THE EFFECTIVENESS OF MAKE A MATCH IN COOPERATIVE LEARNING HOTS ORIENTED TO THE MATHEMATICS LEARNING OUTCOMES OF STUDENT CLASS XI

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ABSTRACT

Teacher-dominated learning causes student mathematics learning outcomes below. This study aims to determine the presence or absence of differences and compare the effectiveness of conventional learning models with cooperative learning models of making a match on students' mathematics learning outcomes of the 11th Textile class of SMK Negeri 2 Sewon, Bantul Regency, 2017/2018 Academic Year. This research is quantitative, with a population of 11th-grade students consisting of 68 students. The samples were randomly selected and class XI Textile 3 as the experimental class and XI Textile 2 as the control class. Data collection techniques used to test techniques. Test of research instrument used validity test, reliability test, and different power test. Analysis prerequisite tests include normality and homogeneity tests. Data analysis used two-party and one-party tests. The results showed differences in mathematics learning outcomes that used conventional learning models with a cooperative learning model type to make a match. The value of $t_{table} = 2.017$ indicates this and $t_{count} = 2.43$, which means $t_{count} > t_{table}$ and the cooperative learning model type make a match is more effective than conventional learning models on mathematics learning outcomes. This is indicated by $t_{table} = 1.681$ and $t_{count} = 2.43$ which means $t_{count} > t_{table}$.

Keywords: Effectiveness, Make A Match Type Cooperative Learning Model, Mathematics Learning Outcomes.

INTRODUCTION

The development of technology today cannot be separated from the role of science. The development of education nowadays has penetrated the era of globalization. Education has a very strategic role in improving the quality of human resources. One way that can be done to achieve educational goals is to develop educational programs that focus on developing thinking skills. One of them is mathematics because mathematics is a branch of science that helps develop and progress. In this case, mathematics learning applied by Vocational High Schools is a fundamental basis for preparing vocational graduates who are ready to work. To improve the quality of education, the government has developed a curriculum. Today's curriculum is the 2013 curriculum, an improvement from the previous curriculum, the Education Unit Level Curriculum. So with this curriculum, students must think critically in understanding and developing the concept of learning material, including mathematics learning.

Based on the results of observations and interviews conducted by the author when mathematics takes place, the learning model used is a cooperative learning model with lecture methods, questions and answers, and assignments that cause students to be less interested and less excited and students tend to be passive namely writing, listening, and memorize the material so that learning looks monotonous. Sometimes, the mastery of the material is still very low, causing students only to accept limited material conveyed by the teacher, while the rest are not looking for information from other sources. These various problems cause students to learn mathematics learning outcomes are low. This can be seen from the Mid-Semester value data in Table 1 as follows:

Table 1. Average Value of Mid Semester Class X1 Textile Odd Semester Vocational School 2 Sewon Bantul

Classification	Class		
	Textiles 1	**Textiles 2**	**Textiles 3**
Average value	72,04	70,54	72,17
Highest score	75	75	75
Lowest Value	65	65	65
<70	1	5	1
≥70	22	17	22

From all three classes of Textile XI, some students have not yet received a grade above Minimum Completeness Criteria (MCC), even though the results are obtained from remedial results, while the MCC determined by the school is 70. The teacher also mentions that some students consider mathematics challenging to study. Students' thinking supports this assumption that not all mathematical formulas are applied in everyday life.

To obtain the expected student learning outcomes, cooperative learning needs to be applied in the learning process that requires active students, working together with friends, to improve the quality of the process, and learning achievement. Strived in teaching and learning, a learning model can create a fun and student-oriented learning atmosphere, affecting the learning outcomes of mathematics. One of the appropriate learning models used, and these conditions are the Make A Match cooperative learning model. According to Rusman (2014: 223), the Make A Match model is a cooperative learning model. One of the advantages of this learning is that students look for partners while learning about a concept or topic in a pleasant atmosphere. This model is expected to train students to participate actively and be able to work together with groups so that they can improve learning outcomes in mathematics.

Sidrotul Khasanah (2013), in his research, stated that the type of making a match cooperative learning model is better in improving student learning outcomes. Also supported by Dwi Febriani Sumiartini (2017), her study shows that the make a match type of cooperative learning model is more effective than conventional learning models. According to Kosasih in Masrurun (2017: 3), effective learning can directly involve students to form competencies that will lead them to the goals set. Will be achieved if the teacher and students contribute to achieving the teaching and learning process's objectives. Suprijono (2014: 54), cooperative learning is a concept of group work led by the teacher, where the teacher gives the question or problem to students who then seek to solve the problem.

