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Influence of Learning Model and Early Ability to Ability of Mathematics Problems on Class V Sd(Experimental Study on Grade V Students at SDN Kecamatan Duren Sawit)

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Abstract:- This study aims to determine the effect of the learning model and early ability to solve the problem of mathematical problem. The research was conducted at SDN Kecamatan Duren Sawit, using experimental research design treatment by level 2 x 2. The result of research indicate that (1) There is difference of problem solving ability of mathematics between student which given model of cooperative learning type jigsaw with student which is given problem based learning model learning, (2) There is interaction effect between jigsaw type cooperative learning model and initial ability to problem-solving ability, (3) ability of problem solving of student with high initial ability with taught model of jigsaw type cooperative learning is higher than math problem-solving ability with taught learning problem-based learning model, (4) Ability to solve mathematical problems of students who have low initial ability with taught model jigsaw type cooperative learning is lower than the ability problem-solving mathematics with taught learning model problem-based learning.

Keywords:- *Problem based learning, jigsaw, initial ability, solution to problem.*

I. INTRODUCTION

Mathematics becomes one of the important subjects to be taught to make students literate in thinking. It is to equip students with logical, analytical, systematic, critical and creative thinking skills, as well as the ability to work together. Such skills can enable students to be skilled at solving problems. Mathematics is many things to many people. The more we know about what people believe mathematics is all about, the better we'll be able to communicate with them. More important, the better we 'll understand the mathematics, the better we' ll be able to help children learn. [1] [2] [3]

Problem-solving is a focus in mathematics learning. Problems confronted can include closed issues with single solutions, open issues with non-singular solutions, and problems with various solutions. To improve problem-solving skills, it is necessary to develop problem-solving skills, create mathematical models, solve problems, and interpret the solutions.

Problem-solving is not merely a goal of learning mathematics, but it is also a tool to do it and is a skill that will be brought to the daily problems of the student or situations in making good decisions in his or her life. [4] solving the problem as an attempt to find a way out of a difficulty in order to achieve a goal that is not so easily immediately achieved. [5] [6] [7]

Polya problem-solving diagram can be seen in the following figure:

Fig 1:- Polya Problem Solving Diagram

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Problem-solving as an activity to solve story problems, solve problems that are not routine, apply mathematics in everyday life and other circumstances, and prove or create so that there appears the activity of developing mathematical power (mathematical power) to students. [8] [9] In solving mathematical problems, there are three keys that must be understood by students. The three steps are: 1) changing the problem in problem-solving into mathematical sentences, 2) solving problem-solving problems using the skills and techniques needed, 3) changing the answer to the problem-solving problem into the mathematical sentence. [10]

The low mathematical problem-solving ability of Indonesian students can be seen from the results of the PISA (OECD, 2013) survey in 2012 which shows that Indonesia is ranked 64th out of 65 countries surveyed with an average score of 375 of the average standards score the PISA set is 500. There is a survey that one of the cognitive indicators assessed is problem-solving. The result of TIMMS and PISA survey shows that the students 'mathematical ability in Indonesia, especially the students' mathematical problem-solving ability, is still low.

Facts inside and outside Indonesia show that students' mathematical problem-solving ability is still low. This is based on several research results, of which no fewer than fifteen national and international studies reveal that classically the ability to solve mathematical problems has not yet reached a satisfactory level. The results of this study provide clues to immediately fix the weaknesses of the learning process in the classroom related to the ability of problem-solving mathematics.

One effective cooperative learning model for developing mathematical problem-solving ability is a jigsaw type cooperative learning model and problem-based learning model. Jigsaw type cooperative learning model is one type of cooperative learning that encourages students active and mutual help in mastering the subject matter to achieve maximum performance. Cooperative learning of the jigsaw model is a cooperative learning model by means of students studying in small groups of four to six people heterogeneously and students working together with positive and responsible interdependence independently. [11] [7] [12] Jigsaw type cooperative learning scheme can be seen in the picture below:

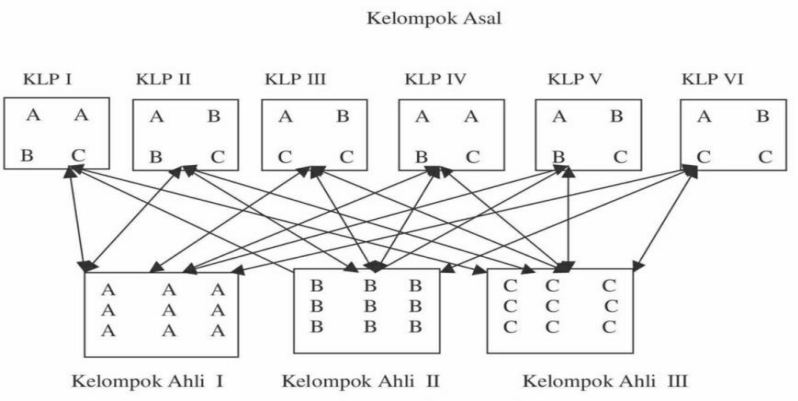

Fig 2:- The steps of the jigsaw learning model

While on the learning model problem-based learning, students are expected to be involved in the learning process that requires students to identify problems, collect data, and use the data for problem-solving. Tan in Rusman states that the problem-based learning model is an innovation in learning because, in this learning model, students' thinking ability is optimized through group work process or systematic team so that students can empower, sharpen, test and develop the ability to think continuously.[11]

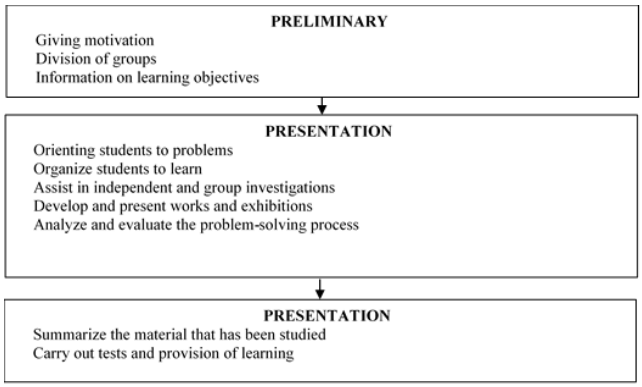

Fig 3:- Problem Based Learning Learning Flow

While Trianto argues that the problem-based learning model is a learning model based on the many problems that require an authentic investigation of the investigation that requires a real settlement of the real problem. [13][14]

The flow of learning problem-based learning model can be seen in the following flowchart:

According to Barbara in Rusmono, to reach an effective group that needs to be done are: 1) starting group: group formed on the first day of commencement of lesson with activity writing group biography, giving short test, filling instrument and performing mental game; 2) monitoring groups: each teacher acts as a tutor, and the tutor guides a group of students; 3) the role of the group: one way to increase student participation by asking students to take roles and responsibilities within their group; 4) evaluation: provide constructive feedback verbally and in writing to individuals and groups. [13]

The active interaction between students and students and students with teachers should be a daily activity in learning

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mathematics. This is only possible when teachers have the ability to organize such learning. This is only possible if teachers are eagerly waiting for student answers to think about teacher questions. In addition, in order for interaction between students and students, teachers should have the ability to teach with a group approach, because with a group approach, the interaction between students and students will occur.

Initial capability is the ability that students have acquired before students gain a certain terminal capability. Initial skills show the current status of students' knowledge and skills to get to the next status the teacher wants to achieve by the students. With this ability can be determined from where the teaching should begin. The ability of the terminal is the direction of the teaching objectives terminated, so that teaching takes place from the initial ability to the terminal capability that is the responsibility of the teacher. [15] [16] [17] [18]

Based on the things that have been described, encouraging researchers to find out how much influence between the model of learning on the ability to solve mathematical problems achieved by elementary school students after the learning process occurs. Therefore, researchers need to examine what factors affect the ability to solve mathematical problems. Especially the researcher will do research the influence of learning model and initial ability to the ability of problem-solving of mathematics in fourth graders of the elementary school in Kecamatan Duren sawit.

➢ *Formulation of the problem*

- Are there differences in the ability of problem-solving of mathematics between students who are taught using Jigsaw type cooperative learning model with students who are taught using the problem-based learning model?
- Are students with high initial skills taught using Jigsaw type cooperative learning model having different mathematical problem-solving abilities with students taught using the problem-based learning model?
- Are students with low initial skills taught using Jigsaw type cooperative learning model having different mathematical problem-solving abilities with students taught using the problem-based learning model?
- Is there an interaction effect between the use of learning models and initial ability to solve mathematical problems?

