The Effect of Coloured Puzzle Media on The Ability to Recognize Geometrical Shapes of Kindergarten Students

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Article Info

Abstract

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This research was based on finding the weakness of children's ability to mention geometric shapes, which was caused not yet optimal, and the learning media provided was less attractive. This study looked at the effect of color puzzle media in increasing children's ability to recognize geometric shapes in kindergarten. Pre-experimental quantitative method or quasi-experimental was used in this research. The research sample consisted of 15 children without a control class. The sampling technique is a purposive sampling technique. The research data were analyzed using the SPSS (statistical product and service solution) application type 17 with the t-test hypothesis test. The results of this study positively impact learning outcomes to recognize geometric shapes in kindergarten because of an increased children's ability to identify through color puzzle media. The results obtained a sig. value of 0.000 and t-count (40.905) > t-table (2.145). It is stated that hypothesis Ha was accepted, and hypothesis Ho was rejected. So the color puzzle media has an influence on recognizing geometric shapes in children in kindergarten and obtained significant results with a change of fifty point three percent (54.3%). So in this study, it is said that colored puzzle media increases children's ability to recognize geometric shapes in kindergarten. With the hope that this learning media is used as a tool for recognizing geometric shapes in children, making it easier for children to learn.

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Info Artikel	**Abstrak**
_____ *Riwayat Artikel* Diterima: 18 Mei 2022 Direvisi: 12 Agustus 2022 Diterbitkan: 15 Oktober 2022	_____ Penelitian ini didasarkan temuan lemahnya kemampuan anak untuk menyebutkan bentuk geometri, yang disebabkan belum optimal dan kurang menariknya media pembelajaran yang diberikan. Penelitian ini ditujukan untuk melihat pengaruh media puzzle warna dalam meningkatkan kemampuan mengenal bentuk geometri pada anak di Taman Kanak-kanak. Metode kuantitatif pre-eksperimen atau eksperimen semu digunakan oleh peneliti. Sampel penelitian terdiri dari 15 orang anak tanpa adanya kelas kontrol. Teknik untuk pengambilan sampel adalah teknik purposive sampling. Data penelitian ini dianalisis menggunakan aplikasi SPSS (Statistical Product and Service Solution) tipe 17 dengan uji hipotesis t-test. Hasil penelitian ini memperoleh dampak positif untuk meningkatkan hasil pembelajaran mengenal bentuk geometri di TK Karena adanya peningkatan dalam kemampuan mengenal anak melalui media puzzle warna. Hasil penelitian ini diperoleh nilai sig 0.000 dan t-hitung (40.905) > t-tabel (2.145), dinyatakan bahwa hipotesis Ha diterima dan Ho ditolak. Maka media puzzle warna memiliki pengaruh terhadap kemampuan mengenal bentuk geometri pada anak di Taman Kanak-Kanak dan memperoleh hasil yang signifikan dengan perubahan sebesar lima puluh koma tiga persen (54.3%). Maka dalam penelitian ini disimpulkan bahwa media puzzle warna berpengaruh dalam meningkatkan kemampuan pengenalan bentuk geometri pada anak di Taman Kanak-kanak. Dengan harapan media pembelajaran sejenis dapat ini digunakan untuk alat pengenalan bentuk geometri pada anak sehingga memudahkan anak untuk belajar.
Kata Kunci:	
Cara Mensitasi:	

INTRODUCTION

Educating is the teacher's obligation in schools, where good learning will be helpful for children in the community setting (Nurhafizah, 2018a). Education is the government's effort to improve the ability of the nation's children to become more intelligent and insightful and is expected to be able to develop the country in the future. Education also positively impacts everyone if they can build their potential according to their expected needs or desires.

According to Nurhafizah and Kosnin (2016), early childhood is a child ranging from 0-6 years. It is called the golden age, which will experience significant intellectual development so that optimal education is needed to be a provision that will be brought to adulthood. For this reason, a forum for education is provided called Early Childhood Education.

According to the Law of the Republic of Indonesia Number 20 of 2003, concerning the National Education System, Chapter 1 Paragraph 14, early childhood education is guidance to children aged 0-6 years by providing education or stimulation to help them grow and develop optimally and to have provisions to the higher education (Nurhayati, 2020).

