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The Influence of Puzzle Learning Media on Students' Independent Learning in Pythagorean Theorem Material

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Abstract

This research is expected to prove the influence of Puzzle learning media on students' independent learning, between students who learn to use drawing learning media on the blackboard compared to students who learn to use Puzzle learning media. This research method is quantitative research with the research design used is Quasi-Experimental Design. To determine the effect of the two groups being given different treatments, both groups were given a post-test. The results of the questionnaire are used to find out which one is more effective. The sample used was 60 students from class VIII. The selection of the research sample was done by cluster random sampling. Based on the hypothesis test, it was obtained that count was 17,638 and stable at the real level = 0.05, and dk = 58 was 2,002, furthermore, because t count is higher than t table (17,638 > 2,002), it can be concluded that there is a significant positive influence of the Puzzle learning media on student learning independence on the Pythagorean theorem material in class VIII SMP Negeri 1 Jemaja Timur. Thus this Puzzle learning media can help in increasing student learning independence, especially in the Pythagorean theorem material.

Keywords: independent learning, puzzles, phythagorean theorem.

1 INTRODUCTION

Mathematics is one of the subjects taught at every level of education in Indonesia, from kindergarten to university. Being one of the most difficult subjects makes mathematics less liked by many students (Yuni & Suryana, 2020; David et al., 2019). Mathematics which is full of numbers and formulas makes it even more difficult for students to understand (Yuni & Suryana, 2020). But of course, every teacher has hopes that students can understand the material he provides and practice the material in their daily lives. The saturation and boredom of students are not an obstacle for optimal learning to take place following what is expected. During mathematics lessons in class, students tend to be less active in learning activities. This is because the teacher only explains and then gives questions and there is no student activity so learning outcomes are less than optimal. Learning media is part of the learning resources that should be provided by teachers to develop students' attitudes, skills, and knowledge in learning mathematics (Yuni & Fisa, 2020).

Optimal learning of mathematics does not only have to take place in the classroom when the teacher is teaching but also requires an interest in learning mathematics from the students themselves (Basa & Hudaidah, 2021). Students must be able to study on their own at home to repeat learning in class that has been taught by the teacher or can find out the discussion about the next material. Of course, if students can learn independently, the desired achievement or learning outcomes in mathematics will be better than just learning in class (Brown et al., 2019; Sufatihah, 2018). Students have a desire to learn independently when their curiosity about a material overcomes their laziness (Aziz, 2018).

Students' curiosity will be highly expected so that learning objectives can be achieved. Using learning media will function as a tool to help students understand the material (Anas, 2014). Students can see the real and simple form of the material being taught. Using learning media not only helps students at the time but also improves students' memory when faced with su Using learning media will affect students' curiosity (Sulasteri et al., 2018). The place of this research is on the outskirts of the city, because there the use of media is still needed to understand the Pythagorean theorem, namely SMP Negeri 1 Jemaja Timur is located in the Riau Islands.

SMP Negeri 1 Jemaja Timur specifically located is in the village of Kuala Maras, Jemaja Timur District, Anambas Islands Regency, Riau Archipelago Province. The researcher chose this place because the researcher wanted to explore areas in Indonesia that are still far away from the crowds. Researchers also want to see the development of the world of education, namely schools in remote areas.

One of the mathematics materials at the junior high school level and often found at the next level is the Pythagorean Theorem. The Pythagorean Theorem is the basis for learning Trigonometry material which is also taught at the high school level, Class X and Class XII, majoring in Science. As the basis for learning Trigonometry, the Pythagorean Theorem material must be liked by students first, that is the reason researchers want to use this material. Because learning media includes learning aids for students, the researchers chose Puzzle as the media that will become learning media for students later. Of course, to calculate the effect of learning independence on the learning media here, namely Puzzle, an official report is needed. Puzzle media has succeeded in improving students' geometry abilities in previous studies (Elan & Feranis, 2017). Therefore, the researcher wanted to do research with the title "The Effect of Puzzle Learning Media on Students' Learning Independence in Pythagorean Materials in Class VIII SMP Negeri 1 Jemaja Timur".

2 RESEARCH METHODS

This research was carried out in class VIII SMP Negeri 1 Jemaja Timur which is located at Ulumaras Village, Jemaja Timur District, Anambas Archipelago Regency, Riau Archipelago Province, Indonesia. The sample used in this study amounted to 60 students, namely class VIII A totaling 30 students, and class VIII B totaling 30 students. This research method is quantitative research with the research design used is Quasi-Experimental Design (Arikunto, 2010; Tersiana, 2018). This form involves two groups, the experimental group, and the control group. The main characteristic is that the samples used for the experiment as well as the control group were taken randomly from a certain population (Sugiyono, 2014). To determine the effect of the two groups, it is enough to be given different treatments, both groups were given a post-test. The results of the questionnaire are used to find out which one is more effective (Creswell, 2014).