II. METHODS

The experimental research design used in this research is design treatment by level 2x2. According to Sugiyono, the factorial design is a modification of true experimental design (experimentally true) that is to consider the possibility of moderating variables affecting treatment (independent variables) on the results (dependent variable). [19]

Table 1. Experiment Pattern with Design Treatment by Level 2 x 2

Initial Ability (B)	Group Learning Methods (A)	
	Jigsaw (A1)	*Problem Based Learning*(A2)
Height (B1)	14	14
Low (B2)	14	14
Amount	28	28

The sample of this study was taken from the population of 1 school with each class of VA and VD. Results based on the use of cluster sampling technique obtained SDN Duren Sawit 01 VA class and VD as a sample. The population in this study are VA and VD class students in one same school located in Kecamatan Duren Sawit East Jakarta. The samples in this study were 56 students spread into 2 classes each of which each of the VA classes was 28 students who were experimental class 1 using Jigsaw type cooperative learning model, and VD class was 28 students, respectively experimental class 2 using problem-based learning model.

cooperative learning model and model of learning problem based learning semester even grade V. Recapitulation of students' problem-solving ability scores in all groups can be presented in the following table:

III. RESULTS

A. Description and Data Processing

Descriptive statistical analysis of the problem-solving ability of students obtained from the treatment of jigsaw type

Table 2. Description of Data Distribution

	A1	A2	B1	B2	A1B1	A1B2	A2B1	A2B2
Mean	83,39	78,75	70,00	67,64	88,57	78,21	78,57	78,93
SD	9,53	8,01	16,01	15,09	7,70	8,46	6,63	9,44
Varians	90,84	64,12	256,22	227,57	59,34	71,57	43,96	89,15
Median	85	80	67	67	87,5	77,5	80	80
Modus	85	80	60	60	85	70	75	80

B. Testing Requirements Analysis

Normality test

The normality test is performed to determine whether the sample is from a normally distributed population or not. Normality test of data is done through Liliefors test with α = 0,05. The hypothesis is rejected if Lhitung> Ltabel and accepted if Lhitung <Ltabel. The recapitulation of the results of the normality test data math problem-solving ability can be seen in the following table.

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Table 3. Recapitulation of Test Result Normality Mathematical Problem Solving Ability

No	Group	Lhitung	Ltabel	Information
1	A1	0,112	0,167	Normal
2	A2	0,117		Normal
3	A1B1	0,179	0,237	Normal
4	A1B2	0,148		Normal
5	A2B1	0,134		Normal
6	A2B2	0,114		Normal

Based on table 3 it can be seen that Lhitung of six groups is smaller than Ltabel (Lhitung < Ltabel) means Ho accepted. It can be concluded that the six groups of data are normally distributed.

Uji Homogenitas

Test homogeneity Mathematical Problem Solving ability in two treatment groups A1 and A2

Table 4. Calculation of Homogeneity Test in Two Groups A1 A2

Sample	db	1/db	$_i^2$	log $_i^2$	db log $_i^2$	db $_i^2$
1	13	0,08	59,34	1,773	23,054	771,4
2	13	0,08	71,57	1,855	24,111	930,4
3	13	0,08	43,96	1,643	21,359	571,4
4	13	0,08	89,15	1,950	25,351	1158,9
Total	52				93,875	3432,1

Based on the data in Table 4:11 can be obtained price X ^ 2hitung 0815. for α = 0.05 with db = 2. X^2count <X^2tables is 0.81 <3.84. So Ho accepted, so it can be concluded the two sample data above comes from a homogeneous population

Homogeneity Test of Mathematical Problem Solving in four treatment interaction groups and attributes ie A1B1, A1B2, A2B1, A2B2

Table 5. Homogeneity Test Calculations on Four Groups (A1B1, A1B2, A2B1, A2B2)

Sample	db	1/db	$_i^2$	log $_i^2$	db log $_i^2$	db $_i^2$
1	13	0,08	59,34	1,773	23,054	771,4
2	13	0,08	71,57	1,855	24,111	930,4
3	13	0,08	43,96	1,643	21,359	571,4
4	13	0,08	89,15	1,950	25,351	1158,9
Total	52				93,875	3432,1

Based on the data in Table 4:12, obtained price X ^ 2 count 1.708. for α = 0.05 with db = 4. X^2count <X^2tables is 1.708 <7.81. So Ho is accepted, so it can be concluded both sample data come from homogeneous population

C. Hypothesis Testing

Table 6. Results of Variance Analysis

Source of Variance	Db	JK	RJK	F Hitung	F Tabel
Between Columns	1	301,79	301,79	4,57*	4,03
Between Rows	1	350,00	350,00	5,30*	4,03
Interaction	1	401,79	401,79	6,09*	4,03
In	52	3432,14	66,00		
Total Reduced	55	4485,71			

- *Differences in Mathematical Problem Solving Ability Students Provided Treatment with Cooperative Learning Model Jigsaw Type Higher Compared With Student Group Given Learning Model Problem Based Learning*

The result of data analysis by using two way ANOVA at significance level α = 0,05 obtained F value = 4.57 at Ftabel = 4.03. This means that H0 is rejected. This means that there is an average difference in students' mathematical problem-solving skills using Jigsaw cooperative learning model and Problem Based Learning.