In Indonesian law, early childhood ranges from 0-6 years old. Children in kindergarten cover the ages of 4-6 years, not only preparing provisions for elementary school but preparing for the stimulation of six developmental aspects: language, cognitive, artistic, social, emotional, and religious (Purwati, 2021). Where every aspect of early childhood development is equally important, it is expected to provide optimal teaching so that it develops well. For that reason, it is necessary to provide game media for children as attractive as possible so that children are happy when playing while learning.

Fitri et al. (2020) stated that Mathematics is essential for children to develop intellectual abilities. Children with mathematical abilities are the basic foundation to achieve new and unique knowledge in mathematics, especially in solving their problems. According to Juwantara (2019), in early childhood mathematics, in Jean Piaget's theory, children are not yet capable of correspondence at the concrete pre-operational stage, but a constructive approach can be used. This approach is good if children are active and able to solve their problems through discussion and experiment methods, reduce children to memorize things, and reduce storytelling methods.

Learning media is a tool that provides opportunities to increase knowledge, improve thinking abilities and language, help recognize the environment, motivate, and improve the focus of thinking in the early childhood phase. Rohani (in Dewi, 2017) said that media is a tool used to convey messages in the learning process, namely learning materials given to children so that young people readily understand and master the lessons provided.

Media is not only a means to learn but helps children to recognize something abstract. Learning media gives children the opportunity to increase experience and knowledge directly by considering children's cleanliness, hygiene, and safety so that children can explore, experiment, and motivate children to be creative according to the level of child development (Nurhafizah, 2018b).

All aspects of child development are fundamental, but researchers take one aspect of development in children: cognitive development, an essential aspect to improve children's thinking power. According to Marinda (2020), Piaget's theory groups the stages of children's cognitive development into four sets: sensorimotor stage (0-2 years), pre-operational stage (2-7 years), concrete operational stage (7-11/12 years), and the formal operational stage (12 years and above).

According to Ibda (2015), in his article on Jean Piaget's theory that cognitive is a child in the pre-operational period explains the cognitive activity in understanding patterns and symbols that are not yet systematic, not consistent, and not yet logical. Based on Piaget's development theory, kindergarten children are in the pre-operational stage of development, characterized by the formation of stable concepts and understanding of the realistic environment. Still, children's characters are not yet systematic, not consistent, and not yet logical. Children's cognitive development in recognizing colors and geometric shapes is critical because it will

be the basis of concepts for the next level of education.

The concept of introduction to geometry is the study of forms and spatial relationships. It provides an opportunity for children to connect mathematics with the real world. Ananda et al. (2021) stated that the introduction of geometric shapes in kindergarten must be introduced to children even with the use of exciting and real media. Rachmat & Sumiati (2016) states that geometry has many applications in mathematics and the real world with its problem-solving elements.

Based on the results of the first observations, the researchers met at Sadar Bakti Kindergarten, Jorong Kasik Putih, Sungai Aur District, regarding the children's inability to recognize geometric shapes such as squares, circles, and triangles. Children already know the objects around them. Still, children do not yet understand what geometric shapes are in these objects, so they are confused about them. For example, a child knows a book, but the child is confused about what geometric shape the book is, or a child knows a coin, but the child is still confused about the geometric shape. Then the child cannot distinguish the colors around them, so the child incorrectly mentions the color they see. For example, a child holds a green crayon, but they say blue. Teachers lack creativity and attractiveness in making learning media during learning and limited time for teaching, so it seems boring for children. For that reason, researchers designed a media, namely colored puzzle media.

Colored puzzle media can introduce children to geometric shapes and distinguish the available colors. Consciously or unconsciously, children can distinguish geometric shapes and distinguish colors when children are playing. It is hoped that after the media is given, it can help children to recognize geometrical shapes better.

METHODS

Based on the preliminary observation results of the research studied, the researcher took a quantitative study with the type of pre-experimental research, which is a method to obtain precise and accurate research data, namely by doing it directly on the object of research (Sugiyono, 2012 in Nari et al., 2019). This research was conducted in the experimental class. There was no control class in this study.

This data collection was carried out at Sadar Bakti Kindergarten in Jorong Kasik Putih, Sungai Aur, West Pasaman. Data collection was carried out in one sample group with 15 respondents. The sampling technique is the purposive sampling method. If this test can measure what will be calculated, then the test is categorized as valid.

