THE EFFECT OF COOPERATIVE LEARNING MODELS ON MATHEMATICS LEARNING OUTCOMES IN TERM OF STUDENT COOPERATION

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ABSTRACT

Mathematics learning in the seventh grade of SMP Negeri 3 Wates Kulon Progo regency for the academic year 2017/2018 made the students bored and less enthusiastic. The cooperation between students is not optimal. This study aims to determine whether or not there is a significant influence (1) the factors of cooperative learning model on the students 'mathematics learning outcomes, (2) factors of student learning between students' learning achievement, (3) the interaction between cooperative learning model and student-to-student cooperation learning mathematics students. (4) between ST-class and PBL-class learning of mathematics learning outcomes, (5) between ST and PBL type cooperative learning models of mathematics learning outcomes. This study population was all seventh-grade students of State Junior High School (SMP Negeri) 3 Wates Kulon Progo of the academic year 2017/2018, which consisted of four classes, namely class VII-A, VII-B, VII-C, VII-D and amounting to 138 students. The sample consists of two classes taken at random. Data analysis techniques used include prerequisite tests and hypothesis tests. The results of the study at a significant level of 5% with df = 1 showed no significant influence (1) factor model of cooperative learning on mathematics learning results, obtained F_{obs} (A) = 0,262 $<F_{0,05;\ 1,65}$ = 3,989 (2) factors of student's co-work on mathematics learning result, obtained F_{obs} (B) = 0,270 $<F_{0,05;\ 1,65}$ = 3,989 (3) the interaction between cooperative learning model and student's co-work on mathematics learning result, obtained by F_{obs} (AB) = 0,043 $<F_{0,05;\ 1,65}$ = 3,989. (4) ST-type cooperative learning model has no more significant effect than PB-class student intercourse, it is obtained t_{count} = -12,574 $<t_{0,05,67}$ = 1,996, with df = 67. (5) ST type cooperative learning model no more significant than the cooperative learning model of PBL type, obtained t_{count} = -0.828 $<t_{0,05;\ 8}$ = 2.306, with df = 8.
Keywords: Snowball Throwing (ST), Problem Based Learning (PBL), Inter-Student Cooperation, Learning Outcomes.

INTRODUCTION

Education is one of the foundations of human life in society. Education is very important for the continuity of human life in this era. According to Isnaeni and Taram (2015: 222), education is a process to influence students to adapt themselves as best as possible to their environment, and thus will cause changes in themselves that allow it to function optimally in people's lives. Schools are one of the supports of education in Indonesia. Students in schools are taught various kinds of education through several existing subjects. One subject that plays an essential role in education in mathematics. In addition to subjects, learning models also take part in supporting education. Mathematics requires an appropriate learning model to achieve successful student education. To help students in being active, one of them uses learning models that emphasize cooperation in it. Permendikbud Number 104 of 2014 states that observations of students' attitudes and behaviors, among others, require that there should be cooperation between students. Explanation from the Minister of Education and Culture Regulation No. 104 of 2014 emphasizes that collaboration between students is essential when learning in the classroom. Various learning models are used by teachers so that learning in the school can take place.

Based on observations at SMP Negeri 3 Wates, the teacher uses the cooperative learning model Problem-Based Learning type when mathematics lessons in the classroom. When students are asked for a group discussion, some students tend to be less active because there is still an ego that students have brought from elementary school. Students who still have high egos tend to be still shy to mingle with their group friends working together and are reluctant to ask questions that are still confused. Apart from the high ego, students' motivation in learning mathematics is still low—students who have low learning motivation due to a lack of readiness to learn. Before starting mathematics learning, some students are usually still in front of the class, waiting for the teacher to come. When learning occurs, some students make a noisy classroom atmosphere, and some students sleep when the teacher explains

in front of the class. Based on the 2017-2018 Middle Semester Repeat scores, student mathematics learning outcomes are also low. The average value of each class does not meet the Minimum Completeness Criteria (MCC) value. MCC determined by the school is 75.00.

