

Differences Of Mathematical Reasoning Ability And Emotional Intelligence Students Between Problem Based Learning And Inquiri Learning At Smp Swasta Pelita Medan

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Abstract: This study aims to determine (1) Differences in the ability of mathematical reasoning students between problem-based learning with inquiry learning, (2) Differences in emotional intelligence students between problem-based learning with inquiry learning, (3) Interaction between models of learning and students' early mathematical abilities of mathematical reasoning ability, and (4) Interaction between learning models and students' early math ability toward emotional intelligence. This research is semi experimental research. The population of this study is the seventh grade students of SMP Swasta Pelita Medan. And the sample of this research is class VII-1 and VII-2. Data analysis was performed by two way analysis of the ANOVA. The results showed that (1) There was a difference in mathematical reasoning ability between students that were given problem based learning with inquiry learning. It can be seen from ANAVA result from $F_{count} = 11.774$ bigger than $F_{tabel} = 3.980$. (2) There is no a difference in emotional intelligence between students that are given problem-based learning with inquiry learning. It can be seen from ANAVA result from $F_{count} = 39.402$ bigger than $F_{tabel} = 3.980$. (3) There is no an interaction between the learning model and the student's early mathematical ability to the mathematical reasoning ability. (4). There is an interaction between the learning model and the student's early mathematical ability to emotional intelligence.

Keywords: Problem Based Learning, Inquiri Learning, Mathematical Reasoning Ability, and Emotional Intelligence

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I. Introduction

Education is the medium and right tool in shaping the aspired society and nation, that is knowledgeable, creative, critical, independent and knowledgeable society. Besides education is the spearhead in preparing the human resources (HR) is reliable, because education can encourage maximize the potential of students as a candidate for reliable human resources to be able critical, logical and innovative in dealing with and solving problems encountered.

According to the Ministry of National Education (Depdiknas : 2006) states there are several indicators that need to be developed in learning mathematics, such as mathematical understanding, problem solving, and reasoning and reasoning. The ability of mathematical reasoning is one of the important skills in learning mathematics, where mathematical ability which is a high thinking pattern that includes logical and systematic thinking or a way of thinking to draw conclusions, both general conclusions drawn from the things that are specific and general things can be a conclusion that is special..

Baroody (Rohana, 2015) mentions at least four important reasons why reasoning is important for mathematics and everyday life. First, The reasoning needed to do mathematics, This means reasoning plays an important role in the development and application of mathematics. Second, The need for reasoning in school mathematics It is clear that to master mathematical concepts correctly requires reasoning in mathematics learning. Third, Reasoning involved in other content area, meaning reasoning skills can be applied to other sciences. It can be said that reasoning supports the development of other sciences. Fourth, Reasoning needed foe everyday life. This means reasoning to solve problems in life in everyday life.

This is in accordance with the fact that the results of observations at SMP Swasta Pelita Medan on November 27, 2016, mathematics learning outcomes of students SMP Swasta Pelita Medan is still relatively low because it is still below the limit of the minimum criteria of examination that apply to the school that is 75. Based on the problem of mathematical reasoning given to the students of SMP Swasta Pelita Medan as many as 28 students as a sample. Only 3 students or (10%) write down what is known and asked in the question but it is incomplete and still wrong in planning and problem solving. While 27 students (90%) did not write the things

that were known and asked and the adequacy of the data provided, only 6 students (20%) answered the problem correctly but did not follow the steps in solving the problem, most students lack understanding problem so wrong and unable to solve the problem well and correctly. This shows the ability of low student math reasoning.

This is also supported by the research of Manullang (2014:74) as follows: "conducted in Grade VII State Junior High School SMP 17 Medan found that there were only 6 students with fair mathematical reasoning ability, while others were very low with the average achieved 2,06 (lowest category). It means that mathematical reasoning ability can be achieved if the students understand the material and concept very well, and the students are able to think rationally or it is also called Intelligence Quotient (IQ).

In addition to students mathematical reasoning ability, students emotional intelligence in learning also contributes to the learning process. The learning process of school is a complex and thorough process. Emotional intelligence can be done if the students have an understanding of the material or concept and have the courage to do. This understanding can occur based on the result of rational thinking which is cognitive and intellectual intelligence, better known as Intelligence Quotient (IQ). Many people argue that to attract high achievement in learning, one must have a high IQ because intelligence is a potential stock that will facilitate the learning, and in turn will result in optimal learning achievement.

