

THE EFFECT OF THE COLLABORATIVE PROBLEM SOLVING ON MATHEMATICS LEARNING RESULT REVIEWED FROM THE ABILITY OF MATHEMATICS LITERACY OF CLASS VII

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ABSTRACT

This research aims to determine the effect of Collaborative Problem Solving (CPS) learning models on learning outcomes in students' mathematical literacy abilities. This research is included in an experimental study. This study's population was VII grade students of Junior High School (SMP) Muhammadiyah 3 Depok in 2019/2020 consisting of 4 classes. Using random sampling techniques, the sampling technique obtained class VII D as an experimental class and VII-A as a control class. Based on the variance analysis, there is no influence of learning model factors, the interaction of learning models, and inter-student mathematical literacy abilities on mathematics learning outcomes in class VII students of SMP Muhammadiyah 3 Depok.

Keywords: Collaborative Problem Solving (CPS), Mathematical Literacy Ability, Learning Outcomes.

INTRODUCTION

Education is a very important process in the progress of student thinking. Quality education can create quality Human Resources (HR) as well. Through education, students are expected to be active and creative in developing their potential and have religious-spiritual strength, noble morals in society, nation, and state.

In general, learning mathematics is difficult for most students. Students feel lazy to do math problems, and when students are given questions, these students do it carelessly without paying attention to the content of the questions in the question and ask for help from others. If this continues, students' abilities will not develop (Inayah, 2015:2). It is necessary to have-level thinking skills in solving math problems to foster a sense of creativity and confidence in their abilities. Therefore, a teacher must apply the right learning model to make the quality of student learning better. However, the teacher must also see the class's conditions and the learning objectives to be achieved in the learning. Students' learning outcomes are influenced by two factors, namely, internal and external factors. Student ability factors have a significant influence on learning outcomes. In addition to students' ability factors, there are also other factors such as learning motivation, interest and attention, learning attitudes and habits, persistence, socioeconomics, and physical and psychological factors (Sudjana, 2014: 39).

Based on the results of an interview with one of the mathematics teachers in class VII SMP Muhammadiyah 3 Depok, it was said that the students' ability to solve math problems related to contextual problems was still lacking. Some students can only understand the problem without understanding the solutions that must be taken to solve it.

Literacy is the ability to read and write information that is owned. High literacy skills help someone understand something and draw conclusions from the information read. Richard Ken (2000) defines literacy or literacy in a second language to mean more than just the ability to read and write. However, he is better known as a complex language concept, and that concept is used in writing language and communicating. Reading competence is needed, which involves interpreting and evaluating various kinds of reading sources from written and spoken texts. Mathematical literacy is very important for students because it can help individuals understand the role of mathematics in real life and help make various kinds of assessments and decisions in building, caring, and thinking (OECD, 2018: 76). The seven mathematics literacy indicators based on PISA 2018 include communication, mathematics, representation, reasoning, and arguments, formulating strategies for solving problems, using symbols, formal and techniques and operations, and using mathematical tools. This is indicated by the fact that

some students have not understood the concepts and formulate mathematical models. Some students have not been able to present their work results in graphs, tables, or pictures. Students also cannot reason logically to connect math problems.

Based on class VII observations during mathematics learning, most students are not ready to learn when the teacher enters the class. When the teacher asked questions, only a few students could answer correctly. Some students find it difficult to solve the problems given by the teacher to ask each other questions. Students also have difficulty expressing their ideas, ideas, or thoughts in various forms to solve mathematical problems.

The Collaborative Problem Solving (CPS) learning model is a learning model that involves students working together in a group to solve a problem. In this learning model, students are given problems that must be solved individually and in groups. The problems given will encourage students to find various opinions or ideas expressed by each individual or group to trigger students to interact with other students in solving these problems with the provision of initial knowledge possessed by each individual.

According to Djamilah, the steps for problem-based collaborative learning are as follows: (1) learning begins with challenging problems, (2) students are allowed to identify problems given by the teacher and design strategies for solving them independently before they study in groups, (2) 3) students study in groups of 4-6 people to clarify their understanding, criticize the ideas/ideas/thoughts of friends in their group, make conjectures, choose learning strategies, and solve problems by asking questions and arguing, (4) Students solve problems given by the teacher individually, (5) The teacher as a facilitator, facilitates the course of the discussion by asking questions that provoke students so that an atmosphere of collaboration is achieved, (6) Students present the results of solving their problems in front of the class.

METHODS

This research is experimental research where the researcher wants to know the CPS learning model on learning outcomes in terms of students' mathematical literacy abilities. The research design used a 2x2 factorial design. This research was conducted at SMP Muhammadiyah 3 Depok.

This study's population were all grades VII of SMP Muhammadiyah 3 Depok in the even semester of the 2019/2020 academic year. The sampling technique used is the random sampling technique. The instrument used in this study was a test question. The questions used are in the form of multiple choices and essays designed according to predetermined indicators. The instrument was tested by testing the validity with the product-moment correlation coefficient formula from Karl Pearson and the reliability test for learning outcomes using the Kader Richardson formula (KR-20) while using the Alpha formula for mathematical literacy skills. The data analysis technique has two requirements that must be met, namely the normality test and the homogeneity test. The normality test is to find out whether the value of students' mathematical literacy abilities in mathematics learning and the value of learning outcomes in the experimental class and control class usually are distributed or not. Normality test using Chi-Square.

Furthermore, the homogeneity test assumes that the two samples come from the same or homogeneous conditions. As a follow-up, the mean value significance test between groups was carried out using Least Significant Differences (LSD). The research design included three stages: (1) the preparation stage, (2) the teaching implementation stage, (3) the final test implementation stage.

