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Analysis of Students Metacognition Abilityin Mathematical Problem Solving On Problem Based Learning in SMA Negeri 1 Binjai

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Abstract: *This study aimed to analyze: 1) the level of students 'metacognition ability in mathematicalproblems solving, and 2) difficulties experienced by students' metacognition in mathematical problem solving. This research is asqualitative descriptive research aimed to describe the students' metacognition ability in mathematical problem solving on problem-based learning. Subject in this research is class X in SMA Negeri 1 Binjai. While the object of this research is the students' metacognition ability in solving problems by learning mathematics with problem based learning model on the subject of Systems of Linear Equations Three Variables. Based on the analysis of research data, the result that: 1) the mathematical problem solving ability of students with high category at the level of metacognition Strategic Use, the medium category at the level of metacognition Aware Use, and low category at the level of metacognition Tacit Use. 2) metacognition difficulties experienced by students in solving mathematical problems include difficulty facts, concepts, principles and procedures.*

Keywords: *Analysis, Metacognition Ability, Problem Solving, Problem Based Learning*

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I. Introduction

Formal education has a very close relationship with mathematics, because at every level of formal education in mathematics is always learned by the students. Mathematics has a very important role in life because basically math required by scientific disciplines to improve the prediction and control of such knowledge. Mathematics also plays an important role in the development of modern technology, a variety of disciplines and advancethe power of human thought. Given the importance of mathematics in life, it should mathematics be taught at every level of education. Cornelius (Rahman, 2012) suggests five reasons for studying math Because math is (1) a means to think Clearly and logically, (2) the means to solve the problems of everyday life, (3) the means to know the relationship patterns and generalizations experience, (4) the means to develop creativity, and (5) a means to increase of awareness of cultural development.The importance of mathematics is also evident from the statement Cockroft (Rahman, 2012) that "mathematics need to be taught to students because it is always used in all facets of life". One of the goals of mathematics learning in the 21st century is the student able to have high-level thinking skills. In the study of mathematics, the ability to think and to solve the problem is one of the very important ability that must be owned by the students (Mustafa *et al*., 2017). One very important thinking ability possessed by a student is the ability of metacognition in problem solving. The student's ability to solve problems is one of the benchmarks for student success in learning mathematics. The main objective is for students to learn mathematics to solve the problem(Kennedy, *et al*., 2008; Musser *et al.,* 2011). Students can develop a positive attitude in learning when solving problems. That stance is unyielding, determined and confident in unusual situations (Ontario Ministry of Education, 2006). This attitude positively affects students' ability to solve problems (Pimta, *etal,* 2009).

Problem solving is central to the purpose of learning mathematics, and metacognition is seen as one of the five key inter-related components attainment problem solving ability (Hoe *etal,*2001). Metacognition capability is very important because it can train students' in learning mathematics. Constructing mathematic understanding requires both cognitive and metacognition elements, learners "construct mathematic knowledge" using metacognition, and they guide, regulate, and Evaluate Reviews their learning using metacognition (TEAL, 2011). Metacognition has advantages where someone tried to contemplate ways of thinking or contemplating doing cognitive processes. Metacognition is also a process in which a person thinks about thinking in order to develop a strategy to solve the problem.

Jayapraba (2013) says that "metacognition as thinking in thinking, metacognition is a capability which is the object of thinking is a thought process that occurs in yourself". Students are said to have the ability in problem solving metacognition if students are able to fulfill the following steps: (1) develop an action plan, (2) monitor the actions of solving problems, and (3) evaluate the problem solving action (NCREL, 2007).
However, based on preliminary observations in SMA Negeri 1 Binjai, the facts show that the students' metacognition ability in solving problems is low. Low ability can be seen from the results of diagnostic tests that there are mistakes in the student answers metacognition process that will result in errors in problem solving. As for the mistakes made by students in metacognition are: (1) at the stage of developing a plan of settlement, the students do not show awareness of prior knowledge that will help in solving the problem, (2) at the stage of carrying out the settlement of the problem, the student did not show consciousness to describe the process of resolving the problem and do not indicate a high confidence that the results obtained by their accuracy in solving problems, and (3) at the stage after executing the settlement of the problem, the student did not show consciousness to describe the reason for the settlement process uses well, the students do not understand how to check the answers correctly, and have not been able to deduce what they learn through problem solving is done. The low ability students in metacognition also have an impact on students' problem solving become less well done. As Boekaerts, *et al* (Ozcan&Erktin, 2015) which states that "students who have high metacognition skills perform better in mathematics lessons (including problem solving) than students who have low metacognition skills".

