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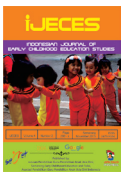

The Use of Three Dimensional Puzzle as a Media to Improve Visual-Spatial Intelligence of Children Aged 5-6 Years Old

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Abstract

The visual-spatial intelligence of children aged 5-6 years old becomes absolutely essential for individuals to be able to adapt well to the environment and to be successful. The purpose of this study was to determine the increase in visual-spatial intelligence of children aged 5-6 years after being treated using three-dimensional puzzle in PGRI 25 kindergarten, Karangrejo Semarang. The population was the students of PGRI Kindergarten in Gajahmungkur district that implemented the same curriculum. The sampling technique used in this study was cluster sampling, and the drawn sample was PGRI 25 Kindergarten, Karangrejo, group B as many as 30 children. The results of the study found an increase in the children's visual-spatial intelligence, seen from the results of the first test and the second test after being given treatment. The result of the first test was a percentage of 46% and the second test was 54%. Then based on the calculation results of test I and II, there was an increase of visual-spatial intelligence by 8%. Based on that description, it can be concluded that three-dimensional puzzle can enhance the visual-spatial intelligence of children aged 5-6 years after being given treatment using three-dimensional puzzle. Teachers are advised to use this media.

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INTRODUCTION

Education is fundamentally a development process of individual potential. Through education, the potential of an individual can be changed into competence. Competence reflects the abilities and skills of the individual in performing a task or job. Learning in early childhood aims to introduce the basic concepts that are meaningful to the child's life to be able to interact with the environment, both now and in the future. These concepts should be introduced through activities oriented play activities. By playing, children have the opportunity to explore, discover, express various things encountered in life in a fun way.

In Kindergarten, educational games are needed to develop various aspects of the child's ability. One of the educational games that can be used to develop children's skills is a puzzle. There are two types of puzzle, the two-dimensional puzzle, and three-dimensional puzzle. The two-dimensional puzzle can increase children's knowledge about colors and shapes in two dimensions. While the three-dimensional puzzle can enhance the ability to know the color, shape, position and spatial concepts in more detail resembling the real thing. Children who have visual-spatial intelligence will be able to solve the problem of space (spatial). Children are able to observe the spatial world accurately, even imagining shapes and three-dimensional geometry, as well as the ability to visualize the graph or the idea of space (spatial). Children are sensitive to the signs of nature and studied thoroughly. Then they will easily and quickly understand the concept of visual-spatial and look enthusiastic when performing activities related to visual-spatial abilities such as puzzles, Lego, blocks, drawing and coloring, as well as create maps.

Children at the age of 5-6 years belong to a pre-schematics stage of visual-spatial intelligence development. This stage is characterized by the ability to create shapes that can be recognized, but the shapes are not detailed and do not have themes. Children are able to construct a simple puzzle, capable of creating a recognizable shape as the results, and start managing body properly when moving indoors and around other people.

The facts show that the learning process generally emphasizes more on the forms of logical-mathematical intelligence and linguistic while giving less attention to other forms of intelligence that may be owned by learners as kinesthetic, visual-spatial, interpersonal, intrapersonal, and naturalist music intelligence. Regarding the development of spatial intelligence, although the centralization has been identified by researchers who examined the adults, but research on this intelligence in children is still very limited. The visual-spatial skills test is more difficult than testing language or logical-mathematical intelligence. In addition also, because children are intuitively less developed and less interested in spatial intelligence.

Based on the observations on a kindergarten in Gajahmungkur district, there are only a few that use the three-dimensional puzzle as learning media. Especially in PGRI kindergarten, educational games are still very limited. Teachers only provide a medium beam, two-dimensional puzzles, and beams to develop visual-spatial intelligence. Most teachers provide learning with lectures and giving assignments through magazines or children worksheet, for example, coloring and bold letters. This makes the child's visual-spatial intelligence is not well developed.

There are still shortcomings in the visual-spatial intelligence of children, children do not know a lot of colors and are not familiar with geometric shapes either. In addition, knowledge of the spatial concept of the child is still lacking, for example, knowledge about the size, direction and position. Spatial concepts can be improved by using educational games as the media. To hone the intelligence of children, teachers have to be more creative in utilizing tools and educational games as well as encourage the children to be active in the learning activities. Teachers are not only fixated on media available in schools. There are still a lot of media which are rarely used in the study that can be utilized as a three-dimensional puzzle.

