THE EFFECTIVENESS OF THE STANDARD MEDIA ASSISTED CTL MODEL ON MATHEMATICS LEARNING OUTCOMES

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Abstract

This study aimed to test the effectiveness of contextual teaching and learning model assisted by geoboard on mathematics learning outcomes of area and perimeter subject in the fourth grade at Tamansari Cluster Elementary School Kebumen Regency. The design of this study was quasi-experimental in the form of nonequivalent control group. The population in this study were all the fourth grade students at Tamanwinangun 4 Elementary School as the experimental class and fourth grade students at Tamanwinangun 3 Elementary School as the control class. The data collection techniques used test and non-test techniques. The hypothetical analysis test used the z test, t test and N-gain test. The result showed that the CTL learning model assisted by geoboard was more effective which surpassed 75% of the passing grade while the control class did not reach 75%, tcount (4.06)> ttable (1.67), and n-gain experimental class (0.6529)> control class (0.5078). The conclusion of this research was that the CTL learning model assisted by geoboard was more effective to gain the mathematics learning outcomes in the fourth grade at Tamansari Cluster Elementary School Kebumen Regency.

Keywords: CTL, Mathematics, Geoboard

1. PRELIMINARY

Education is one of the most important parts in improving the development of a nation because education can create better human resources and have broad insight. In education, it has a set of plans and arrangements regarding the objectives, content, and teaching materials and methods used as guidelines for implementing learning activities to achieve educational goals. This set of plans is called a curriculum. The current curriculum used in Indonesia is the 2013 curriculum. Based on Government regulation Number 32 of 2013 article 77H paragraph 1 states that one of the learning content at the basic level is mathematics.

According to Susanto (2013: 185) Mathematics is one of the disciplines that can improve thinking and argumentation skills, contribute to solving everyday problems, and provide support in the development of science and technology. Therefore mathematics as a basic science needs to be mastered well by students, especially since elementary school age. However, the results of PISA 2018 on learning mathematics are still low and there are still many students who are less interested in taking mathematics lessons because their perception of mathematics is difficult.

This problem was also found in SD N Gugus Tamansari Kebumen where the mathematics learning outcomes of grade IV students were still low. Based on the results of observations of grade IV teachers at SD N Gugus Tamansari Kebumen, it shows that mathematics learning outcomes are still low. Evidenced by the grade 1 mathematics PAS value which shows that class IV SD N Gugus Tamansari Kebumen classically 56% who have reached the KKM and 44% of them have not reached the predetermined KKM.

The results of observations found that teachers still use the direct learning model where learning takes place in one direction so that students become bored and less interested in learning mathematics and have an impact on the lack of student activity during the learning process. In addition, most teachers during the learning process do not use learning media that can help students understand the material.

As it is known that mathematics is an abstract science that requires concrete objects to be more clearly understood. For this reason, it is necessary to make improvements in the learning process by using appropriate learning media and learning models. The results of research conducted by Furner (2017) recommend that teachers use mathematics manipulative media to create concrete rather than abstract mathematical concepts. One example is the geoboard (nail board). The nail board described by Khotimah (2018) is a learning medium that makes it easier for teachers to show flat shapes besides that it can also make it easier for students to know the shape of a flat shape without requiring a lot of time to draw on paper, without using an eraser, ruler, pencil, and paper. According to Husnaya (2018) geoboard media can help students to make it easier to understand learning material, namely flat shapes. According to Kantohe (2013) the use of geometric board props can be

considered as an alternative that can be used as a learning method.

One learning model that emphasizes student activeness is the CTL learning model. According to Komalasari (2014: 7) explains that contextual learning is a learning approach that links the material studied with the real life of everyday students, both in the family, school, community and citizen environment with the aim of finding the meaning of these materials for their lives. According to Mahendra (2015) also says that learning mathematics must be connected with real-world situations that arise in everyday life. Good CTL learning is supported by Putra's research (2017) that learning using a contextual approach makes students learn optimally so that the material can be remembered by students higher and improves students' ability to solve math problems. Then Selvianiresa (2017) states that CTL learning can help students build their own thoughts, rather than being passive recipients of information. In addition, according to Kusumah (2015), CTL can improve communication and problem solving.

Based on this description, the researchers conducted research on the effectiveness of the nailed board media assisted CTL model on mathematics learning outcomes, which aims to test the effectiveness of the nailed board media assisted CTL model compared to the direct learning model with image media on the learning outcomes of class IV SD N Gugus Tamansari.

2. RESEARCH METHODS

This research is an experimental research, with a research design using a quasi experimental with the form of the nonequivalent control group. The population in this study were all fourth grade students of SDN Gugus Tamansari Kebumen. The sampling technique used cluster sampling. The results of the sample determination showed that there were two classes used, namely the fourth grade students of SD N 4 Tamanwinangun as the experimental class and the fourth grade students of SD N 3 Tamanwinangun as the control class. While the data collection techniques used tests and non-tests.

