (cognitive, language, psychomotor, social and emotional development), their creativity, interests and needs, and providing their learning while entertaining them (Atalay and Aral, 2001; Avcı, 1999; Sull, 2006). Therefore, educators and parents have to understand the importance of puzzles in children's development and their education and they are supposed to present puzzles to the child as educational materials. From this point of view this study intends to investigate the effect of puzzle prototype activities on preschoolers' developmental areas (cognitive, language, psychomotor, social and emotional development).

## Material and method

The design of the research

In this study experimental design with pretest, posttest control group was used.

Participants

Randomly chosen children who show normal developmental characteristics from nursery classes of primary schools in Ankara city center during 2008-2009 academic years took part in this study. Among the randomly picked schools, two classes were chosen as control and experimental groups using random sampling methods. Sampling consists of 28 children, 14 of which were included in control group and the other 14 were included in experimental group. The mean ages of the children involved in the study were 64.21 months for the experimental group and 63.57 months for the control group. It was found that 50.0 % of the children included in the test group were female, 50.0 % male, while in control group, 42.9% was female and 57.1% male. 35.7% of the children in the test group and 57.1% of the children in control group were first child while 42.9 % was the first child and the majority of the children (test: 71.5%, control: 57.2%) had two siblings. It was determined that 57.2% of the mothers of the children included in the test group and 64.3% of those

of the children in the control group were graduates of a high school; 42.9% of the fathers of the children in the test and 57.2% of those of the children in the control group were graduates of a university.

#### Data collection instruments

In this research 'Demographic Information Form' and 'Preschool Developmental Evaluation Form' were used.

**Demographic Information Form:** Such items as the child's birthday, gender, and number of siblings, birth order, and parents' educational status were given in General Information Form. General Information Forms were filled in by parents.

**Preschool Developmental Evaluation Form:** This scale was developed by the researchers using Ministry of Education Preschool Education Program for 36-72 month-olds (M.E.B., 2006) and was further refined depending on field experts' opinions and valid suggestions as forms. In Preschool Developmental Evaluation Form for 6 year-olds five sub-dimensions were included; psychomotor development, social-emotional development, language development, cognitive development, and self-care skills. This form was developed as three point Likert; 'can do it independently', 'can do it with help', and 'can't do it yet'. Items on Preschool Developmental Evaluation Form are graded 2, 1, 0 and total grades are calculated for each sub-dimension for psychomotor development, social-emotional development, language development, cognitive development, and self-care skills. Developmental areas in Preschool Developmental Evaluation Form are evaluated according to total points calculated. Preschool Developmental Evaluation Form was filled in by parents.

#### The puzzles and education program

According to the yearly plan, puzzle prototypes were prepared paying attention to self-recognition, my school, my family and home, emotions, Atatürk, social rules, animals around us, sea animals, changes around us and colors. In parallel to the goals and attainments mentioned in the yearly plan, an educational program was eventually prepared. In the plan, there are plays that can be played progressively.

#### Procedures

As a pre-test 'Preschool Developmental Evaluation Form' was given before puzzle prototype treatment was administered to kindergarten children in control group and experiment group who showed normal development characteristics. After the pre-test was applied, with experimental group 10 puzzle prototypes developed to handle different themes that were integrated into education parallel to yearly curriculum were used two days a week,

one class hour a day 45 minutes for five weeks. After puzzle prototype was applied, as a post-test 'Preschool Developmental Evaluation Form' was given to parents of both control and experimental group children.

#### Data analysis

Shapiro-Wilk Test was used to investigate whether the scores children got on 'Preschool Developmental Evaluation Form' showed normal distribution or not. When results of Shapiro-Wilk Test were studied, it was observed that scores children in control and experimental group got from pre-test and post-test Preschool Developmental Evaluation Form didn't show normal distribution. For this reason, whether there was a difference in average scores of pretest and post-test of children in control and experimental group Mann-Whitney U test, non-parametric one was used (Büyükoztürk, 2009).

#### Findings and discussion

The result of the study carried out to determine the effects of puzzle prototypes activities on preschoolers' developmental areas (cognitive, language, psychomotor, social and emotional development) were given and discussed below.

Table 1 shows that there was no significant difference found between the experimental and control group children according to their pretest scores from cognitive development (U=90,  $p>.05$ ), language development (U=77.5,  $p>.05$ ), social-emotional development (U=91,  $p>.05$ ), psychomotor development (U=94,  $p>.05$ ) areas and self-care skills (U=82,  $p>.05$ ) in Preschool Developmental Evaluation Form. This finding shows that children in both groups were similar in terms of Preschool Developmental Evaluation Form.

Table 2 shows that there was no significant difference found between the experimental and control group children according to their posttest scores taken from cognitive development (U=74,  $p>.05$ ), language development (U=83,  $p>.05$ ), social-emotional development (U=76.5,  $p>.05$ ), psychomotor development (U=77.5,  $p>.05$ ) areas and self-care skills (U=87,  $p>.05$ ) in Preschool Developmental Evaluation Form. However, experimental group children's mean scores of Preschool Developmental Evaluation Form were found out to be higher than those of control group children.