Although IQ is seen as a benchmark of one's achievement, the reality is that there are students that have high intelligence ability but have relatively low learning achievement, but there are students who, despite their relatively low intellectual ability, can achieve relatively high learning achievement. The level of intelligence is not the only factor that determines one's success, because there are other factors that influence. According to Goleman (Uno, 2005: 70), intellectual intelligence (IQ) only supports about 20% of the factors that determine success, while the remaining 80% comes from other factors, including emotional intelligence or Emotional Quotient (EQ). Emotional intelligence includes the ability to motivate yourself, overcome frustration, control the urge of the heart, control the mood (mood), empathy, and ability to work together.

According to Hasrattuddin (2011: 2), Emotional Intelligence is the ability of a person to control his own emotions and others, to distinguish one other emotion and use that information to guide the process of thinking and behavior. The same thing that is stated Goleman (Hidayat, 2014: 55), emotional intelligence is the ability of a person to manage his emotional life with intelligence (to manage our emotional life with intelligence); maintaining emotional harmony and expression through the ability of self-awareness, self-control, self-motivation, empathy and social ability. However, intelligence does not mean anything if the emotions are in power. Emotional intelligence adds much more qualities that make us more humane. Mathematical learning accompanied by grinding emotional intelligence of students is also expected to improve learning achievement, because emotions provoke one's actions against what he faced.

Student's mathematical reasoning ability and emotional intelligence can be grown with good learning process, lack of students' mathematical reasoning ability and low learning result in math learning can be influenced by mistake during learning process. This can be due to improper learning model or the ability of teachers in developing learning models less able to explore the reasoning ability and emotional intelligence of students.

The low of students' mathematical reasoning ability and emotional intelligence are caused by many factors, such as how to teach a teacher in the learning process, education orientation in Indonesia generally treats the students as an object, the teacher as the highest authority on science and subject-oriented matter. Handayani, et al (2014: 1) says teacher-centered learning, resulting in passive students in classroom learning.

Based on the above problems, allegedly need an improvement in the learning process of learning models that can improve the ability of mathematical reasoning in terms of students' emotional intelligence. There are many models of learning that we usually use in the effort to grow both capabilities, while the learning model is expected to be in line with the characteristics of mathematics that emphasize that the learning is no longer centered on the teacher but on the students. Referring to the less emphasized learning to make the students more active one of them is problem based learning and inquiry learning.

Problem Based Learning (PBL) is one of the learner-centered learning by confronting learners with the various problems faced in their life. In other words the problem-based learning model is a learning model that challenges students to "learn how to learn", work in groups to find solutions to real-world problems. This is in line with the opinion of Arends (2008: 45) that "PBM involves students to interpret and explain real world phenomena and to construct their own understanding of the phenomenon." This gave problem is used to bind students to the curiosity of the intended learning. The PBM curriculum facilitates the successful problem-solving, reasoning, group work and interpersonal skills better than other Education, in line with Amir (2013: 49) "that with the PBM conducted in the learning group getting more skills that is problem-solving skills, critical thinking skills, team work skills, interpersonal skills and reasoning and information search and information processing skills.

The advantages of problem-based learning model (Trianto, 2009: 96) are: realistic with student life, concepts according to the needs of students, Fostering the nature of student inquiry, concept retention becomes

strong; and fosters problem solving abilities. Furthermore, the three components that play a central role in problem-based learning in the form of teaching materials, class interactions and teacher interventions so that in the learning activities there is a focus on attention to students. Thus in teacher-based learning does not present the concept of mathematics in the finished form, but through problem-solving activities students are led to find the concept of knowledge itself.

Inquiry learning is a learning activity that involves maximally the entire ability of students to search and investigate something systematically, critically, logically and analytically so that they can formulate their own findings with confidence. In this lesson idea or ideas are conveyed through the process of discovery. This is in line with the opinion of Bruner (Budiningsih 2005: 41) who says that the learning process will work well and creatively if the teacher gives the learner the opportunity to find a concept, theory, rule, or understanding through the examples he encounters with his life. Inquisition of instructional materials is not presented in the final form, learners are required to undertake various activities to collect information, compare, categorize, manganalisi, integrate, organize materials and make conclusions.