Research findings also suggest that the low ability of metacognition in solving problems due to the learning model used by teachers not on target. The model used is direct instruction that is not focused on training metacognition ability in solving problems. There are many models of learning that can be used in an effort to develop a mathematical metacognition abilities of students in solving problems. The learning model used must be able to make students active in learning activities, create meaningful learning, and be able to train students to become familiar metacognition in solving problems. One model of learning that allegedly would be in line with the characteristics of mathematics and curriculum expectations prevailing at this time is a problem-based learning model. In accordance opinions Arends (Trianto, 2009) is a teaching based on the problem is a learning approach where students work on authentic problems with a view to construct their own knowledge. Developing such an inquiry, and the higher level thinking skills, develop independence and confidence.

The application of this model is striving to develop the ability of students' metacognition in mathematical problem solving student began working on the problem given, linking the issues to be investigated by looking at the issue from many aspects, investigating authentic to find a solution to the real to real problems, make the product in the form of a report to be demonstrated to other friends, cooperate with each other to develop social skills and thinking skills. Based on this description, implementation of the model PBL is expected to be an alternative to creating a good learning to improve students' metacognition in solving problems.

II. Literature

2.1 Metacognition Ability in Problem Solving :

Metacognition isthought processinvolving control of their own cognitive activity. On the other handWellman(1985) states "metacognition is a form of cognition, a second or higher order thinking process involves active control roomatcognitive processes. It can be simply defined as thinking about thinking or as a "person's cognition about cognition". Simply put, metacognition is thinking in thinking (Jayapraba 2013). As Schoenfeld (1992) says "metacognition is thinking about our thinking and it comprises of the following three important aspects: knowledge about our own thought processes, control or self-regulation, and belief and intuition. Metacognition has advantages where students try to contemplate ways of thinking or contemplating doing cognitive processes.According to Flavell (Jonnasen, 2000) The ability of metacognition is awareness of a person about how he learned, the ability to assess the difficulty of a problem, the ability to observe the level of understanding itself, the ability to use a variety of information to achieve the objectives and the ability to assess their own learning progress. Meanwhile, Hamzah (2007) states "The ability of metacognition is a skill to regulate and control the thought processes".

In conjunction with learning, that students use metacognition properly will be a critical thinker, problem solver, as well as good decision makers than those who do not use the metacognition. Teachers can improve use of metacognition strategies in discussing a new concept by recalling what students already know before.In conjunction with the completion of a math problem, a person's success in resolving the issue also influenced by the activity of metacognition (Panoura, 2005). Problem solving in mathematics is a complex mental process that requires visualization, imagination, manipulation, analysis, abstraction and pooling of ideas. In the process of mathematical problem solving, interaction between cognitive and metacognition activities.Cognitive and metacognition activity relationship in a model that is referred to as a model of metacognition activity during the process of resolving the problem. This model illustrates how the cognitive

activity that begins from observing the problem up to find the answers. Then to establish metacognition activities learners need to identify the purpose and process of cognitive activity.

Based on some of the expert's opinion, the ability of metacognition is the ability to recognize, manage, and control their own thought processes.Indicators are based on the ability of metacognition NCREL (2007), namely: (a) develop an action plan, (b) regulate or monitor the actions and (c) evaluating the action. Furthermore NCREL (TEAL, 2010) provides guidance on the three components of metacognition, some of which are as follows:

When you develop a plan of action, ask yourself:

- what's initial knowledge to help in this task?
- Why do I read (parts of) this choice?
- How long do I complete this task?

When you set up or monitor the actions, ask yourself:

- How do I do that?
- Am I on the right track?
- What to do if I do not understand?

When you evaluate the action, ask yourself:

- How well do I do that?
- What did I learn?
- Am I getting the results I want?