Visual-spatial intelligence itself is the ability to perceive patterns, space, color, line and shape and realize the visual and spatial ideas graphically (Armstrong, 1994; Gardner, 1993; Lazear, 1991). This intelligence is used by children to think in terms of visualization and images to solve problems or find answers. According to Armstrong (2002), visual-spatial is the ability to visualize an image in one's mind. While Suyadi (2009) argues that visual-spatial intelligence is the ability to see an object with great detail. Then the child is able to record what is seen in the brain in a very long period of time. Moreover, if one day the child wants to explain what is seen to others, he or she is able to describe it on a piece of paper perfectly.

According Priyatna (2013) visual-spatial

intelligence is the ability to form a mental model of the spatial world and operates using the model, create a mental image and then convert that image to recreate a visual experience without needing the help of relevant physical stimuli, and capable of producing graphic equations of a spatial information that children receive. Then Musfiroh (2004) argues that the visual-spatial intelligence is related to the ability to capture color, direction, space accurately.

Based on expert opinions above, it can be concluded that the visual-spatial intelligence is the child's ability to perceive patterns, space, color, lines, shapes, as well as building and visualize an idea in mind in detail.

Basically, the child in infancy must always be given something that can stimulate brain growth and turn into a genius. According to Koran Jakarta (in Anonymous, 2012) 3D Puzzle is one of the most appropriate means that can foster a child's brain development. Initially, 3D puzzle is the brand name of a jigsaw three-dimensional puzzle production of Hasbro, which previously produced by Wrebbit Inc. 3D puzzle, unlike traditional puzzle that consists of a series of flat pieces that when put together, create a single unified image. However, 3D Puzzle is a series of puzzle consisting of plastic foam, with a part of the image that is applied to the stiff paper glued to the underlying foam pieces, and cut to match the dimensions of the part. When the pieces are put together, they make the structure.

According to Patmonodewo (Misbach, Muzamil, 2010) the word puzzle comes from English meaning puzzle or disassembly, the puzzle is a simple media played with disassembly, whereas a 3D puzzle has a length, width, and height. Based on the understanding of puzzle as a media, it can be concluded that three-dimensional puzzle game is an educational tool that can stimulate the child's abilities, which are played by disassembling the pieces of a puzzle that have length, width, and height based on its match.

Pramono (2012: 48) states that a puzzle game can be played by toddlers to teenagers, but, of course, the degree of difficulty should be tailored to the age of children who play. The puzzle is a simple media which is done by pairing matches. While 3D puzzle has a length, width, and height. Based on the understanding of puzzle, it can be concluded that the three-dimensional puzzle game is an educational tool that can stimulate the child's abilities, which are played by disassembling the pieces of a puzzle that have length, width, and height based on each match. Puzzles can train the visual-spatial intelligence, creativity, order and concentration of children.

A child who is smart in visual spatial has the sensitivity to color, lines, shapes, spaces, and buildings. Children have the ability to imagine something, gave birth to the idea of visual and spatial (in the form of an image or a shape which is invisible to the eye) (Armstrong, 1996). Children who have visual-spatial intelligence like doodling, draw the image, coloring, and composing elements such as puzzles and building blocks. Visual-spatial intelligence has tremendous benefits in human life. For children, a high visual-spatial intelligence is a sign of impressive creativity. Children have the ability to create shapes, such as the shape of an airplane, a house, a car, suggests that there is an element of intricate shapes transformation.

According to Musfiroh (2005: 62) teachers can stimulate visual-spatial intelligence through various programs such as painting, forming something with plasticine, taste, and arrange pieces of the picture. Teachers need to prepare a wide range of facilities to enable children to develop their imagination, such as tools of constructive (puzzles and Lego), including the three-dimensional puzzle. Visual-spatial intelligence in children will increase when the children love playing the three-dimensional puzzle. By imagining some form of puzzle pieces and form it into a different object, the child will be trained to be more creative.

Based on the above explanation, it can be concluded that puzzle can be played by toddlers to teenagers, but the degree of difficulty should be tailored to the age of children who play. In addition, the stimulus using a three-dimensional puzzle media can improve children's visual-spatial intelligence includes, sensitivity to color, lines, shapes, spaces, and buildings. In addition to improving visual-spatial intelligence, three-dimensional puzzle also can enhance the creativity and imagination of children, especially in children aged 5-6 years.

Based on the above problems, the purpose of this study was to determine the increase in visual-spatial intelligence of children aged 5-6 years after being treated using three-dimensional puzzle in PGRI 25 kindergarten, Karangrejo Semarang. The researchers will focus on the study "Use of Three-Dimensional Puzzle as a Media to Enhance Visual Spatial Intelligence OF Children Aged 5-6 Years (Descriptive S Quantitative study in PGRI 25 kindergarten, Karangrejo, Semarang)".