Suherman, et al (2003: 190) states that the activities of discovery nuance opportunity to improve the ability in learning mathematics. In line with Kemendikbud (2013: 199) that the advantage of using inquiry model is to make students active in issuing ideas and can help students to acquire the concept of learning so that indirectly can improve student self-confidence. Thus, inquiry learning is able to cultivate students' mathematical reasoning ability and emotional intelligence with the involvement in students learning actively and creatively in the learning process and able to encourage students to get a better understanding of mathematical concepts or principles. Students and teachers are equally active in issuing ideas, even teachers can act as students, and as researchers in discussion situations. So students can think, work on their own initiative, and students' reasoning ability and emotional intelligence can be trained.

In practice, the two models of student learning will be grouped to discuss with their friends of reasoning mathematical ideas. Students will exchange opinions, accept and refute the arguments with their friends, arrange conjecture, to agree in making the final decision as a result of group work. In the problem-based learning model there are several learning steps that one of them develop and present the work can meet the characteristics of students' mathematical reasoning ability that to construct evidence and provide a justification for the truth of the solution. Then in step of learning inquiry proposed hypothesis can meet the characteristics of students' mathematical reasoning ability that is to examine the validity of an argument..

Based on the above explanation, that problem based learning and inquiri learning have different learning steps. In problem-based learning the teacher guides the students to investigate the problems given in groups. While in the inquiry students solve the problem given by guided discovery. But the two models are more directed to the characteristics of mathematical reasoning ability. So that the process of learning like this can foster students' different mathematical reasoning ability and emotional intelligence.

The students' mathematical reasoning ability and emotional intelligence is not only driven from the learning approach used but also influenced by the students' Early Mathematical Ability (EMA). EMA is an initial ability that students need to achieve instructional goals. As the Education Commission of the States (ECS) (2013: 1) states that "students' early mathematical abilities not only predict success in mathematics, but also predict student achievement".

EMA is the first ability students have to have before learning the next topic. If the students have mastered the previous material, then the students will be easier to master the advanced material of the material that has been mastered students. Conversely, if the student has not mastered the previous material, it will have difficulty in mastering the advanced material. Students with high initial math skills tend to have high learning abilities as well. Students with low initial skills taught by using a specific learning model will have a lower learning ability than those with high initial skills taught to use specific learning models as well.

Based on the description of the problems that has been described previously, the authors need to examine the differences in problem-based learning and inquiry learning in improving students' mathematical ability. So this research entitled " Differences of mathematical reasoning ability and emotional intelligence student between problem based learning and inquiry learning at SMP Swasta Pelita Medan".

II. Research Methods

This study was a quasi experiment with the pretest-posttest two design design, ie experiment 1 class received treatment 1 and experiment 2 class received treatment 2. In this study, experimental class 1 was given problem based learning and experiment class 2 was given inquiry learning.

The population of this study is all junior high school students SMP Swasta Pelita Medan. In the sample determination the initial step to be taken is to limit the type of population, or determine the target population. So the sample of the study is limited to VII grade students of SMP Swasta Pelita Medan sampling in this study was chosen two classes at random because based on information and teachers that the students' ability of each class evenly heterogeneous. One way of selecting samples representing the population is a simple random way, ie

when every member of the population has equal opportunity to choose. The selected sample is the students of class VII-1 and VII-2 SMP Swasta Pelita Medan.

Samples of both the experimental class each divided by category Early Mathematical Ability (EMA) group of students of high, medium and low. Scores are used to determine the category of EMA of students gathered from EMA values were done before treatment. The instrument of this research is the description of the test form to measure students' mathematical reasoning ability and emotional intelligence questionnaire to measure students. Before to use, test and questionnaire was tested for validity and reliability first.

This research activity is carried out through the following stages. The preparatory stage includes: a) theoretical study of the variables to be studied ie mathematical reasoning and emotional intelligence, problem-based learning and inquiry learning, and relevant research results; b) specify the sample and place of study; c) developing instruments and teaching materials; d) conducting instrument and instrument improvement trials. Implementation phase includes: a) implementation of learning and data collection through tests of mathematical reasoning ability and questionnaire emotional intelligence b) analyze data and conduct discussion. The stages of preparing the report include: a) preparing reports on research results; b) guidance of research results with supervisor.