In this study, the questions metacognition is modified and used as an aid to build students' metacognition in solving a given problem. Furthermore, Schwartz and Perkins (1989) suggest that the ability of students' metacognition in solving can be divided into four levels, namely: 1) *Tacit Use* is the use of thinking without consciousness. This type of thinking with regard to making decisions without thinking about the decision. 2) Use Aware is the use of thought with consciousness. This type of thinking related to the students' awareness of what and why students do the thinking. 3)Strategic *Use* is the use of strategic thinking. This type of thinking associated with individual settings in conscious thought processes by using specific strategies that can improve the precision of his thinking. 4) Reflective Use is the use of reflective thinking. This type of thinking associated with individual reflection in his thinking process before and after, or even during the process by considering the continuation and improvement of the results of his thinking. Furthermore, the problem solving is reviewed based on the fulfillment of four indicators, namely: i) understanding the problem, ii) devising a plan, iii) carrying out the plan, and iv) Looking back the problem solving (Polya, 1985).

2.2 Problem Based Learning (PBL)

Problem-based learning is an instructional model that uses a problem as the starting point of learning. Issues that can be used as a learning tool is an issue that meets the real-world context, which is familiar with the daily life of the students.Eggen and Kauchak (2012) mentions a set of problem-based learning is a teaching model that uses the focus on developing problem solving ability.

Dewey (Trianto 2009) study based problem is the interaction between the stimulus-response, is a two-way relationship between learning and the environment. The environment gives feedback to the student in the form of aid and problems, while the nervous system of the brain function effectively interpret the aid so that the problems encountered can be investigated, assessed, analyzed and sought to solve well. Arends (2008) stated that the problem based learning model is a model of learning in which students work on authentic problems with a view to construct their own knowledge, inquiry and to develop higher level thinking skills, develop independence and confidence. Tan (Rusman 2011) adds that the problem-based learning is the use of different kinds of intelligence necessary to confront the challenges of the real world, the ability to deal with everything new and existing complexity.Liu (2005) explains that there are characteristics of problem-based learning, namely:1) Learning is student-centered, 2) Authentic problems form the organizing focus for learning, 3) New information is acquired through self-directed learning, 4) Learning Occurs in small groups, and 5) Teachers act as facilitators. Based on multiple expert opinion on the above, the problem-based learning is learning that exposes students to the practical problems as a foothold in the study or in other words, students learn through problems. Indicators of problem-based learning in this study refers to Arends (2012) states the five-step problem-based learning are: (1) the orientation of students on the problem, (2) organize the students to learn, (3) assist in the investigation of individuals and groups, (4) develop and present the work, and (5) analysis and evaluation of problem solving.

III. Methods

The research is astudy. qualitative descriptive This research is a type of research that aims to describe the students' metacognition ability in mathematical problem solving on problem-based learning.

3.1 Subject And Object Of Research

Subjects in this study were students of class X SMA Negeri 1 Binjai school year of 2017/2018, amounting to 40 people. Then based on the results of tests the ability of metacognition in solving mathematical problems that are tested to the students will be taken subject to the interview subject.The object of this research is the ability of students' metacognition in solving problems by learning math problem based learning on the subject of Systems of Linear Equations Three Variables. This object, among others, can be seen from the test results, namely the ability of student answer sheets, and through interviews that a transcript of a tape recorder and record field notes, which were obtained investigators from the interview process, both from interviews with students and interviews with teachers during thestudy.

3.2 Mechanism And Study Design

The mechanism used in this study includes three phases, namely: (1) The planning stage, (2) instrument validation phase of the research, (3) The implementation stage of research and data analysis. Each stage is designed such that the data obtained are valid to the purpose of research. The design of this study are as follows:

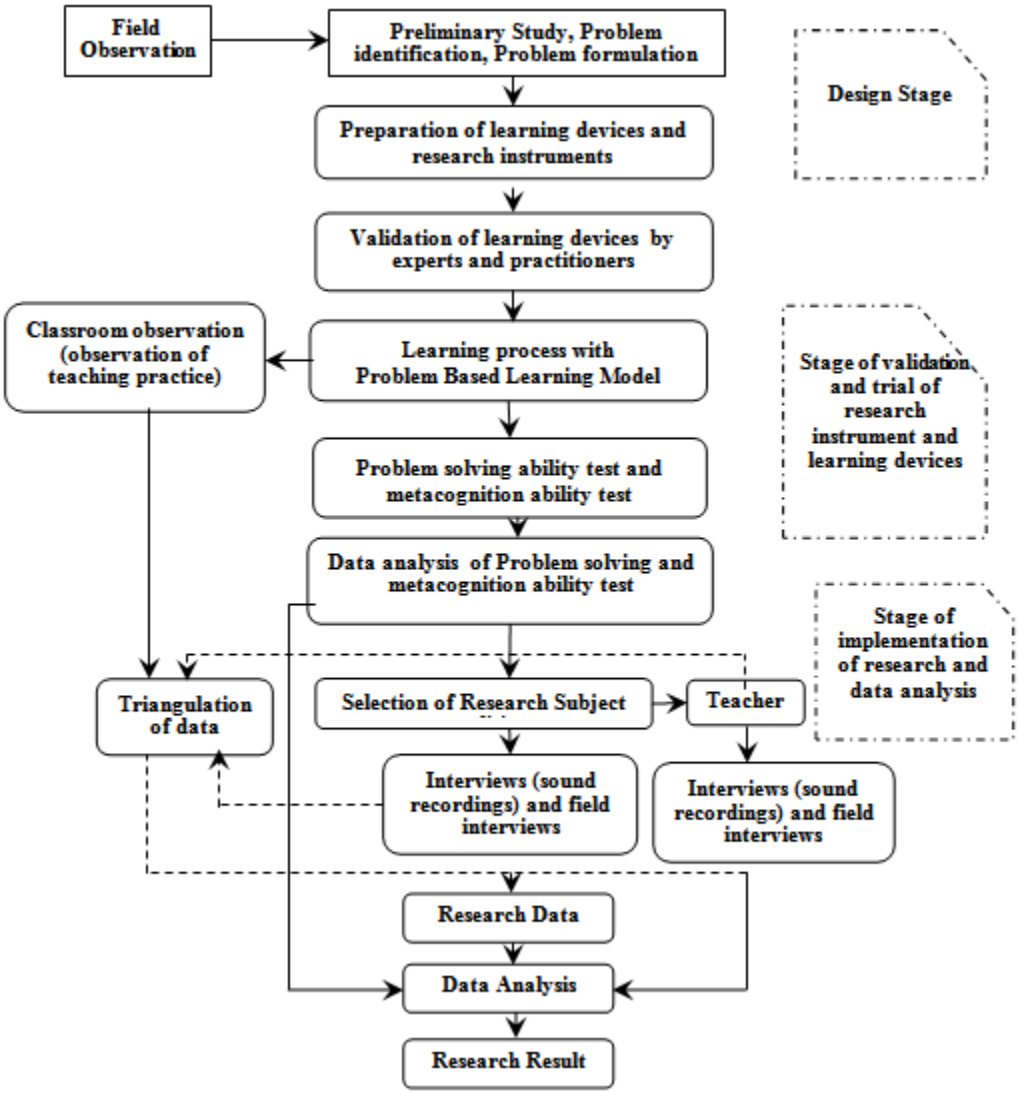

Figure 1. Study Design

3.3 Instrument, Data Collection and Data Analysis Techniques:

The main instrument in this study is the researchers themselves, which means that the position of the researcher is the key (determinant) in the crawl and analyze data. As described Sugiyono (2012) "in qualitative research, which became the instrument or tool is the researcher's own research". In addition to researchers as the main instrument in the research will be developed a simple instrument to refine and complete the research data. The instruments include: problem solving ability test, students' metacognition ability test, interview, and triangulation of data. Interviews were conducted to the subject elected directly(facetoface)between researchers and informants in dialogue, question and answer and discussion. Interview techniques used are unstructured interviews(unstructured).In accordance with this form of interview, the researcher is not tied strictly to the guidelines for the interview. Implementation can be done anywhere and anytime as long as related phenomena and research focus. Type of interview used in this study is the widely and deeply interview.