RESEARCH METHOD

This research used a qualitative approach. The type of research used in this study was descriptive quantitative. Descriptive quantitative research methods aim to clarify or explain with numbers or percentages. The use of the methodology of research should be focused on the research objectives, straightforward and easy to understand so that the research results obtained in accordance with the purpose of research.

The study was conducted from 13th January 2014 until 30th January 2014 in PGRI 25 Kindergarten, Karangrejo, Semarang. The population used in this study is PGRI kindergarten in the district of Gajahmungkur, because the use of educational games are still limited and not using a Three-dimensional puzzle to enhance the visual-spatial intelligence of children. From that characteristics, the population in this study is PGRI 25 kindergarten Karangrejo, PGRI 27 kindergarten Puspoyudo, PGRI 29 kindergarten, PGRI 31 kindergarten Lempongsari, and PGRI 32 kindergarten Petompon. The sampling technique used cluster sampling technique, the sample drawn was PGRI 25 Kindergarten Karangrejo, B class consists of 30 children. Research variable is an attribute or trait or value of people, objects or events that have a certain variation defined by researchers to learn and then drawn the conclusion (Sugiyono, 2010: 61). The variable in this study is a three-dimensional jigsaw puzzle and visual-spatial intelligence of the child. Data collection techniques used in this study were observation and questionnaires. The data were analyzed by using the descriptive method.

RESULTS AND DISCUSSION

The study was conducted in PGRI 25 kindergarten, Karangrejo Semarang, in children aged 5-6 years old or children in group B. The number of students used in the study was 15 children. The test I was carried out during the initial meeting with the children. The test I was used to measure the values of the children's' character before the treatment was given.

The results of the test I and test II

The test I was carried out during the initial meeting with the children. The test I was used to measure the values of the children's' character before the treatment was given.

Data from the first test showed 20% of children are at very low criteria with 50-58 grade span (3 children). Equally, children who are at medium criteria with grade span of 68-76 are also 3 children. Followed by 2 children (13.33%) at low criteria with 59-67 grade span. Equally, children who are at very high criteria with grade span of 86-94 are also 2 children. Then children who are at high criteria with grade span of 77-85 (33.33%) are 5 children.

After getting the results of Test I, then given the treatment with a three-dimensional puzzle. The study with three-dimensional puzzle was implemented over 10 times of treatments. Therefore, the results of Test II can be seen in Table 2.

The results of Test II explains that there was 1 child (6.67%) at very low criteria with 57-64 grade span, equal with the number of children at low criteria with a 65-72 grade span which was also 1 child. There were 4 children (26.6%) at medium criteria with 73-80 grade span, equal with the number of children at very high criteria with 89-96 grade span which were also 4 children. Then there were 5 children (33.33%) at high criteria with 81-88 grade span.

The Table 3 shows that there is an increase in visual-spatial intelligence at the time of the first test the result was 46% and after the second test the result was 54%. This means that the children's visual-spatial intelligence was increased by 8%.

Table 1. The Results of Test I

Grade Span	Quantity	Percentage	Criteria
50-58	3	20%	Very Low
59-67	2	13.33%	Low
68-76	3	20%	Medium
77-85	5	33.33%	High
86-94	2	13.33%	Very High
Percentage out of 15 stu	students		

Table 2. The results of Test II

Grade Span	Qty	Percentage	Criteria
57-64	1	6.67%	Very Low
65-72	1	6.67%	Low
73-80	4	26.67%	Medium
81-88	5	33.33%	High
89-96	4	26.67%	Very High

Table 3. Improved Visual Spatial Intelligence on Children

1	Abdul	52	57	5
2	Indah	68	80	12
3	Gilang	94	92	-2
4	Dita	50	83	33
5	Fardan	79	90	11
6	Chesya	80	94	14
7	Okta	78	76	-2
8	Sefi	50	72	22
9	Wulan	76	78	2
10	Jefier	68	87	19
11	Azril	62	84	22
12	Ataka	78	82	4
13	Kirana	64	78	14
14	Adam	77	88	11
15	Marfin	90	96	6
Total		106	127	
Percentage	46%		54%	8%
Total Improvement				171

Discussion

The use of three-dimensional puzzle to improve the visual-spatial intelligence of children at the age of 5-6 years. Marhayati (2010) explains that the visual-spatial intelligence is intelligence related to sensitivity, in integrating the activities of visual perception (eye) as well as the mind and transform the visual perception of spatial as is done in painting activities, designing patterns, or designing buildings. Painting activities, designing a pattern or design a shape can be enhanced in various ways.