Puzzles, which are categorized as educational toys, support learning by playing and at the same time help to improve children's certain skills such as perception, remembering, analysis, envisioning, problem solving, critical thinking, establishing part-whole relationship, concentration and observation (Aral, Kandır, and Can-Yaşar, 2002; Demiral, 1987; Dodge and Colker, 1995; Spodek and Saracho, 2005)

Table 1: Mann-Whitney U Test according to the pretest scores of children in both the experimental group and the control group taken from Preschool Developmental Evaluation Form

Preschool Developmental Evaluation Form	Groups	N	$\bar{x}$	Med.	Min.	Max.	sd	Mean rank	U	p
Cognitive development	Experimental	14	31,5	33	17	41	8,2	15,1	90	0,712
	Control	14	31,4	31,5	10	43	7,9	13,9		
Language development	Experimental	14	21,6	24,5	7	28	6,6	16	77,5	0,344
	Control	14	20,9	20	15	28	4,6	13		
Social-emotional development	Experimental	14	23,4	24	10	28	5	15	91	0,746
	Control	14	22,6	25	8	28	5,7	14		
Psychomotor development	Experimental	14	52,9	54,5	39	64	8,2	14,8	94	0,854
	Control	14	52,9	54,5	35	62	7,1	14,2		
Self-care skills	Experimental	14	24,6	25	16	28	2,8	15,6	82	0,449
	Control	14	23,9	24,5	17	28	3	13,4		

Source: Author

Table 2: Mann-Whitney U Test according the posttest scores of children in both the experimental group and the control group taken from Preschool Developmental Evaluation Form										
Preschool Developmental Evaluation Form	Groups	N	$\bar{x}$	Med.	Min.	Max.	sd	Mean rank	U	p
Cognitive development	Experimental	14	36,3	37	28	44	4,9	16,2	74	0,268
	Control	14	33,3	34,5	19	44	6,7	12,8		
Language development	Experimental	14	23,3	24	12	28	4,3	15,6	83	0,488
	Control	14	22,9	24	18	28	3,3	13,4		
Social-emotional development	Experimental	14	25,8	28	18	28	3,1	16	76,5	0,303
	Control	14	24,6	26,5	15	28	4,1	13		
Psychomotor development	Experimental	14	58,5	58,5	53	64	3,7	16	77,5	0,343
	Control	14	56,7	56,5	49	64	4,3	13		
Self-care skills	Experimental	14	25,4	25	21	28	1,7	15,3	87	0,606
	Control	14	25,2	25	23	28	1,6	13,7		

Source: Author

together with facilitating cooperation among peers during a group work on puzzles and fostering expressive language (Atalay and Aral, 2001; Dodge and Colker, 1995; Oğuzkan, Tezcan, Tür, and Demiral, 1992) while at the same time helping to the improvement in some social skills such as commitment to the task, playing with peers, sharing, solidarity, cooperation, waiting one's turn and obedience and supporting children in terms of enhancing their independence and self-confidence, obedience to the written rules, being respectful to others and listening to the other party (Oğuzkan and Avci, 2000). Moreover children are benefited from the opportunity to express their feelings such as joy, anger, shock or frustration in a variety of contexts as they play with educational toys as they are regarded as mentally healthy as well as having necessary skills in expressing their emotions in an appropriate manner at other contexts. Environment and materials provided to the children are effective in their use of hand and finger muscles and skills such as hand-eye coordination (Chia, 2008; Hohmann and Weikart, 1995; Oğuzkan and Avci, 2000).

Isenberg and Quisenberry (2002) stated that toys addressing children's psychomotor development had more of an impact on the support of their hand-eye coordination together with gross and fine muscle development. Self-care skills which can be named as life skills include decision making, problem solving, creative thinking, critical thinking, self-awareness, effective communication, intrapersonal relations, empathy, management of stress and emotions (Dunn and Arbuckle, 2003; Ferrari, Houge, and Scheer, 2004) and it was reported that educational toys can be effective in the development of these skills. In line with this issue, Taylor, Morris and Rogers (1997) claimed that toys supported children's language, psychomotor, social and emotional development.

All in all, it can be suggested that puzzle prototypes have a significant effect on fostering children's cognitive, social-emotional and psychomotor developmental areas. In order to observe the predicted effect in children, a specified time length is a prerequisite. Within this context, one can claim that the planned time period for the puzzle prototype educational program to foster the children's developmental areas (cognitive, language, psychomotor, social and emotional development) is not sufficient.

Puzzles are effectual educational materials which support children's cognitive, language, psychomotor, social and emotional developmental areas while fostering their creativity and self-care skills as well as providing learning during playing with them. Therefore, use of puzzles by practitioners and parents to support children's development and their academic skills is important. In the light of findings, seminars and in-service training sessions regarding the utilization of puzzles as educational toys can be organized.

Also, educational policies can be adopted addressing the use of puzzles as educational materials at early childhood centers.

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