When learning mathematics in class, the mathematics teacher at SMP Negeri 3 Wates uses the Cooperative learning model type Problem-Based Learning that emphasizes cooperation. The teacher asks students to discuss groups and solve problems that have been predetermined material using Student Worksheets or worksheets. After the problem is solved, each group is appointed to present the results of their group's work in front of the class in a faster way to finish. The use of the Problem Based Learning type of cooperative learning model gives students active, creative, and work together with their groups from the observations. However, the emphasis on cooperation in the group is less than optimal or still low. Although students can discuss well with group members, some students always tend to be shy to explain the material to group members. Some group members did not solve the problem discussed because some group students were absorbed in playing alone. Students who are engrossed in playing alone due to the childish nature brought while still in elementary school. Also, there are still two students from a particular class shunned by all groups because they cannot solve the problem correctly during the discussion.

In this study, the following problems were formulated: (1) Did the cooperative learning model factor significantly influence the mathematics learning outcomes of Grade VII students of SMP Negeri 3 Wates, Kulon Progo Regency Even Semester Academic Year 2017/2018? (2) Does the cooperation factor significantly influence the mathematics learning outcomes of Grade VII students of SMP Negeri 3 Wates, Kulon Progo Regency Even Semester 2017/2018 Academic Year? (3) Does the interaction between cooperative learning models and collaboration between students have a significant influence on mathematics learning outcomes of Grade VII students of SMP Negeri 3 Wates, Kulon Progo Regency Even Semester Academic Year 2017/2018? (4) Which one has more significant influence between the cooperation between students of Snowball Throwing class and collaboration between students of Problem Based Learning classes on the mathematics learning outcomes of Grade VII students of SMP Negeri 3 Wates, Kulon Progo Regency Even Semester 2017/2018? (5) One has the most significant influence between the Snowball Throwing cooperative learning model and Problem Based Learning on the mathematics learning outcomes of Grade VII students of SMP Negeri 3 Wates, Kulon Progo Regency Even Semester 2017/2018 Academic Year?

From the main problems that have been formulated above, the purpose of this study is to: (1) Know whether or not there is a significant influence of cooperative learning model factors on mathematics learning outcomes of Grade VII students of SMP Negeri 3 Wates, Kulon Progo Regency Even Semester 2017 Academic Year / 2018. (2) Knowing whether or not there is a significant influence of the cooperation factor on the mathematics learning outcomes of Grade VII students of SMP Negeri 3 Wates, Kulon Progo, Even Semester, 2017/2018 Academic Year. (3) Knowing whether or not there is a significant influence of interaction between cooperative learning models and student-to-student cooperation on mathematics learning outcomes of Grade VII students of SMP Negeri 3 Wates, Kulon Progo Regency Even Semester 2017/2018 Academic Year. (4) Knowing which has more significant influence between students of Snowball Throwing class and cooperation between students of Problem Based Learning classes on mathematics learning outcomes of Grade VII students of SMP Negeri 3 Wates Kulon Progo Regency Even Semester 2017/2018 Academic Year. (5) Determine the most significant influence between the Snowball Throwing cooperative learning model and Problem Based Learning on the mathematics learning outcomes of Grade VII students of SMP Negeri 3 Wates Kulon Progo Regency Even Semester 2017/2018 Academic Year.

METHODS

This research was conducted in VII class of SMP Negeri 3 Wates in the even Semester of the academic year 2017/2018 with class VII D as a control class and class VII A as an experimental class, class VII D totaling 36 students, and class VII A totaling 34 students. The design in this study was

carried out in two classes, namely, control and experimental classes. The research design is described in Table 1.

Table 1. Research Design

Cooperative Learning Model	Cooperation	
	Low	High
Snowball Throwing	Y_{11}	Y_{12}
Problem Based Learning	Y_{21}	Y_{22}

Information:

Y_{11}: The lowest grade score using the Snowball Throwing Model

Y_{12}: Highest grade score using the Snowball Throwing Model

Y_{21}: The lowest grade score using the Problem Based Learning Model

Y_{22}: The lowest grade score using the Problem Based Learning Model

(Suparman, 2015:37-38)

The sampling technique used was random. The research instrument test conducted was the validity test. The analysis prerequisite tests include the normality test, the variance homogeneity test, and the test using the average test. The instrument used in this study was in the form of a non-test in an observation sheet and a checklist sheet with the required data. The observation sheet was an observation sheet about cooperation between students in class with the Problem Based Learning model and the Snowball Throwing model.

