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RESEARCH ARTICLE

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The Effect of the Educational Plaything Number Puzzle on Fine Motor Improvement of Preschooler Aged 4-6 Year

Ni Nyoman Murti^{1(CA)}, Ega Ersya Urnia²

^{1(CA)} Midwifery Department, Health Polytechnic of East Kalimantan, Indonesia; baratamurti@gmail.com
(Corresponding Author)

²Midwifery Department, Health Polytechnic of East Kalimantan, Indonesia; egaersya@gmail.com

ABSTRACT

UNICEF data in 2011 showed a high rate in growth and developmental disorders in children; especially, motor development disorders of 27.5%. In other words, 3 million children experience it. Based on national data from the Ministry of Health of the Republic of Indonesia, in 2010, 11.5% of children in Indonesia experienced growth and developmental disorders. This research aimed to determine the effect of educational plaything 'number puzzle' on the improvement of fine motor skills of preschoolers aged 4-6 years. This was quasi-experimental research with a non-equivalent control group design. Based on the results of statistics tests using the Mann-Whitney test, the p-value = 0.013 for fine motor difference between experimental and control groups and the p-value 0.018 for improvement in fine motor development in the experimental group. There was a significant effect on the provision of stimulus in the form of an educational plaything 'number puzzle in improving the fine motoric of preschoolers aged 4-6 years.

Keywords: educational plaything, fine motor

INTRODUCTION

Background

According to UNICEF, in 2011, the data showed a high rate of growth and developmental disorders in children; especially, motor development disorders of 27.5%. In other words, 3 million children experience it. In 2015, growth and developmental disorders in Indonesian children reached 35.7% and was classified as a high public health problem according to WHO because it was above 30%⁽¹⁾.

Based on the examination of the growth and development of children under five and preschoolers, there were 3,657,353 children who experienced delays in growth and development in East Kalimantan in 2013; as many as 2,321,542 (63.48%) children which was still below the target of 80%⁽²⁾.

According to Beaty⁽³⁾, fine motor development involves the smooth muscles that control the hands and feet. According to Marmi, the role of motor skills of the children affects their abilities to entertain themselves and get a feeling of pleasure. By having good motor skills, children easily adapt and place themselves to the school environment. Fine motor examination is performed using the Denver Development Screening Test (DDST). Interpretation of DDST shows that advanced fine motoric is when a child is able to carry out the task on the right of the age line with a number of failures of less than 25%, normal fine motoric is when a child fails to perform the task on the right of the age line with a number failure of 25-75%, and caution fine motoric is when a child fails to carry out the task on the right of the age line with a number of failure of 75-100%⁽⁴⁾.

Educational plaything is a game tool that can optimize the development of children according to their age and level of development. It is useful for physical development, language development, cognitive development, and social development⁽⁵⁾. Puzzles offer amazing exercises for finger dexterity and eye and hand coordination, as well as cognitive concepts in matching shapes⁽³⁾.

Purpose

The research objective is determining the effect of educational plaything 'number puzzle' on the improvement of fine motor skills of preschoolers aged 4-6 years.

METHODS

This study was conducted using quantitative research type; i.e. research in the form of numbers⁽⁶⁾. The study design was quasi-experimental which examines experimental activities and aims to find out the symptoms or effects it caused as a result of certain treatments⁽⁷⁾ without strict restrictions on randomization⁽⁸⁾. This study was non-equivalent control group design. There were one experimental group and one control group that will be given a pre-test and post-test⁽⁸⁾.

This study was conducted in March-April 2018 including 1 month 2 weeks in the experimental group and 2 weeks in the control group. It took place in Anyelir Kindergarten of Samarinda as the intervention or experimental and Cendrawasih Kindergarten of Samarinda as the control group. Population of study were all children aged 4-6 years in Samarinda who attended school in Anyelir Kindergarten of Samarinda (as many as 15 children) and Cendrawasih Kindergarten of Samarinda (as many as 37 children).