Sujiono and Sujiono (2004: 292-295) describe how to develop visual-spatial intelligence in children by way of scribbling, drawing and painting, making crafts activities or crafts, visiting various places, play a constructive and creative, as well as organizing and design. This is done continuously so that the intelligence of the children will improve gradually. These methods have been applied when conducting research on children aged 5-6 years in kindergarten children group B. There is an increase in the child's visual-spatial intelligence, as seen from the results of the first test and the second test after being given treatment. Results of the first test percentage of 46% and the results of tests II percentage of 54%. Then to the results of the first test and the second test is based on calculations showed an increase in visual-spatial intelligence by 8%.

Learning process using three-dimensional puzzle is a new media for children. In the beginning, children might find difficulties in installing a three-dimensional puzzle because they usually played only by using two-dimensional puzzle. But after a few times, they will be able to construct a three-dimensional puzzle. This is consistent with the theory by Priyatna (2013: 38) which explains that in children development stage, one of which is pre-schematic stage takes

place at the age of 4 to 7 years old. At this stage, children are able to put together simple puzzles and able to create a shape with recognizable results.

The treatment was carried out gradually. First, children are introduced first with the three-dimensional puzzle. For example, a puzzle shaped chairs, tables, beds, and houses with blue roofs, green walls, and orange doors. Children are taught how to take the pieces apart and put the puzzle together piece by piece. This activity requires concentration. Here the children are required to use a memory when they unload the pieces and then put them back to hone a child's brain. This is in line with Kusmayadi opinion on page 97 that playing puzzle can sharpen a child's brain.

The treatment is given continuously for two weeks. Results showed that the treatment using the three-dimensional puzzle as media in the learning process can improve visual-spatial intelligence. This was because playing three-dimensional puzzle will increase children's knowledge about spatial concepts such as introducing geometric shapes, sizes, patterns, as well as the direction and position.

Children are capable of recognizing geometric shapes when asked about geometric shapes and geometry such as triangles, rectangles, circles, in terms of more complex shapes, tubes and balls. Also recognizing colors, that is, when the children were told to name the color of blue roofs and green walls, they can refer to the color quickly, as well as the mixing of colors, e.g. orange colored door. Orange is the blending of red with yellow. Children already know the concept that they can distinguish the size of chair legs is shorter than the length of a table foot, as well as capable of distinguishing the size of puzzle pieces such as large and small.

Then the child also understands the concept of pattern, i.e. when installing the roof of the house which has a chessboard pattern of orange and white, children can mention the color pattern. Getting to know the position, the child understands that the roof is on top, the door in front, and the window is next. Then getting to know the direction, i.e. when arranging puzzle shaped dining table, a child can put a chair to the right of the table, then put back four seats with the direction circling the table. Children can arrange the puzzle in the form of a small closet on the left puzzle bed.

In general the results of the above study, the use of three-dimensional puzzle media can improve visual-spatial intelligence in children aged 5-6 years. The percentage increase in visual-spatial intelligence is 8%. It is due to the factor of treatment conducted by researchers for two weeks when the treatment time was given a month or longer, the percentage will increase even higher. Factors supporting media are also inadequate as there are no lego media and so forth that can support the visual-spatial intelligence. Then the factor of family, researchers are less coordinated with parents, it will be better if besides getting treatment at school, parents at home also continue to provide stimulus to improve children's visual-spatial intelligence.

From the above explanation, the use of puzzle can improve the visual-spatial intelligence of children, including three-dimensional puzzle that can improve children's visual-spatial intelligence. A three-dimensional puzzle resembles the original object which has length, width, and height so that the child can understand more quickly the concept of spatial. Then visual-spatial intelligence can be improved by being given the right stimulus to the child in accordance with the needs at the time of the learning by using educational games such as two-dimensional puzzle, three-dimensional puzzles, blocks, lego, and a maze.

CONCLUSION

Based on the results of the discussion, it can be concluded that the use of three-dimensional puzzle media gives rise to the visual-spatial intelligence of children aged 5-6 years. The visual-spatial intelligence of children increased after the they were given treatment using a three-dimensional puzzle. This is shown from the calculation of visual-spatial intelligence which increased by 8%. So it can be said that the media use of three-dimensional puzzle in this study is effective in improving the visual-spatial intelligence of children aged 5-6 years in kindergarten.

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