III. Result And Discussion Of Research

Early Mathematical Ability (Ema)

EMA data were collected and analyzed to determine the students' early mathematical abilities prior to the study. This data is derived from a test consisting of 20 objectives with materials already studied in school. The test results in initial math ability as follows:

Table 1. Student Grouping by Category EMA

Kelas	Students' Ability			Total
	High	Medium	Low	
Experiment 1	4	23	8	35
Experiment 2	4	24	7	35
Total	8	47	15	70

Based on the above Table 1, the experimental class I obtained level of students' ability for high category 4 students, medium category 23 students, and low category 8 students while for the experimental class II level of students' ability for high category 4 students, medium category 24 students, and low category 7 students.

Mathematical Reasoning Ability

To obtain a picture of mathematical reasoning ability differences between problem-based learning and inquiry learning descriptive by looking at the difference in the average pre-test and post-test on students' mathematical reasoning ability. The calculation results can be seen from the following table:

Table. 2 Average Differences Pre Test and Post Test Reasoning Ability between Problem Based Learning and Inquiry Learning

Indicators	Average Pre Test Class PBL	Average Pre Test Class Ink	Average Post Test Class PBL	Average Pre Test Class Ink
Presenting prediction	3.29	2.68	3.73	3.23
Composing proof, giving the reason of the solution	1.86	2.46	2.44	3.12
Checking the validity of argument	1.53	1.27	2.60	2.40
Drawing conclusion	2.78	2.67	3.50	3.31

From Table 2 it can be seen that the average score before the learning is done on average of all students in both classes is still low, but after the learning done there are improvement on all indicators of students' mathematical reasoning ability.

Where the indicator presenting prediction the average value of pre-test in the class PBL of 3.29, while the average value of pre-test in the class of invention are inquiry learning by 2.68 and for the average value of post test in the PBL class of 3.73, while the average post test of the inquiry learning classes is 3.23. In the indicator composing proof, giving the reason of the solution of the average value of pre test of PBL class equal as 1.86, whereas the average value of pre test of inquiry learning class is 2.46 and for the average post test in grade PBL of 2.44, while the average post test of the inquiry learning class is 3.12. The indicator checking the validity of argument the average value of pre-test in the class PBL of 1.53, while the average value of pre-test in the class of invention are inquiry learning by 1.27 and for the average value of post test in the PBL class of 2.60, while the average post test of the inquiry learning classes is 2.40. And on the indicator drawing conclusion the average value of pre-test in the class PBL of 2.78, while the average value of pre-test in the class of invention are inquiry learning by 2.67 and for the average value of post test in the PBL class of 3.50, while the average

post test of the inquiry learning classes is 3.31. It is clear that there is an increasing difference between the mathematical reasoning ability of the difference in the mean value of pre test and post test of mathematical reasoning ability. The test results showed that the data group of students' mathematical reasoning ability came from the normal distributed population with the variance of each pair of homogeneous data groups, then the statistical analysis of two path ANAVA was done. The results of the calculations are presented in Table 3 below:

Table 3 Anava Two Path Test Results

SourceVariance	JK	db	RJK	F_o	F_{tab}
Between A	192.229	1	192.229	11.774	3.980
Between B	3465.264	2	1732.632	106.119	3.130
Interaction AB	71.853	2	35.927	2.200	3.130
In	1044.940	64	16.327		
Total	4774.286	69			

For Hypothesis 1 that has been formulated used two path ANAVA using statistic F with formulas and criteria set. Based on Table 3, the value of F_o 11.774 is bigger than F_{table} 3.980 means that H_0 is rejected so that it can be concluded that the mathematical reasoning ability of students learning with problem-based learning is higher than students that learn with inquiry learning.

For Hypothesis 3 that has been formulated used two path ANAVA using statistic F with formulas and criteria set. Based on Table 3 it is found that the value of F_o for EMA category is 35.927with F_{table} 3.130 which means H_0 is rejected. So EMA category has an effect on student's mathematical reasoning ability. From Table 3 it can also be seen that for learning factor and EMA, obtained F value for learning interaction and students' math early ability of 2.200 and F_{table} 3.130. Because $F_o > F_{table}$, it can be concluded that reject H_a and accept H_0 , which means there is no interaction between learning model and EMA to students' mathematical reasoning ability. It can also be interpreted, there is a mutual influence provided by the learning model and EMA on students' mathematical reasoning abilities. More specifically, the interaction between the learning model and the student's early ability to students' mathematical reasoning abilities in the graph of the interaction can be seen in Figure 1 below:

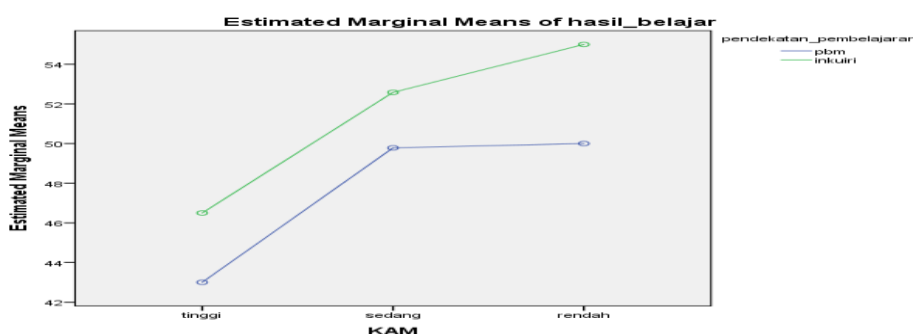


Figure 1 Interaction Between Learning and EMA on Mathematical Reasoning Ability

From Figure 1 above, it can be seen that there is no interaction between learning and students 'early ability to students' mathematical reasoning ability.

SCALE OF EMOTIONAL INTELLIGENCE

To get a picture of differences in the increase in emotional intelligence between PBL and descriptive inquiry learning is to see the difference in the average pre test and post test on the emotional intelligence of students. The calculation results can be seen from the following table:

Table. 4 Differences Pre Test and Post Test Scale of Emotional Intelligence between PBL and Inquiry

Aspect	Average Pre Test Class PBL	Average Pre Test Class Ink	Average Post Test Class PBL	Average Pre Test Class Ink
Recognizing Emotions	5.76	4.83	6.13	6.33
Managing Emotions	2.25	3.23	3.23	3.23
Motivating Yourself	5.69	6.17	6.45	6.17
Recognizing the Emotions of Others	5.35	5.35	6.78	5.60
Relationships of Others	3.65	3.65	5.54	4.44

From Table 4 it can be seen that the mean score before and after learning is done on the emotional intelligence scale, where the average of all students in the two classes is different. Where the indicator recognizes the emotion of the average value of pre test of the PBL class of 5.76, whereas the average value of pre test of inquiry learning class of 4.83 and for the average post test on the PBL class of 6.13, while the average value of post test of inquiry learning class of 6.33. On the indicator of managing the emotion of the average value of pre test of the class of PBL of 2.25, while the average value of pre test of the class of invention inquiry learning class of 3.23. Of self-motivating indicators, the average value of pre-test on the PBL class are 5.69, whereas the average pre test value of the inquiry learning class is 6.17 and for the mean post test value of the PBL class is 6.45, whereas the average value of the post test of inquiry learning class as 6.17. Of the indicator to recognize the emotions of others, the average value of pre-test of the class of PBL are 5.35, whereas the average value of pre test of inquiry learning classes are 5.35 and for the mean post test in the PBL class is 6.78, post test of inquiry learning classes of 5.60. And on the indicator foster relationships of others the average value of pre-test of the class PBL as 3.65, while the average value of pre test of inquiry learning class as 3.65 and for the average value of post test in the class of PBM of 5.54, while the value of the average post-test in inquiry learning classes is 4.44. It is clear that there is an increased difference between the emotional intelligence of the difference in mean pre test and post test values of emotional intelligence.

The results show that emotional intelligence data group of students come from normally distributed population of a variance between each pair of homogeneous data sets, we then performed statistical analysis ANAVA two path test. The calculation results can be seen in Table 5 below:

Table 5 ANAVA Two Path Test Results

SourceVariance	JK	db	RJK	F_o	F_{tab}
Between A	288.057	1	288.057	39.402	3.980
Between B	1861.756	2	930.878	127.330	3.130
Interaction AB	15.669	2	7.835	1.072	3.130
In	467.889	64	7.311		
Total	2633.371	69			

For Hypothesis 2 that has been formulated used two-way ANAVA using statistic F with the formula and criteria set. Based on Table 5, the value of F arithmetic 39.402 greater than F_{tabel} 3.980 means H_0 rejected so that it can be concluded that the emotional intelligence of students learning with problem-based learning model is higher than students that learn with inquiry learning.