The variables in this study consisted of: (1) independent variables, namely the contextual teaching and learning model assisted by nail board media and the direct learning model assisted by image media; (2) the dependent variable, namely the learning outcomes of fourth grade students in mathematics. Data collection techniques using tests and non-tests in the form of observation, interviews, and documentation. This test is conducted to determine the level of students' cognitive abilities. The research instrument used as a benchmark in this study was the pretest and posttest questions. The test questions used in this research are learning outcomes test questions in the form of multiple choice with the circumference and area of a square, rectangle, triangle and combination. Before being used as research instrument questions, the questions were first tested in the trial class, namely to test the level of validity, reliability, difficulty level, and distinguishing power of the questions. Good questions are questions that have a valid category, have good reliability, and are not too easy or too difficult. The test questions used were questions in the form of multiple choice, totaling 30 questions with 4 answer options. Of the 30 test questions that the students did, 27 questions passed the validity, reliability, difficulty level, and distinguishing power of the questions. Of the 27 questions that were then used as pretest and posttest questions. The learning outcome data (posttest scores) were analyzed using the z test, t test, and N-Gain test. The z-test to prove student learning outcomes using the contextual teaching and learning model assisted by nailed boards can achieve KKM. The t test to prove the average learning outcomes using the contextual teaching and learning model assisted with nailed board media is more than the average learning outcomes using the image media assisted direct learning model. The N-gain test is to prove the increase in the average learning outcomes of the contextual teaching and learning model assisted by nailed board media is more than the average increase in learning outcomes using the image media assisted direct learning model on the learning outcomes of grade IV SD N Gugus Tamansari. The t test to prove the average learning outcomes using the contextual teaching and learning model assisted with nailed board media is more than the average learning outcomes using the image media assisted direct learning model. The N-gain test is to prove the increase in the average learning outcomes of the contextual teaching and learning model assisted by nailed board media is more than the average increase in learning outcomes using the image media assisted direct learning model on the learning outcomes of grade IV SD N Gugus Tamansari. The t test to prove the average learning outcomes using the contextual teaching and learning model assisted with nailed board media is more than the average learning outcomes using the image media assisted direct learning model. The N-gain test to prove the increase in the average learning outcomes of the contextual teaching and learning model assisted by the nailed board media is more than the average increase in learning outcomes using the image media assisted direct learning model on the learning outcomes of grade IV SD N Gugus Tamansari.

3. RESULTS AND DISCUSSION

In the experimental class using the CTL learning model with nailed board media and the control class using the direct learning model (Direct Instruction) with image media. The number of

meetings between the experimental class and the control class is the same, each class starts with a pretest then the meeting is held 4 times and ends with a posttest.

Results of Preliminary Data Analysis

Data analysis for normality test used the Lilliefors test. The results of calculations using the Lilliefors test with a significance level of 0.05 indicate that in the experimental class the value of Lhitung = 0.1702 and the value of Ltabel = 0.173 so that Lhitung <Ltabel then H0 is accepted, which means that the pretest value of the experimental class is normally distributed. In the control class the value of Lhitung = 0.149 and the value of Ltabel = 0.161 so that the Lhitung <Ltabel then H0 is accepted, which means that the pretest value of the control class is normally distributed. So it can be concluded that the initial data normality test shows that the pretest value data in the experimental class and control class are normally distributed. Furthermore, data analysis for homogeneity test.

Data analysis for homogeneity test used Fisher's exact test. The results of calculations using Fisher's test with a significance level of 0.05 indicate that the experimental class and control class obtained the value of Fcount = 1.06 and Ftable = 1.96, so H0 is accepted because Fcount <Ftable, which means that the pretest value for the experimental class and control class has variants. the same (homogeneous).

Final Data Analysis Results

The final data normality test (posttest) for the experimental class and control class used the Lilliefors test with a significance of 0.05. The results of the posttest normality test for the experimental class showed the value of Lcount = 0.1204 and Ltable value = 0.173 so that Lcount <Ltable which means H0 was accepted so that the posttest value for the experimental class was normally distributed. The results of the posttest normality test for the control class showed the value of the Lcount = 0.1516 and the Ltable value = 0.161 so that the Lcount <Ltable, which means H0 was accepted so that the posttest value for the control class was normally distributed.

The final data homogeneity test (posttest) used Fisher's exact test with a significance of 0.05. In the experimental class and control class, the value of Fcount = 1.4038 and Ftable 1.96 is obtained, so H0 is accepted because Fcount <Ftable so that it can be said that the posttest data between the experimental class and the control class has the same / homogeneous variance.

Hypothesis test analysis is the test of the effectiveness of the CTL learning model assisted by nailed board media using the z test, t test, and N-gain test. The level of significance used is 0.05. The results of the calculation of the learning mastery test can be seen in the above, namely table 1.