The data analysis technique in this study used the t-test. Before the test was carried out, it was necessary to go through the normality test with the Kolmogorov-Smirnov and homogeneity tests. After that, the linearity test was carried out with the Lavene statistical test. Finally, the hypothesis test analysis used the t-test to analyze how much influence the colored puzzle received on children's ability to recognize geometrical shapes.

RESULTS AND DISCUSSION
Results

Therefore, the researchers have carried out research data collection based on the research problem and objectives that have been described. Data collection was conducted in one sample group with 15 respondents. The data obtained consisted of pre-test data and post-test data for this research. The pre-test and post-test used 6 statement items with the assessment provisions as follows, BSB (Developed Very Well) scored 4, BSH (Developed as Expected) scored 3, MB (Starting to Develop) scored 2, and BB (Not Developed) scored 1.

The result of pre-test can be seen in the below table.

Table 1. Pre-test Result of Children's Ability to Recognize Geometrical Shapes

Indicator	Factual Score	Ideal Score	%	Criteria
1	26	60	43.33	MB
2	32	60	53.33	MB
3	25	60	41.67	MB
4	21	60	35.00	BB

5	38	60	63.33	BSH
6	30	60	50.00	MB
Total	172	360	47.78	MB

Table 1 shows that indicator 1 obtained a pre-test score of 26 out of 60 or 43.33% of the maximum score. Furthermore, indicator 2 got a score of 32 or 53.33%. Indicator 3 scored 25 or 41.67% of the maximum score. The score of indicator 4 is 21 or 35%, indicator 5 received a 38 out of 60 or 63.33%, and indicator 6 has a score of 30 or 50% consecutively. In this pre-test data, the indicator that obtained the highest score was indicator 5 (showing geometry based on a color puzzle), which was 38 or 63.33%. Next, the lowest is indicator 4 (grouping geometry based on the colored puzzle), with a score of 21 out of 60, or 35%.

The result of post-test can be seen in the below table.

Table 2. Post-test Result of Children's Ability to Recognize Geometric Shapes

Indicator	Factual Score	Ideal Score	%	Criteria
1	41	60	68.33	MB
2	47	60	78.33	MB
3	40	60	66.67	MB
4	44	60	73.33	BB
5	54	60	90.00	BSH
6	48	60	80.00	MB
Total	274	360	76.11	MB

Thus Table 2 shows that indicator 1 obtained a post-test score of 41 out of 60 or 68.33% of the maximum score. Furthermore, indicator 2 got a score of 47 or 78.33%, and indicator 3 obtained a score of 40 or 66.67% of the maximum score. Indicator 4 scored 44 out of 60 or 73.33%, indicator 5 received 54 out of 60 or 90%, and finally, indicator 6 obtained a 48 or 80% score. In this post-test data, the indicator that gets the highest score is indicator 5 (showing geometry based on a colored puzzle), which is 54 or 90%. Next, the lowest

is indicator 3 (distinguishing colors in the puzzle), with a score of 40 out of 60 or 66.67%.

The recap of pre-test and post-test result can be seen in the below table.

Table 3. Recapitulation of Children's Ability to Recognize Geometric Shapes Before and After Using Colored Puzzle Media

Criteria	Range Score	Before (Pre-test)		After (Post-test)	
		F	%	F	%
BB	0% to 40%	4	27	0	0
MB	41% to 55%	8	53	0	0
BSH	56% to 75%	3	20	7	47
BSB	76% to 100%	0	0	8	53

In Table 3, there is a difference in the criteria for children's ability to recognize geometric shapes before and after being given colored puzzle media. At the pre-test, the BSB criteria had 0% (zero percent), and the children's ability to recognize geometric shapes mainly was in the MB category, namely 8 people or 53%. Meanwhile, after being given a game using colored puzzle media, the children's ability to recognize geometric shapes has increased rapidly. At this stage, the MB and BB criteria become 0%, and as many as 8 people, or 63% of children are in BSB criteria, and 7 people or 47% of children are in BSH criteria.