The make Lurna Curan introduced a matching model in 1994. Things to consider when applying this make a matching model are preparation, namely preparing cards and playing time. The steps are 1) dividing students into three groups, namely groups that carry cards containing questions, groups that carry cards containing answers, and assessment groups 2) Teachers arrange the position of groups that have been previously divided and distribute cards containing questions and answers oriented HOTS in each group 3) The teacher gives a signal that students in each group move to look for pairs of cards that have been distributed according to the time given 4) The teacher allows the assessor to assess. The question cards that were distributed were HOTS or higher-order thinking skills. It is expected to help students think critically and increase their positive influence in solving problems. In this study, the following problems were formulated: (1) Is there a difference in mathematics learning outcomes using HOTS-oriented Make A Match cooperative learning models with mathematics learning outcomes using conventional learning models of class XI students of SMK Negeri 2 Sewon, Bantul Regency, 2017 / 2018? (2) Is the Make A Match type of cooperative learning model HOTS oriented more effective than conventional learning models for the mathematics learning outcomes of class XI students of SMK Negeri 2 Sewon, Bantul Regency in the academic year 2017/2018?

From the main problems that have been formulated above, the purpose of this study is (1) to find out whether or not there are differences in mathematics learning outcomes using HOTS-oriented Make A Match cooperative learning models with mathematics learning outcomes using conventional

learning models of class XI students of SMK Negeri 2 Sewon Bantul Regency for the academic year 2017/2018 (2) to find out more effective learning models between HOTS oriented Make A Match cooperative learning models with conventional learning models towards the mathematics learning outcomes of students in class XI of SMK Negeri 2 Sewon Bantul Regency in the academic year 2017/2018.

METHODS

This type of research is quantitative. The study was conducted at SMK Negeri 2 Sewon Bantul Regency class X_1. Tekstil in the even semester of the academic year 2017/2018 with class X_1 Tekstil 2 as a control class and Textile 3 as an experimental class. The variables in this study were the Make A Match cooperative learning model, the conventional learning model, and the mathematics learning outcomes of class X_1 students in the even semester of SMK Negeri 2 Sewon Bantul Regency in the academic year 2017/2018. Based on the research variables above, the research design used is the posttest-only control group design as follows:

O_1	X	O_2
O_3	X	O_4

Figure I. Research Design X_1, X_2, X_3

Information:

O_1= measurement of the initial ability of the experimental group

O_2= measurement of the final ability of the experimental group

X = giving an experiment

O_3= measurement of the initial ability of the control group

O_4= measurement of the final ability of the control group

Data collection techniques using mathematics learning achievement tests. The research instrument tests conducted were validity tests, different power tests, and reliability tests. Analysis prerequisite tests include tests for normality and homogeneity tests. Data analysis for hypothesis testing uses two-party and one-party hypothesis testing.

RESULTS AND DISCUSSION

Description of Initial Ability Value

Table 2. Summary Description of Initial Ability Values

Class	Parameter				
	Highest	Lowest	$\bar{x}$	S_i	S_i^2
Experimental class	66	52	61,17	3,588	12,88
Control class	66	52	59,18	3,647	13,3

Normality Test Results Initial Capability Value

Table 3. Summary of Normality Test Results

Class	X^2_{count}	X^2_{table}	Significant Level	df	Conclusion
Experimental class	0,665	3,841	5%	1	Normal
Control class	0,204	3,841	5%	1	Normal

Based on the above table, it can be seen that $\chi^2_{\text{count}} < \chi^2_{\text{table}}$. This shows that the initial mathematical ability values come from normally distributed data.

Homogeneity Test Results Initial Capability Value

Table 4. Summary of Homogeneity Test Results Initial Ability

X^2_{count}	X^2_{table}	Significant Level	df (k-1)	Information
0,0006	3,841	5%	1	Homogeneous

Based on homogeneity tests carried out on class X_1 Tekstil 2 and X_1 Tekstil 3, it can be seen that $X^2_{count} = 0.0006$ and $X^2_{table} = 3.841$, which means that both classes have the same variance.

Hypothesis Test Results Two Parties Initial Capability Value

H_0: There is no difference between the value of students 'initial mathematical abilities using the HOTS-oriented Make A Match cooperative learning model and the students' initial ability values using conventional learning models of class X_1 Textile students.

H_1: There is a difference between students 'initial mathematical ability scores using HOTS-oriented Make A Match cooperative learning models and students' initial ability scores using conventional learning models for Grade X_1 Textile students.

The testing criteria for an average of two parties at a significant level of 5% with degrees of freedom $(df) = (n_1 + n_2 - 2)$, namely:

If $t_{count} < -t_{table}$ or $t_{count} > t_{table}$, then H_0 is rejected, and H_1 is accepted.

Table 5. Summary of Results of the Two-Party Hypothesis Test Initial Values

t_{count}	t_{table}	Significant Level	df	Information
1,847	3,841	5%	43	H_0 accepted H_1 rejected

Based on the analysis results obtained, the value of $t_{count} = 1.847$, then H_1 is rejected and H_0 is accepted, which means there is no difference between the initial mathematical ability of students who use the cooperative learning model type Make A Match HOTS oriented with the initial ability scores of students who use conventional learning models of class X_1 students Textiles.