- *The interaction between Learning Model and Early Ability to Mathematical Problem Solving Ability*

The result of data analysis by using two way ANOVA at significance level α = 0,05 obtained F value = 4.57 at Ftabel = 4.03. This means H0 is rejected. This means that there is a significant interaction effect between Jigsaw type cooperative learning model and early ability to solve a mathematical problem.

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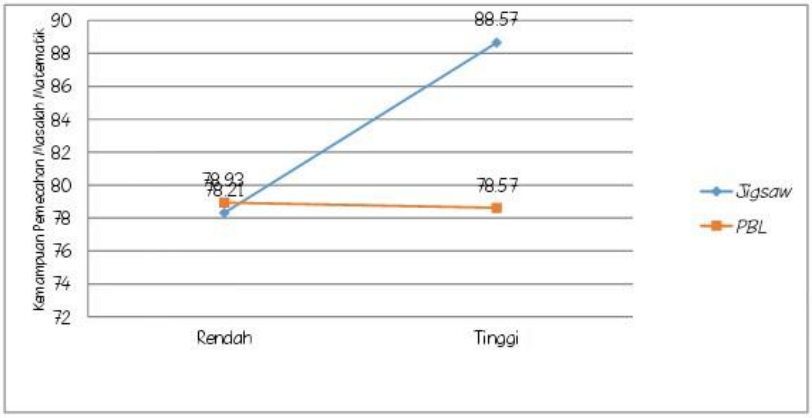

Fig 4:- Interaction between Learning Model and Initial Ability to Mathematical Problem Solving Ability

- *Differences in Mathematical Problem Solving Ability between Student Group Using Jigsaw Type Cooperative Learning Model with Student Group Using Problem Based Learning Model with High Ear Capability*

Students who have high initial ability to give effect to the problem-solving ability of mathematics by given model of jigsaw type cooperative learning. This is proven on the basis of further test results in ANOVA by using the Tukey Test which results as follows:

Table 7. Comparison of Groups A1B1 with A2B1

Kelompok yang Dibandingkan	Qhitung	Qtabel	Keterangan
A1B1 dengan A2B1	4,61	4,11	Sangat Signifikan

The result of data analysis by using Tukey Test at significance level α = 0,05 give value Qhitung 4,61 bigger than Qtabel = 4,11. This means that H0 is rejected. This means that there is a difference in the average problem-solving ability of high student group mathematical problems using a jigsaw type cooperative learning model rather than the average problem-based learning model.

- *Differences in Mathematical Problem Solving Ability between Student Group Using Jigsaw Type Cooperative Learning Model with Student Group Using Problem Based Learning Model with High Ear Capability*

Differences in the problem-solving ability of groups of students who have low initial ability can be proven by further testing using Tukey's test which results as follows.

Table 8. Comparison of Groups A1B1 with A2B2

Kelompok yang Dibandingkan	Qhitung	Qtabel	Keterangan
A1B2 dengan A2B2	0,33	4,11	Sangat Signifikan

Result of data analysis using Tukey test at significance level α = 0,05, group of students who were treated with jigsaw type cooperative learning model with low initial ability (A1B2) compared with group of students who were treated with problem based learning model with low initial ability (A2B2) obtained Qhitung = 0.33 and Qtabel = 4.11. Thus Qcount is less than Qtable so H0 is rejected. It means that there is the difference of problem-solving ability of mathematics of student which is given the model of cooperative learning type jigsaw with the student who is given the treatment of problem-based learning model having the low initial ability.

IV. DISCUSSION

- *Differences in Student Mathematical Problem-Solving Ability in Student Group Using Jigsaw Cooperative Learning Model and Learning Based Problem Learning Model*

In this study found that there are differences in the problem-solving skills of students who are taught mathematically using cooperative learning model type jigsaw with model learning problem-based learning. Mathematical problem-solving skills taught using jigsaw type cooperative learning model is higher than the problem-based learning model. Jhonson and Jhonson in Rusman said the research on cooperative Jigsaw model shows the result that cooperative interactive has various positive effects on child development. [11] In jigsaw type cooperative learning, students get an opportunity to express their opinions, and each group has responsibility for the success of all group members so that students with more ability can help their uninformed friends. That way, jigsaw type cooperative learning can further encourage students to be active and cooperate with their friends. Based on this it can be stated that the jigsaw type cooperative learning model is considered more effective to be used than the problem-based learning model because in this learning the students will get better achievement, have a better attitude and more positive towards learning, in addition to mutual respect for differences and opinions other people.