RESULTS AND DISCUSSION

The average score of cooperation ability between students for the experimental class and the control class was calculated using frequency distribution. The experimental class's average score was 92,397, with the highest score of 100 and the lowest score of 76. In contrast, the control class obtained an average score of 63,929, with the highest score of 80 and the lowest score of 24. The average value of students' mathematics learning outcomes also used the frequency distribution and obtained an average score of experimental class learning outcomes is 47,348, with the highest value of 80 and the lowest 25. While the average value of the control class's learning outcomes is 44,745, the highest value is 82.5, and the lowest is 20. The analysis can be continued with the normality test and homogeneity test.

The normality test is used to determine whether the score of cooperation between students in mathematics learning and the value of learning outcomes in the experimental class and the control class usually are distributed or not. Test for normality using Chi-Square. The results of the normality test are presented in Table 2.

Table 2. Summary of Normality Testing

No	Testing	χ^2_{count}	χ^2_{table}	Significant Level	df	Info.
1.	Experiment class collaboration	5,157	7,815	5%	3	Normal
2.	Control class collaboration	3,736	7,815	5%	3	Normal
3.	Experimental class learning outcomes	2,991	7,815	5%	3	Normal
4.	Control class learning outcomes	2,937	7,815	5%	3	Normal

After the normality test is then carried out homogeneity tests, the homogeneity test is used to determine whether the score of cooperation between students and the value of learning outcomes in the experimental class and the homogeneous control class. The homogeneity test uses the F-test. A summary of the results of the homogeneity of cooperation between students can be seen in Table 3.

Table 3. Summary of Homogeneity Test Results Cooperation between Students

F_{count}	$F_{0,025(33,34)}$	$F_{0,975(33,34)}$	Significant Level	Info.
0,223	1,988	0,501	5%	Homogeneous

Based on calculations, the value of $F_{count} = 0.223$ is obtained. At the F distribution's critical value with a significant 5% level and degrees of freedom for large samples, 34 and small samples are 33. It turns out that $F_{\frac{\alpha}{2}(n_1-1),(n_2-1)} = F_{0,025(33,34)} = 1,988$ and $F_{(1-\frac{\alpha}{2}),(n_1-1),(n_2-1)} = F_{0,975(33,34)} = 0,501$ as a result $F_{count} < F_{0,025(33,34)}$ H_0 is accepted, which means that both classes have a variance in the score of cooperation between students (have homogeneous variance). Homogeneity test calculation of learning outcomes can be seen in Table 4.

Table 4. Summary of Homogeneity Test Results Learning Outcomes Value

F_{count}	$F_{0,025(33,35)}$	$F_{0,975(33,35)}$	Significant Level	Info.
1,137	2,292	0,503	5%	Homogeneous

Based on the calculation, the value of $F_{count} = 1.137$ is obtained. At the F distribution's critical value with a significant level of 5% and degrees of freedom for large samples 35 and small samples 33. It turns out that $F_{\frac{\alpha}{2},(n_1-1),(n_2-1)} = F_{0,025(33,35)} = 2,292$ and $F_{(1-\frac{\alpha}{2}),(n_1-1),(n_2-1)} = F_{0,975(33,35)} = 0,503$ consequently $F_{count} < F_{0,025(33,35)}$ then H_0 is accepted, which means that both classes have the same variance in learning outcomes (have homogeneous variance).

After homogeneity testing, hypothesis testing is done. In the first hypothesis, the research results obtained $F_{obs}(A) = 0.262$ and $F_{0.05; 1.65} = 3.989$ then $F_{obs}(A) < F_{0.05; 1.65}$ so that $H_{0.1}$ is accepted, which means that there is no influence of cooperative learning model factors on learning mathematics in class VII students. When learning occurs, students already think and are embedded in students' minds that mathematics is a tricky subject. The statement is based on questions and answers when interviewing students.

In the second hypothesis, the research results obtained $F_{obs}(B) = 0.270$ and $F_{0.05; 1.65} = 3.989$; consequently, $F_{obs}(B) < F_{0.05; 1.65}$ so that $H_{0.2}$ is accepted, which means that there is no influence of cooperation factors on mathematics learning outcomes in grade VII students. Students' collaboration activities were not seen because students chatted with other students outside the group and did not discuss their worksheet problems. Also, there were only two observers, so the observer lacked focus on each student's cooperation totaling 34 for the experimental class and 36 for the control class.