Table 1. Research Design

Group	Treatment	Questionnaire
A	X	O
B	-	O

Table 1 shows that the two groups were given the same questionnaire but the treatment was different. Technique The sampling used in this research is Cluster Random Sampling. Cluster random sampling is a sampling technique in which researchers from several clusters the results of selecting some individuals who are part of a population. Several clusters of this population are then formed based on homogeneous or identical traits or characteristics among certain individuals in a population. In the cluster random sampling technique, researchers perform random sampling from various clusters in a population. Sampling is done by random sampling because it is not possible to examine every individual who composes a population. In this study, the researcher first made a questionnaire test

instrument with as many as 30 statement items. The questionnaire was then tested for validity and reliability using Ms. Excel and manual calculations.

After being tested for validity, and reliability using Ms. Excel and manual calculations, to determine a sufficient and good questionnaire, then proceed with the prerequisite test for data analysis, namely the normality test to prove that the sample comes from a normally distributed population. The normality test used is the normality test using the Liliefors method. After performing the normality test, then the homogeneity test was carried out. A homogeneity test is used to determine the similarity in each class or group. After the research data is known to be normally distributed and homogeneous, then the hypothesis is tested. The hypothesis test used is the similarity of two averages: two-part test (t-test).

3 RESULT AND DISCUSSION

The data analyzed in this study is student learning independence data after learning by using puzzle learning media and drawing media on the blackboard. The data was taken from 60 students of class VIII SMP Negeri 1 Jemaja Timur. Following the research problem, the process of data analysis and discussion of the results of this study is focused on explaining the influence of Puzzle learning media on the learning independence of students in the Pythagorean theorem class VIII SMP Negeri 1 Jemaja Timur. The description of the results and discussion consists of five parts, namely: validity and reliability test using Ms. Excel and manual calculations, normality test, homogeneity test, and hypothesis testing.

3.1 Instrument Test Results

The instruments used in this study were multiple choice questions. Initially, 30 questions were made, and an instrument test was carried out. The results of the instrument test, validity test that have been tested using Ms. Excel and manual calculations on questionnaires from variables (student learning independence) in the Pythagorean theorem material obtained 22 valid questionnaires and 8 invalid questionnaires. The results of the instrument reliability test that have been tested using Ms. Excel and manual calculations obtained the results of r_{11}=0,856 with high criteria.

3.2 Data Analysis Prerequisite Test Results

The prerequisite tests for data analysis in this study were the normality test using the Liliefors method, the homogeneity test using the Fisher method, and hypothesis testing using the similarity of two averages: two-part test (*t*-test).

The first test is the normality test. The results of testing the research sample are used to conclude whether the observed population is normally distributed or not. To find out whether the data is normally distributed or not, the Lilliefors test is used with samples from each group to be tested. The following conditions: if $L_{count}<L_{table}$, then the data is normally distributed. If $L_{count}>L_{table}$, then the data is not normally distributed. For the experimental class, based on calculations obtained L_{count}=0,1384 while L_{table} for n=30 with a significant level (α) of 0,05 is 0,161. The decision the data is normally distributed. As for the control class, based on calculations obtained L_{count}=0,0269 while L_{table} for n=30 with a significant level of 0,05 is 0,161. The decision the data is normally distributed.

Table 2. Normality Test

Class	*N*	α	$L\ count$	$L\ table$	Category
Experiment	30	0,05	0,1384	0,161	Normal
Control	30	0,05	0,0269	0,161	Normal

Table 2 shows that the two class data are normally distributed because they both have a value of $L_{count}<L_{table}$, it can be concluded that both data groups are normal.

The second test is the homogeneity test. The results of testing the research sample are used to conclude whether the observed samples are both homogeneous groups. The results of the homogeneity test was the experimental class score variance was 12,39, and the control class score variance was 8,94, using the Fisher test. From the calculation results in the attachment, the fount value is 1,385. The value of F_{count} is then compared with F_{table} with *dk* denominator *n*−1 and *dk* numerator *n*−1. So do numerator 29 and *dk* denominator 29 with α=0,05. Based on table *F*, the price is $F_{0,05(29.29)}$= 1,86 and $F_{(0.95)(29.29)}$= 0,54. It turns out that F_{count} lies between the value of F_{table} or 0.54<1.385<1.86. Thus it can be concluded that the variance of the data to be analyzed is homogeneous.