RESULTS

Table 1. Distribution of fine motor development in the experimental group before stimulus giving

Fine Motor Development	Frequency	Percentage
Advanced	4	26.7%
Normal	4	26.7%
Caution	7	46.7%
Total	15	100%

Table 2. Distribution of fine motor development in the experimental group after stimulus giving

Fine Motor Development	Frequency	Percentage
Advanced	8	53.3%
Normal	6	40.0%
Caution	1	6.7%
Total	15	100%

Table 3. Distribution of fine motor development in the control group

Fine Motor Development	Frequency	Percentage
Advanced	3	20.0%
Normal	5	33.3%
Caution	7	46.7%
Total	15	100%

Table 4. Comparison of fine motor

	Educational laything 'Number Puzzle'	Number of Respondents	Average Ranking	p-value
Fine motoric of preschoolers aged 4- 6 years	Using stimulus	15	19.23	0.013
	Without using stimulus	15	11.77	
	Total	30		

Table 5. Fine Motoric Improvement of the Experimental Group

	Educational Plaything 'Number Puzzle'	Number of Respondents	Average Ranking	p-value
Fine Motor	Post-test < Pre-test	0	0	0.018
	Post-test > Pre-test	10	11.6	
	Post-test = Pre-test	5	6.2	
	Total	15		

DISCUSSION

Fine Motoric Development of Preschoolers Aged 4-6 Years in the Experimental Group

The researchers conducted an observation through a pre-test using DDST. Then, the research findings were obtained from univariate test on the fine motor skills of children in the experimental group who attended Anyelir Kindergarten of Samarinda. Before giving the stimulus using educational plaything 'number puzzle', respondents who had caution fine motor skills were more dominant which were 7 children (46.7%) than respondents with normal fine motor skills which were 4 children (26.7%) and also advanced fine motor skills which were 4 children (26.7%).

Based on the results of the univariate test on the observation through post-test using DDST, after giving the stimulus using educational plaything 'number puzzle', there is an increase in children's fine motor development. Children with advanced fine motor skills were 8 children (53.3%), children with normal fine motor skills were 6 children (40%) and children with caution fine motor skills were 1 child (6.7%). The acquisition of the test results indicated that giving stimulus using educational plaything 'number puzzle' has increased fine motor development. The stimulation can also function as an amplifier that is beneficial for the development of children⁽⁹⁾.

The fine motor skills most likely to show the greatest improvement were the skills learned in school, in guided play groups, and in vacation camps. These skills include numerical puzzle playing skills that provide a good stimulus for improving children's fine motor skills⁽⁹⁾. The researchers assumed that the stimulus given to respondents in Carnation Kindergarten was successful because it was given by a fun method through a play group that was guided and studied at school. Therefore, it can make the children get used to and trigger an increase in their fine motor skills.

This skill improvement occurs because puzzles offer amazing exercises for finger dexterity and eye and hand coordination, as well as cognitive concepts in matching shapes. Educational plaything 'number puzzle' makes the respondents enthusiastic to play while learning and remembering the numbers.

Fine Motoric Development of Preschoolers Aged 4-6 Years in the Control Group

The results of the univariate test on fine motoric children in the control group that did not use an educational plaything 'number puzzle' at Cendrawasih Kindergarten of Samarinda were obtained using the DDST research instrument. It involved 7 children (46.7%) with caution fine motorskills, 5 children (33.3%) with normal fine motor skills and 3 children (20%) with advanced fine motor skills.

It showed that stimulation using educational plaything 'number puzzle' plays an important role in the process of improving children's fine motor development. This extraordinary ability of children will not appear if the nerve cells of the brain are not stimulated early and continuously. Continuous stimulation allows brain cells to build connections between neurons that play a role in the ability of the children's learning process and intelligence. The more connections between neurons, the higher the children's intellectual intelligence. In addition, the more often the connection between these neurons used repeatedly, the connection will be stronger. When a child grows up, a connection that is not used will break by itself⁽¹⁰⁾.