In the third hypothesis, the research results obtained $F_{obs}(AB) = 0.043$ and $F_{0.05; 1.65} = 3.989$; consequently $F_{obs}(AB) < F_{0.05; 1.65}$ so that $H_{0.3}$ is accepted, which means that there is no interaction effect between learning models cooperation and cooperation between students towards mathematics learning outcomes in grade VII students. This happens because students have assumed that mathematics is difficult to understand, so there is no interest in learning mathematics using any model. Also, the interaction of each student at the time of the study could not be considered by the observer as a whole because of the limited number of observers.

In the fourth hypothesis, an analysis was carried out with a significant level of 5% and degrees of freedom = 67, then the value of $t_{count} = -12.574$ and $t_{0.05; 67} = 1.996$, consequently $t_{count} < t_{0.05; 67}$ so that $H_{0.1}$ was accepted, then cooperation between Snowball class students Throwing has no more significant effect than a collaboration between students of Problem Based Learning classes on Grade VII students' mathematics learning outcomes. This happens because students are not in groups with their peers, so collaboration between students is not optimal. Collaboration between students and the Snowball Throwing and Problem Based Learning models is not visible because students have no interest in mathematics.

In the fifth hypothesis, an analysis with a significant level of 5% and degrees of freedom = 8 is obtained $t_{count} = -0.828$ and $t_{0.05; 8} = 2.306$, consequently $t_{count} < t_{0.05; 8}$ so that H_0 is accepted,

then the Snowball cooperative learning model Throwing is no more significant than the Problem Based Learning type cooperative learning model of mathematics learning outcomes for grade VII students. This happens because of the researcher's voice limitations so that instructions to students are unclear and result in student learning outcomes being less than optimal.

CONCLUSION

Based on the results of the research and discussion that has been described, it can be concluded that the research is (1) There is no influence of cooperative learning models on mathematics learning outcomes in grade VII students of SMP Negeri 3 Wates Kulon Progo Regency Even Semester Academic Year 2017/2018. This is indicated by the results of hypothesis testing with a significant level of 5% and degrees of freedom = 1, obtained $F_{obs}(A) = 0.262$ and $F_{0.05;\ 1.65} = 3.989$, consequently $F_{obs}(A) < F_{0.05;\ 1.65}$ so $H_{0,1}$ is accepted, and $H_{1,1}$ is rejected. (2) There is no influence of the cooperation factor on mathematics learning outcomes in grade VII students of SMP Negeri 3 Wates, Kulon Progo, Even Semester, 2017/2018 Academic Year. This is indicated by the average hypothesis test with a significant level of 5%, and degrees of freedom is 1, then $F_{obs}(B) = 0.270$ and $F_{0.05;\ 1.65} = 3.989$ consequently $F_{obs}(B) < F_{0.05;\ 1.65}$ so that $H_{0,2}$ is accepted and $H_{1,2}$ is rejected. (3) There is no effect of interaction between cooperative learning models and student-to-student collaboration on mathematics learning outcomes in Grade VII students of SMP Negeri 3 Wates, Kulon Progo Regency Even Semester Academic Year 2017/2018. This is indicated by the average hypothesis test with a significant level of 5%, and degrees of freedom is 1, then obtained $F_{obs}(AB) = 0.043$ and $F_{0.05;\ 1.65} = 3.989$ consequently $F_{obs}(AB) < F_{0.05;\ 1.65}$ so that $H_{0,3}$ is accepted $H_{1,3}$ is rejected. (4) Cooperation among students of Snowball Throwing class is no more significant than cooperation between students of Problem Based Learning classes on mathematics learning outcomes of Grade VII students of SMP Negeri 3 Wates, Kulon Progo Regency Even Semester Academic Year 2017/2018. This is indicated by the hypothesis test with a significant 5% level and degrees of freedom = 67. The value of $t_{count} = -12.574$ and $t_{0.05;\ 67} = 1.996$, consequently $t_{count} < t_{0.05;\ 67}$ so that H_{01} is accepted and H_{11} is rejected. (5) The Snowball Throwing cooperative learning model has no more significant influence than the Problem Based Learning type cooperative learning model on mathematics learning outcomes in Grade VII students of Wates 3 Middle School, Kulon Progo Regency Even Semester Academic Year 2017/2018. This is indicated by the hypothesis test with a significant 5% level and degrees of freedom = 8. The value of $t_{count} = -0.828$ and $t_{0.05;\ 8} = 2.306$, consequently $t_{count} < t_{0.05;\ 8}$ so that H_0 is accepted, and H_1 is rejected.

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