In the problem-based learning model, when students have no interest or no belief that the problems learned are difficult to solve, they will be reluctant to try so that students will be bored with learning and show a pessimistic attitude.

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Based on the results of the research, although both of these learning models have the same effect on the ability of problem-solving of mathematics, jigsaw type cooperative learning model gives better result in the learning activity which is compared with the problem-based learning model. This finding is consistent with the results of the study indicating that after applying the jigsaw type cooperative learning model showed significant results.

- *In Group of Students with Higher Ability, Mathematical Problem-Solving Ability Using Higher Jigsaw Cooperative Learning Model from Students Using Learning Problem Based Learning Model.*

Testing of the third hypothesis shows that the ability of mathematical problem solving for students who have high initial ability learning using jigsaw type cooperative learning model higher than students who learn to use problem-based learning model significantly.

Initial skills, directly and indirectly, affect the learning process. Initially, the initial ability can simplify the learning process. Indirectly, the initial ability can optimize the learning materials. Students who have the high initial ability will more easily understand and develop problem-solving skills of mathematics because students already have a basis for leading to new knowledge.

Jigsaw type cooperative learning model is one type of cooperative learning that encourages students active and mutual help in mastering the subject matter to achieve maximum performance. Students who already have a high knowledge base will be easier to master the material to help other students to understand the subject matter, especially in terms of solving problems.

Based on this it can be concluded that for students who have the high initial ability and want to improve problem-solving skills of mathematics should be given cooperative learning model jigsaw type.

- *In groups of students who have the low ability, Mathematical Problem-Solving Ability Using Higher Problem Based Learning Model from Students Using Jigsaw Cooperative Learning Model*

The initial ability of learners is important to be known by the teacher before the teacher starts the lesson because for the teacher to know whether the learners have had the initial knowledge which is a prerequisite to follow the next learning, the extent to which learners know the material to be delivered. Students who have the low initial ability, tend to experience difficulties during subsequent learning, because not yet have a readiness to the previous knowledge.

In a jigsaw type cooperative learning model that requires teamwork, each group member is active and interacts with each other. Jigsaw Type is a learning technique based on the form of a multifunctional group structure that can be used on all subjects and all levels to develop the skills and skills of each group member. [7] Each member has the same opportunity to develop his expertise. Students who have high initial ability can help other students whose initial abilities are low so that each member will be able to help each other.

The third hypothesis test shows that the ability of problem-solving of students with the low initial ability to learn by using jigsaw type cooperative learning model is lower than the students who learn using problem-based learning model not tested.

Empirically this is due to the experimental class that uses cooperative learning model jigsaw type of good social interaction occurs. Students who have the high initial ability have a good understanding and good communication so as to embrace students who have the low initial ability to be able to contribute maximally to the group. Finally, students with low initial ability can develop mathematical problem-solving skills.

- *There is Influence of Interaction between Jigsaw Cooperative Learning Model and Early Capability of Mathematical Problem-Solving Ability*

The result of the research on the fourth hypothesis test shows that there is an interaction between a jigsaw type cooperative learning model and the early ability to solve a mathematical problem.

Glaser argued that as quoted Hamzah Uno that learning has four components, namely content analysis of the field of study, diagnosis of students' early ability, learning process, and measurement of learning outcomes. One that has an important role as a basis for determining the learning process is the diagnosis of early ability (Recognition of Prior Learning). [18] Based on that opinion, it is stated that early ability is very important in starting the learning process because the initial ability is the bridge to get to the final ability. This means that in learning mathematics, the initial ability is needed to plan the learning process to be known to students who have more ability with students who have less ability.

V. CONCLUSION

- There is a difference of problem-solving ability of mathematics between student which given a model of cooperative learning type jigsaw with the student which given by model of learning problem-based learning.
- There is an interaction effect between jigsaw type cooperative learning model and initial ability to problem-solving ability.
- Math problem-solving ability of students who have the high initial ability with taught jigsaw type cooperative learning model higher than the ability of problem-solving mathematics with taught model of learning problem-based learning.
- Math problem-solving ability of students who have the low initial ability with taught jigsaw type cooperative learning model is lower than the ability of problem-solving mathematics with taught model of learning problem-based learning.

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