Respondents in the control group were quieter when the teacher gave questions about numbers. In addition, respondents were also passive in class. The researchers assumed that stimulus using educational plaything 'number puzzle' is needed by preschoolers to increase their enthusiasm and activity in learning. Fine motor skills affect children's ability to adapt to peers and also improve their cognitive skills.

The Effect of Educational Plaything 'Number Puzzle' on Fine Motoric Development of Preschoolers Aged 4-6 Years

The bivariate test results on differences in the average ranking of fine motor improvement found that the experimental group was 19.23% higher than the control group 11.77% with p value = 0.013 < α = 0.05, which

meant that there is a significant effect on giving stimulus using the educational plaything 'number puzzle' to improve children's fine motor skills.

Provision of stimulation, at the first 4-6 years of a children's life, is very important for their lives because at that age the brain is an organ that experiences very rapid growth and development⁽¹⁰⁾. Stimulation, guidance and opportunity for children to move all parts of the body will speed up children's motor development⁽¹¹⁾.

The difference in fine motor skills that was stimulated using educational plaything 'number puzzle' can be seen from the results of post-test calculations between the experimental and the control groups. Different motor skills play different roles in children's social and personal adjustments.

Mittman mentioned some common problems that occur in preschool children on fine motor development without stimulation⁽¹²⁾. Basically, children become disobedient, temper tantrum, verbally or physically aggressive, inferior, impulsive, overactive, unable to concentrate, daydreaming, selfish and too dependent on other people/spoiled. The researcher assumed that the difference can be observed in daily life between the experimental and the control groups. When the respondents in the experimental group were given a stimulus using educational plaything 'number puzzle', they became more active in answering teacher questions about numbers than in the passive control group did.

Meanwhile, the bivariate test results on the development of fine motoric skills in the experimental group consisted of 10 children who experienced fine motor improvement with an average ranking of 11.6% and 5 children who did not experience fine motor improvement with an average ranking of 6.2% with $p \text{ value} = 0.018 < \alpha = 0.05$. It means that there is a significant effect on the provision of stimulus using educational plaything 'number puzzles' in improving children's fine motor skills. Children who did not experience fine motor improvement consisted of 4 children who had advanced fine motor skills and 1 child who had caution fine motor skills.

There are several things that cause children to have weak fine motor skills. First, it is caused by sensory integration in terms of proprioceptive (bones, muscles, and joints) so that children cannot predict the working pressure of muscles, bones and joints. In addition, children cannot hit the target when they have to throw the ball at the specified target because their movements are too weak, and so forth. The second is the disruption of fine motor muscle strength. Therefore, children tend to be lazy to use their fine motor muscles to carry out their activities. This weak muscle characteristic indicates that muscle tone or suppleness is lower than other children. The third is muscle endurance or low fine motor muscle resistance in which children feel easily tired when performing fine motor tasks. The fourth is fine motor coordination that is not good enough in which children are only able to carry out ordinary fine motor activities; for instance, pressing and pushing. However, in doing high-level or more complex fine motor activities, children experience difficulties; for instance, coloring and writing. The fifth is lack of training in fine motor activities, especially high-level fine motor activities such as ADL (activity daily living) that include as buttoning clothes and tying shoelace as well as preschool skills such as cutting, coloring, writing and composing puzzle⁽¹⁰⁾.

The improvement of children's fine motor development that is significantly influenced by educational plaything 'number puzzle' is the activities in imitating cubes, drawing 6-parts person, drawing 3-parts person, and copying circles. Puzzle offers amazing exercises for finger dexterity and eye and hand coordination, as well as cognitive concepts in matching and copying a shape 13.

CONCLUSION

There is a significant effect on the provision of stimulus in the form of an educational plaything "number puzzle" in improving the fine motoric of preschoolers aged 4-6 years.

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