Description of Mathematics Learning Outcomes.

Table 6. Summary Description of Mathematics Learning Outcomes

Class	Parameter				
	Highest	Lowest	$\bar{x}$	S_i	S_i^2
Experimental class	76	62	70,65	3,72	13,87
Control class	76	62	67,14	3,47	13,83

Normality Test Results Initial Capability Value

Table 7. Summary of Normality Test Results

Class	X^2_{count}	X^2_{table}	Significant Level	df	Conclusion
Experimental class	0,635	3,841	5%	1	Normal
Control class	0,551	3,841	5%	1	Normal

Based on the above table, it can be seen that $\chi^2_{count} < \chi^2_{table}$. This shows that the initial mathematical ability values come from normally distributed data.

Homogeneity Test of Mathematics Learning Outcomes

Table 8. Summary of Homogeneity Test Results Mathematics Learning Outcomes

X^2_{count}	X^2_{table}	Significant Level	df (k-1)	Information
0,000036	3,841	5%	1	Homogeneous

The first hypothesis test of initial ability is done by two-party t-test analysis. The H_0 and H_1 hypotheses proposed for the two-party test are as follows:

$H_0: \mu_1 = \mu_2$

$H_1: \mu_1 \neq \mu_2$

H_0: There is no difference between the value of students 'initial mathematical abilities using the HOTS-oriented Make A Match cooperative learning model and the students' initial ability values using conventional learning models of class XI Textile students.

H_1: There is a difference between students 'initial mathematical ability scores using HOTS-oriented Make A Match cooperative learning models and students' initial ability scores using conventional learning models for Grade XI Textile students.

The testing criteria for an average of two parties at a significant level of 5% with degrees of freedom $(df) = (n_1 + n_2 - 2)$, namely:

If $t_{count} < -t_{table}$ or $t_{count} > t_{table}$, then H_0 is rejected, and H_1 is accepted.

Table 9. Summary of Hypothesis Test Results of Two Parties Learning Outcomes of Mathematics

t_{count}	t_{table}	Significant Level	df	Information
2,43	2,017	5%	43	H_0 accepted H_1 rejected

The table above obtained $t_{table} = 2{,}017$ and $t_{count} = 2{,}43$, so $t_{count} > t_{table}$, then H_0 is rejected, and H_1 is accepted. So it can be concluded that there is a difference between the value of students 'initial mathematical ability using the HOTS-oriented Make A Match cooperative learning model and the students' initial ability value using the conventional learning model of class X_1 Textile students.

The first hypothesis test of initial ability is done by one-party t-test analysis. The H_0 and H_1 hypotheses proposed for the two-party test are as follows:

$H_0: \mu_1 = \mu_2$

$H_1: \mu_1 \neq \mu_2$

With

H_0: Learning using the HOTS-oriented type of Make A Match cooperative learning model is no more effective than learning using Grade X1 Textile students' conventional learning model s.

H_1: Learning using the HOTS-oriented Make A Match cooperative learning model is more effective than learning using conventional learning models for Grade X_1 Textile students.

The testing criteria for an average of two parties at a significant level of 5% with degrees of freedom $(df) = (n_1 + n_2 - 2)$, namely:

If $t_{count} < -t_{table}$ or $t_{count} > t_{table}$, then H_0 is rejected, and H_1 is accepted.

Table 10. Summary of Hypothesis Test Results of Two Parties Learning Outcomes of Mathematics

t_{count}	t_{table}	Significant Level	df	Information
2,43	1,681	5%	43	H_0 accepted H_1 rejected

The table above obtained $t_{table} = 1{,}681$ and $t_{count} = 2{,}43$, so $t_{count} > t_{table}$, then H_0 is rejected, and H_1 is accepted. So it can be concluded that learning by using the HOTS-oriented type of Make A Match cooperative learning model is more effective than learning using conventional learning models of XI Textile class students.

CONCLUSION

Based on the results of research and discussion as described in CHAPTER IV, it can be concluded that (1) There are differences in mathematics learning outcomes of students using HOTS-oriented Make A Match cooperative learning models with mathematics learning outcomes using conventional learning models of class X_1 Textile students. This is indicated from the change in the two-party hypothesis test with a significant level of 5%, obtained a t_{count} value of 1.847 to 2.43 and t_{table} of 2.017 (2) There is a HOTS-oriented Make A Match cooperative learning more effective than conventional learning models of mathematics learning outcomes X_1 Textile class students. This is indicated by the results of the one-party hypothesis test with a significant level of 5%, obtained the value of $t_{count} = 2{,}43$ and $t_{table} = 1{,}681$.

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