Table 4. Normality Test Results of Pre-test and Post-test Data

One-Sample Kolmogorov-Smirnov Test			
		Data Post-Test	Data Pre-Test
N		15	15
Normal Parameters[a,b]	Mean	477.713	738.867
	Std. Deviation	846.257	1.001.652
Most Extreme Differences	Absolute	.154	.153
	Positive	.154	.153
	Negative	-.112	-.128
Test Statistic		.154	.153
Asymp. Sig. (2-tailed)		.200[c,d]	.200[c,d]

A normality test is implemented to see and gain the result whether the research data used has already been as expected or not. The normality test was carried out by testing one-sample of kolmogorov-smirnov test (Cania et al., 2020). From Table 4, it can be seen in the column of Asym. Sig. (2-tailed) it gained a score of data significance pre-test > 0,05 which is 0.200 > 0.05 and get significant data score of post-test > 0.05 which is 0.200 > 0.05. From this score, it can be concluded that the research data was normally distributed either in the pre-test or post-test group. Therefore, the data is worth continuing as research data.

After normality, the researcher conducted a homogeneity test. The result can be seen in the below table.

Table 5. The Result of Homogeneity Test

		df	Mean Square	F	Sig.
		ANOVA Table			
Between Groups	Combined	7	140.290	47.718	.000
	Linearity	1	959.334	326.304	.000
	Deviation from Linearity	6	3.783	1.287	.371
Within Groups		7	2.940		
Total		14			

Based on Table 5, it is known from the implemented analysis that it got an F mark of 47.718 and a score of sig. Combined of 0.000 < 0.05. Therefore, it can be seen that the lines between the pre-test and post-test scores are considered linear because the result is significant in the combined column lower than 0,05.

The homogeneity test was conducted through the Levene Statistic test, which is by the condition if it gained a score of sig < 0,05, so the research data can be said that it was not from the same variety and vice versa.

The researcher also conducted a linearity test. The result can be seen in the below table.

Table 6. Linearity Test Result

Test of Homogeneity of Variances			
Result of Ability in Recognizing Shapes			
Levene Statistic	df1	df2	Sig.
.461	1	28	.503

Table 6 gained a significance score of 0.503 > 0.05. So, it can be concluded that the result of the pre-test and the data of the post-test score in recognizing geometrical shapes have been homogeneous.

According to Rahmadani, Novianti & Puspitasari (2017), a linearity test is a test done to see whether the research data has been following the linear line or has a relation between each line. Cania et al. (2020) stated that the hypothesis test was carried out through a t-test to analyze whether there were any differences after treatment than it was before the treatment. It also analyses the influence the colored puzzle media gives the students' ability to know geometrical shapes.

To know how effective the influence given by the colored puzzle media on the ability to understand geometrical shapes in kindergarten, it is through a Gain Formula which David E. Meltzer developed by Cania et al. (2020), as follows:

$$G = \frac{skor\ posttest - skor\ pretest}{skor\ ideal - skor\ pretest} \times 100\%$$

$$G = \frac{274 - 172}{360 - 172} \times 100\%$$

$$G = \frac{102}{188} \times 100\%$$

$$G = 54,3\%$$

Based on the results of the calculation of the gained formula, it is found that the effect of color puzzle media on children's ability to recognize geometric shapes in kindergarten is 54.3%.

The researcher tested the hypothesis by using t-test to see the difference before and after treatment. The result can be seen in the below table.

Table 7. Hypothesis Test Result

	Paired Differences			T	df	Sig. (2-tailed)
	Mean	Std.Dev	95% Confidence Interval of the Difference			
			Lower	Upper			
Posttest-Pretest	-2.61	247.26	-2.74	-2.47	**-40.905**	14	**.000**

Based on Table 7, a score of statistical t-count of -40.905 was a two-party test with an absolute price, so the score is negative (-) and will not be used. Therefore, it got a t-count of 40.905. With df= 15 so, it obtained the t-table of 2.145. After that, it gained the value of sig.2 tailed of 0.000 < 0.05, so Ha is accepted, and H0 is rejected. It has been proven there is an influence of colored puzzle media on the student's ability to recognize geometrical shapes in kindergarten students.

DISCUSSION

Based on the result of the statistical t-count of -40.905, where this test is a two-party test with absolute prices, negative values are not used. So that obtained t-count of 40,905. With df-15, the t-table value is 2.145. Furthermore, the value of sig.2 tailed is 0.00 <0.05, so it can be concluded that Ha is accepted and H0 is rejected, with a success of 54.3%, that is, there is an influence of color puzzle media on the ability to recognize geometric shapes in children in kindergarten. -child.

According to Hapsari et al. (2019) in Hamida & Aulina (2021), suitable media implementation and selection will influence the student's learning process. The teacher should first analyze the students' errors in recognizing the geometrical shapes so that the students will not experience misunderstandings in recognizing geometrical shapes. Therefore, the provided learning process becomes more effective and on target.