For Hypothesis 4 that has been formulated used two-way ANAVA using F statistic with the formula and criteria set. Based on Table 5, it is found that the value of F arithmetic for EMA category is 7.835 with F_{tabel} 3.130 which means H_0 is rejected. So the EMA category affects the students' emotional intelligence. From Table 5 it can also be seen that for learning factor and EMA, we get F value for learning model interaction and student's early math ability 1.072 and F_{table} 3.130. Because $F_0 > F_{table}$, it can be concluded that reject H_a and accept H_0 , which means there is no interaction between learning model and EMA on students' emotional intelligence. It can also be interpreted, there is a mutual influence provided by the learning model and EMA on students' emotional intelligence. More specifically, the interaction between the learning model and the student's early ability to emotional intelligence of students in graphic interaction can be seen in Figure 2 below:

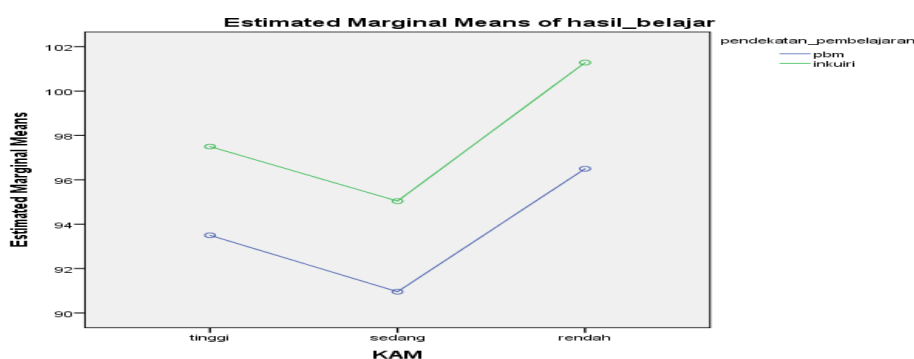


Figure 2 Interaction Between Learning Model and EMA on Student Emotional Intelligence

From Figure 2 above, it can be seen that there is no interaction between learning model and student's early ability to students' emotional intelligence.

IV. Conclusion

Based on the results of data analysis and research findings during problem based learning and inquiry learning with emphasis on students' mathematical reasoning ability and emotional intelligence, obtained some conclusions which are answers to the questions about the formulation of the problem. The conclusions are as follows:

1. There is a difference in the improvement in mathematical reasoning ability between students that are given problem-based learning with students that are given inquiry learning. This can be seen from the result of analysis Anava two path test where obtained value F_0 11.774 is bigger than F_{table} 3.980. The average mathematical reasoning ability for the class with problem-based learning is 49,057 whereas in the class with inquiry learning is 52.371.
2. There is a difference in the students' emotional intelligence ability between learning with problem-based learning and inquiry learning. This can be seen from the result of analysis Anava two path test obtained value F_0 39.402 is bigger than F_{table} 3.980. The average emotional intelligence ability for classes with problem-based learning is 92.51 whereas in the classroom with inquiry learning is 96.57.
3. There is no interaction between learning model (PBM and inquiry) and initial ability (high, medium and low) of students' mathematical reasoning abilities. It can be seen from the result of analysis Anava two path test where obtained value of $F_0 = 2,200$ is smaller than $F_{table} = 3.130$
4. There is no interaction between the learning model (PBM and inquiry) and the initial ability (high, medium and low) of students' emotional intelligence abilities. It can be seen from the result of analysis Anava two path test where obtained value $F_0 = 1,072$ is smaller than $F_{table} = 3.130$

V. Suggestion

Based on the result of research, problem-based learning and inquiry learning applied to the learning activity give important things for improvement, for that the researcher suggest the following things:

1. In problem-based learning and inquiry learning the role of teachers are as a facilitator in the learning process, so teachers should be able to create a fun learning environment for students, giving students the opportunity to generate ideas or ideas in their own way , students should also be given the opportunity to assess their peers' answers so that in learning the students become more courageous to share the right reasons for something, more confident and creative in reasoning the discovery of the answer to a problem.
2. For other researchers that use problem-based learning and inquiry learning to be able to improve other mathematical skills such as problem solving, mathematical reasoning, mathematical connections, mathematical representation and so on.
3. In this study compared is problem-based learning and inquiry learning. The researcher suggests to the reader or subsequent researcher to be able to conduct similar research, ie comparing the more equivalent learning model, for example the problem-based learning model compared to the modified problem-based learning model, such as ICT-based.

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