Class	n	Students Completed	Zcount	ztabel	Criteria
Experiment	22	20	1,7256	1.64	H0 is rejected
Control	29	15	2,8883		H0 is accepted

Based on table 1 in the experimental class, the value of zcount = 1.7256 and ztable = 1.64, then H0 is rejected because the value of zcount> ztable means that the experimental class has the proportion of students who have completed learning reaches 75%. Whereas in the control class the value of zcount = -2.8883 and ztable = 1.64 is obtained, so H0 is accepted because the value of zcount <ztable means that the proportion of students who complete learning does not reach 75%.

Furthermore, the two-point similarity test was carried out using the CTL learning model assisted by nail board media using the t test. The results of the calculation of the two mean similarity test can be seen in table 2.

Table 2: Average Similarity Test Results of Experiments with Control

Sample Class	N	Average	zhitung	ztabel	Criteria
Experiment Class	22	82.4091	4.06	1.67	H0 is rejected
Control Class	29	73,0345			

Based on table 2, it is obtained tcount (4.06)> ttable (1.67) so that H0 is rejected. This shows that the average mathematics learning outcomes of the experimental class students who use the CTL learning model assisted by nailed board media are more than the average learning outcomes of control class students who use the direct learning model with image media.

After the two-average similarity test of learning outcomes is carried out, the next step is to calculate the increase in student ability between before and after treatment in the experimental class and learning activities as usual in the control class. This calculation uses the N-gain test. The results of the calculation of the average increase test can be seen in table 3.

Table 3: Test Results of Experimental Mean Improvement with Control

Class	Average		N-Gain	Category
	Pretest	*Posttest*		
Experiment	49,3182	82.4091	0.6529	Moderate
Control	45,2069	73,0345	0.5078	Moderate

Data on the increase in the pretest and posttest mean scores of the experimental class and control class are presented in the line diagram as follows:

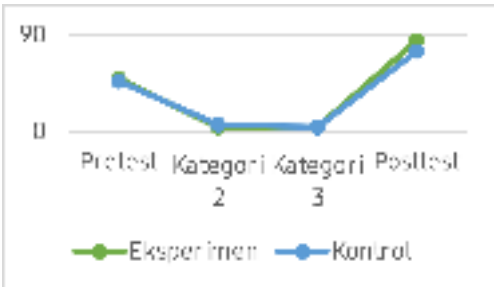

Image 1 Experiment and Control Class N-Gain Diagram

Based on table 3 and diagram figure 1, the pretest average for the experimental class was 49.3182 and the posttest average increased to 82.4091. The N-gain result is 0.6529 with moderate criteria because 0.30 <0.6529 <0.70. The average pretest control class was 45.2069 and the posttest average increased to 73.0345. The N-gain result for the control class was 0.5078 with moderate criteria because 0.30 <0.5078 <0.70. Although both of them have moderate criteria in the experimental and control classes, the N-gain result value is higher in the experimental class. So, the N-gain of the class using the CTL learning model assisted by nailed board media in the experimental class was higher than the control class using the direct learning model using image media.

Based on the results of this research, this is in line with the research conducted by Ardania et al. (2018) showing that the use of the Contextual Teaching and Learning model assisted by Geoboard media can improve students' cognitive abilities in mathematics subjects with flat shape material. Research by Mahendrawati, et al. (2016) states that the group of students whose learning uses the CTL model assisted by concrete media is higher than the group of students whose learning uses conventional learning.

Learning using the CTL model assisted by concrete media is better than the direct learning model which only supports images because mathematics learning using the direct learning model assisted by image media has not been able to clarify abstract concepts to be concrete to students. Students are only given assignments that must be done in groups without students understanding the concept of the circumference and area of a flat shape. Image media is not appropriate when used for perimeter material and the area of a flat shape because image media is very limited when used to find a concept. In addition, the learning model is still centered on teachers and students only as recipients of information. This weakness is what causes learning in the control class to be ineffective so that learning outcomes are not satisfactory.

According to Furner and Worrel's (2017) opinion, currently teachers need to use mathematical manipulatives to make concrete mathematical concepts rather than abstract. One example is the nail board. The nail board is one of the manipulative media that can be used in learning mathematics material in flat geometry. The results of this study are relevant to the research of Lastrijanah et al. (2017) which states that learning using geoboard media has increased good learning achievement compared to tangram media. In addition to the use of media, it is also very influential in choosing the learning model. The suitable model in this study is the CTL model. The use of this suitable model is evidenced by Wangi, et al (2016) stated that the discipline and average learning outcomes of students in the CTL model group were better than students in the DI model group. In addition, it is proven from Sabil's research (2011) that the learning process using the CTL model is of high quality and provides a role in improving learning.

4. CONCLUSION

The conclusions in this study are (1) the average learning outcomes using the CTL learning model assisted by nailed board media in the experimental class can achieve KKM; (2) the average learning outcomes using the CTL learning model assisted with nailed board media in the experimental class is more than the average learning outcomes using the image media assisted direct learning model in the control class; and (3) the increase in the average learning outcomes using the CTL learning model assisted by nailed board media in the experimental class is more than the average increase in learning outcomes using the direct learning model with image media in the control class.

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