Amanda (2018) said that puzzle is a media that can educate the students to optimal the students' intelligence and cleverness. A puzzle is a construction game in which the process is to match, fit, and install the pictures or shapes until they form a unity.

According to Fitri et al. (2020), in mathematics subjects for early-aged students start naturally in the world around them so that they will have the desire and ability to understand and create their world. The way to introduce basic mathematics is to investigate and manipulate concrete materials and to develop the ability to solve their problems.

The learning that implied educational games such as puzzle media increased students' ability to improve cognitive understanding in recognizing geometrical shapes. In the activity, the students will be invited to play. At the same time, they learn to recognize shapes and things around them voluntarily, happily, enthusiastically, and imaginatively through feelings and their body part directly. Therefore, when the learning process is implemented, the students will be invited to join the game, so it will be easier to understand and remember the material delivered by the teacher (Mahardikha et al., 2013).

The students' learning process in recognizing geometrical shapes has increased. It was without using colored puzzle media, where the students have difficulty recognizing geometrical shapes at the beginning. However, after they were given the colored puzzle media, their ability to recognize the geometrical shapes improved. The students could identify geometrical shapes, mentioning its name, distinguishing each of them, and grouping the geometrical shapes based on their colors. Besides that, students become more focused because they have been trained to solve problems while playing with the puzzle. Therefore, the colored media puzzle increased students' ability to recognize geometrical shapes (Srianis et al., 2014).

This study revealed that students' ability to recognize geometrical shapes has already increased because of the role of implementing colored puzzle media in the learning process. Srianis et al. (2014) mentioned that playing is a need that is necessarily fulfilled, especially for kindergarten students. Playing can also fulfill the demand from whole aspects of students' development. Sari & Hasibuan (2014) claimed that giving students an activity to play with puzzle media in geometrical

shapes can help them in their mathematical development in recognizing each of them.

This study showed that the implementation of colored puzzle media influenced kindergarten students' ability to recognize geometrical shapes. The researcher got the result from the t-test with a significant value of 0.000, which is lower than 0.05, where Ha in this study is accepted, namely colored puzzle that enhanced the ability to recognize geometrical shapes for kindergarten students.

This study follows the study of Amanda (2018), who also implemented a study dealing with students' ability to recognize geometrical shapes through puzzle media. The result showed that there is an influence of the puzzle media on students' ability to recognize geometrical shapes. Where the analysis result showed that the t-count > t-table (7.392 > 2.145) and the value of sig < 0.05 (0.000 < 0.05). This study was the same idea as the study of Srianis et al. in 2014, which also found that students' cognitive ability to recognize geometrical shapes after being given the treatment puzzle media has increased. 71.50% of students only got the medium category beforehand, and after the treatment, they got 91,00% which is in the great category.

Septia carried out the same study in 2015, stating that puzzles could influence students' ability to recognize geometrical shapes. The result from the t-count = 9.65 and the t distribution table with the significant level of 5% with (dk) = 18 got the score of t-table =1.73.

Next, a study by Elan et al. in 2017 also found that puzzle media has influenced students' ability to recognize geometrical shapes, which found that there is development after the puzzle media from Cycle I to Cycle III, compared with the LKA (Student Work Sheet). This study is also supported by a study from 'Ainiyah in 2019 also found that puzzle media can enhance students' ability to recognize geometrical shapes at TK Islam Nurul Azizi 3.

CONCLUSION

After completing the research and obtaining the results, the researchers concluded that Ha was accepted and H0 was rejected. It means a color puzzle media influences the ability to recognize geometric shapes in kindergarten, with an effect of 54.3%.

Based on the research results described, suggestions are taken that will help educators or teachers in kindergarten. They should always pay attention to every learning media given to children. Creative media can help children so that children are not easily bored and easy to understand and remember the lessons given by the teacher.

The puzzle media method should be used as a basis for learning so that children are more enthusiastic about learning and influence children's success, especially in recognizing geometrical shapes. As parents and teachers, they are expected to implement learning media that follow the needs of children so that children can grow and develop according to what is expected.

For further research, it is expected to be able to conduct a more in-depth study on the effect of using colored puzzle media and the introduction of geometric shapes in children. Further researchers should make updates and innovations regarding learning media to improve the ability to recognize geometrical shapes.

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