The preparatory stage includes: determining the class to be sampled, determining the research schedule, making lesson plans for the experimental class while for the control class lesson plans made by the subject teacher, compiling validated research instruments, conducting validation tests, testing differences in power, and testing reliability as well as the difficulty level of the research instrument to be used. This research was conducted in 3 meetings in the experimental class.

The implementation stage includes teaching with the Collaborative Problem Solving (CPS) learning model in the experimental class. In contrast, the control class is taught by subject teachers using

the Problem Based Learning (PBL) learning model. The final stage includes giving the final assessment questions to determine how much the student's ability from beginning to end.

RESULTS AND DISCUSSION

The average score of the results of the experimental class's mathematical literacy skills was 29.89, while the average score of the results of the control class's mathematical literacy skills was 23.24. The average score of the experimental class learning outcomes was 57.51, while the control class learning outcomes average was 49.80. The average score of mathematical literacy skills and learning outcomes is presented in Table 1.

Table 1. The average score of Literacy Ability (KL) and Learning Outcomes (HB)

Class	Average KL	Average HB
Experiment	28,89	57,51
Control	23,34	49,80

Before testing the hypothesis with a two-way analysis of variance, the normality test, and the homogeneity test of variance between groups are carried out. The normality test results and the homogeneity of the variance test showed that the distribution of student learning outcomes data was normally distributed, and the variance between groups was homogeneous. Thus, the research data has met the two-way analysis of variance assumptions to continue the research. A summary of the two-way analysis of variance is presented in Table 2.

Table 2. Two Way Analysis of Variance Summary

Source	JK	df	RK	Fobs	Fa
Learning Model (A)	1022,5	1	1022,5	3,2	3,9
Mathematical Literacy (B)	2033,6	1	2033,6	6,3	3,9
Interaction (AB)	40,5	1	40,5	0,1	3,9
Error	21199,2	66	321,2	-	-
Total	24295,7	69	-	-	-

The first hypothesis obtained $F_{obs}(A) = 3.2$ and $F(0.05; 1; 66) = 3.98$, so it is accepted, which means that there is no influence of the learning model factor on students' mathematics learning outcomes.

The second hypothesis, obtained $F_{obs}(B) = 6.3$ and $F(0.05; 1; 66) = 3.98$ so it is rejected, which means that there is an influence of mathematical literacy ability on students' mathematics learning outcomes.

The third hypothesis obtained $F_{obs}(AB) = 0.1$ and $F(0.05; 1; 66) = 3.98$, so it is accepted, which means that there is no effect of learning models and mathematical literacy skills between students learning outcomes.

The LSD test was conducted to determine which one had a better effect on student mathematics learning outcomes using learning model factors and literacy skills. A summary of the calculations and results of the LSD test is presented in table 3.

Table 3. Summary of Calculations and LSD test results

Case	$y_i - y_j$	LSD	Result	Inf
$\mu_1 - \mu_2$	12,34	12,24	$\mu_1 > \mu_2$	PS
$\mu_1 - \mu_3$	9,13	12,34	$\mu_1 < \mu_3$	TP
$\mu_1 - \mu_4$	18,87	13,78	$\mu_1 > \mu_4$	PS
$\mu_2 - \mu_3$	3,21	10,92	$\mu_2 < \mu_3$	TP
$\mu_2 - \mu_4$	6,53	12,52	$\mu_2 < \mu_4$	TP
$\mu_3 - \mu_4$	9,74	12,63	$\mu_3 < \mu_4$	TP

Information :

MPCPS: Collaborative Problem Solving Learning Model

MPPBL: Problem Based Learning Learning Model

μ_1 : MPCPS high KL

μ_2 : MPCPS low KL

μ_3 : MPPBL high KL

μ_4 : MPPBL low KL

KL: Literacy Skills

PS: Significant Influence

TP: No influence

For case I, because $|\bar{y}_1 - \bar{y}_2| > LSD$, then H_0 was rejected. So there is a significant effect between (high MPCPS - KL) and (low MPCPS - KL) on the learning outcomes of grade VII students of SMP Muhammadiyah 3 Depok for the 2019/2020 academic year. With MPCPS - high KL is better than MPCPS - low KL.

For case III, because $|\bar{y}_1 - \bar{y}_4| > LSD$, then H_0 was rejected. So there is a significant effect between (high MPCPS - KL) and (low MPPBL - KL) on the learning outcomes of class VII students of SMP Muhammadiyah 3 Depok for the 2019/2020 academic year. With MPCPS - high KL is better than MPPBL - low KL.

So there is a significant effect between (high MPCPS - KL) and (low MPPBL - KL) on the learning outcomes of class VII students of SMP Muhammadiyah 3 Depok for the 2019/2020 academic year. With MPCPS - high KL is better than MPPBL - low KL.

Based on the calculation of the LSD test in this study, the results can be obtained, namely in cases II, IV, V, VI there is no effect because it involves a different learning model where the results have been tested in the first hypothesis. In contrast, there is an effect in case I and case III because it is based on the ability value. Literacy, although it still involves a model, the emphasis is on literacy skills.

CONCLUSION

Based on data analysis, hypothesis testing, and discussion, it can be concluded that there is no influence of learning model factors, interaction learning models, and students' mathematical literacy skills on student mathematics learning outcomes, and there is an influence of mathematical literacy ability factors on mathematics learning outcomes of seventh-grade students of SMP Muhammadiyah. 3 Depok. The LSD test results show that in cases II, IV, V, VI, there is no effect because it involves a different learning model where the results have been tested in the first hypothesis. In contrast, in case I and case III, there is an effect because based on the value of literacy skills, even though it still involves a model, but the emphasis is on literacy skills.

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