3.3 Hypothesis testing

The hypothesis that will be tested in this study aims to determine whether or not there is an influence of Puzzle learning media on student learning independence in mathematics subject matter for the Pythagorean theorem in class VIII SMP Negeri 1 Jemaja Timur. The process of testing the research hypothesis was carried out using the similarity test of two averages: a two-part test through a t-test. Before looking for the value of count, first look for the combined S (Standard deviation). From the calculation, the t count is 17,638 and a significant level = 0,05 with *dk*=58 of 2,002. Based on the t test it is known that *t* count > *t* table or 17,638>2,002 and this means that the research hypothesis is accepted or there is an influence of puzzle learning media on students' independent learning in pythagorean theorem material. The findings of this study are a continuation of research conducted by Prihatnani (2020), namely developing a media puzzle to understand the Pythagorean Theorem in junior high school students in Semarang Regency. Also also supports the research of Wahid et al., who developed the research about PEN Material (Puzzle Nusantara) in elementary school students.

3 CONCLUSION

Based on research findings and statistical calculations, it was concluded that students who study mathematics at public junior high schools at SMP Negeri 1 Jemaja Timur Kepulauan Riau, they are need learning media using puzzles to understand the phythagorean theorem. after being applied and compared with students who use picture media on the blackboard, it turns out that there are differences in the aspects of their learning independence. it is proven that students who use puzzle learning media are more independent than the picture media on the blackboard. this is because they can use puzzle media anytime and anywhere, as well as by all students. While drawing on the blackboard is only done by the teacher when explaining the material, it is not certain that students pay attention to it.

4 REFERENCES

Anas, M. (2014). *Alat Peraga dan Media Pembelajaran*. Bandung: Universitas Pendidikan Indonesia (UPI).

Arikunto, S. (2010). *Prosedur Penelitian Suatu Pendekatan Praktik*. Jakarta: Rineka Cipta.

Aziz, A. (2018). Hubungan Antara Kompetensi Guru Dan Kepercayaan Diri Dengan Kemandirian Siswa SMP N 2 Pangkalan Susu. *Jurnal Psychomutiara*, 1(1), 15-29.

Basa, Z. A., & Hudaidah, H. (2021). Perkembangan Pembelajaran Daring Terhadap Minat Belajar Matematika Siswa SMP Pada Masa Pandemi COVID-19. *Edukatif: Jurnal Ilmu Pendidikan, 3*(3), 943-950.

Brown, B. A., Boda, P., Lemmi, C., & Monroe, X. (2019). Moving Culturally Relevant Pedagogy From Theory to Practice: Exploring Teachers' Application of Culturally

Relevant Education in Science and Mathematics. *Urban Education*, 54(6), 775-803. https://doi.org/10.1177/0042085918794802

Creswell, John W. (2014). *Research Design, Qualitatives, Quantitative, and Mixed Methods Approcahes (Fourth Edition)*. United State of America: Sage

Elan, E., & Feranis, F. (2017). Penggunaan Media Puzzle untuk Meningkatkan Kemampuan Mengenal Bentuk Geometri. *Jurnal PAUD Agapedia*, 1(1), 66-75.

Prihatnani, E. (2020). Pengembangan media puzzle untuk pembuktian teorema pythagoras. Delta: Jurnal Ilmiah Pendidikan Matematika, 8(1), 41-60.

Sufatihah, I. (2018). Pengaruh Motivasi Berprestasi dan Kemandirian Belajar terhadap Prestasi Belajar Matematika Siswa. *JKPM (Jurnal Kajian Pendidikan Matematika)*, 3(2), 157-164.

Sugiyono (2014). *Metode Penelitian kuantitatif, kualitatif dan R & D*. Bandung: Alfabeta.

Tersiana, Andra (2018). *Metode Penelitian*, Yogyakarta: Start Up.

Sulasteri, S., Rasyid, M. R., & Akhyar, M. (2018). The Effect of the Use of Learning Media based on Presentation Media on Interest and Mathematical Learning Outcomes. *MaPan: Jurnal Matematika dan Pembelajaran*, 6(2), 221-236.

Yuni, Y., & Fisa, L. (2020). Pembelajaran penemuan terbimbing terhadap kemampuan generalisasi matematis siswa sekolah menengah pertama. *Journal of Instructional Mathematics*, 1(1), 20-30.

Yuni, Y., & Suryana, A. (2020). Open-Ended Problems for Junior High School Students' Mathematical Reasoning. *IndoMath: Indonesia Mathematics Education*, 3(2), 88-99.

Wahid, Y., Nuzulia, N., & Arifin, M. B. U. B. (2020). Development of Learning Media for PEN Material (Puzzle Nusantara) Cultural Diversity to Improve Learning Outcomes of Fourth Grade Students at MIS Al-Falah Lemahabang. *Madrosatuna: Journal of Islamic Elementary School.* 4(2), 101-111.