Triangulation is a technique utilizing data validity checking with anything beyond the data, to check or as a comparison to the data (Moleong, 2011). Triangulation techniques most widely used is the examination through other sources. In connection with the triangulation, triangulation in this study serves to:

1. Comparing the results of the study with the data subject interviews test answer sheets and the problem solving ability of students' metacognition abilities.
2. Comparing the results of the interview subjects governess to the data of test answer sheets and the problem solving ability of students' metacognition abilities.

Students are said to be completed in troubleshooting if the gain proficiency problem solving test score ≥ 2.67 of scale 4. Furthermore, to determine the level of metacognition in solving the problem based on the scores metacognition abilities test results refer to the following table:

Table 1. Interpretation of Metacognition Level Student

No	Score Range	Category
1	3.41 - 4.00	Reflective Use
2	2.67 - 3.40	Strategic Use
3	1.33 - 2.66	Aware Use
4	0.00 - 1.32	Tacit Use

Then to determine the students' difficulties in solving mathematical problems based on test results problem solving ability (in every matter) based on the following indicators:

Table 2. Grid Instrument of Mathematical Problem Solving Difficulties

No.	Difficulties Being experienced Student	indicator	No. Problem
1.	Facts	- Students are not able to understand the use of mathematical symbols in solution to problem. - Students can not represent mathematical symbols to design a mathematical model of a given problem.	1, 2, 3
2.	Concept	- Students are not able to apply the method of substitution, elimination, and mixed to solve the problem	1, 2, 3
3.	Principle	- Students are not able to apply the formulas and rules of mathematics in solving the problem. - Students are not able to connect the concepts given to resolve the problem.	1, 2, 3
4.	Procedure	- Students are not able to present troubleshooting steps for EFT and correct. - Students are not scrupulous in presenting the settlement of problem solving. - Students are not able to develop a problem-solving strategies effectively and efficiently.	1, 2, 3

IV. Results

The objective of this study is to obtain information about the study of mathematics by instilling awareness of thinking (metacognition) students in solving mathematical problems through learning Problem Based Learning (PBL). Based on the results of data analysis obtained the following results:

4.1 Mathematical Problem Solving Ability Level Students:

After implementing learning using a Model Problem Based Learning (PBL) on the material linear equation of three variables for 3 (three) meetings continued tests on the students to see the students' mathematical problem solving ability. Student answer sheets are corrected based on the guidelines of scoring assessed based on the principle of valid, objective, equitable, integrated, comprehensive and continuous,

systematic, has a criteria, accountable (Permendikbud No. 23, Chapter IV, Article 5 2016). From the results of tests already corrected presented mathematical problem solving ability level of the students.

Table 4.1. Mathematical Problem Solving Ability Level Students

Item	Interval of Score	Number of Students	Percentage	Category
1.	3.18 ≤MPSC ≤ 4.00	9	25	High
2.	2.18 ≤ MPSC≤ 3.17	15	41.67	Medium
3.	1.00≤ MPSC ≤ 2.17	12	33.33	low

Description:
MPSC: mathematical problem solving Score

From 36 students turned out rate of students' mathematical problem solving ability capable of being has the highest proportion, followed by low-ability students, and further high-ability students. Thus, the level of mathematical problem solving ability of students with high ability as much as 25%, the ability was 46.67%, and 33.33% lower ability.

4.2 Students Metacognition Ability Level:

Level of students' metacognition ability in solving mathematical problems derived from the results of tests given after learning to use the model of Problem Based Learning (PBL). The results were as follows:

Table 3. Level Students Based Metacognition Metacognition Ability Test Results

No	Score Range	Number of Students	Percentage	Letter
1	3.41 - 4.00	0	0.00%	Reflective Use
2	2.67 - 3.40	8	22 22%	Strategic Use
3	1.33 - 2.66	16	44.44%	Aware Use
4	0.00 - 1.32	12	33.33%	Tacit Use

Based on the table showed that 8 students (22.22%) with metacognition *Strategic*Use,16 students (44.44%) with a level of metacognition *aware*use,and 12 students (33.33%) with a level of metacognition *Tacit*Use.

4.3 Implementation of Interviews:

Implementationconducted interviews on the subject of each classification pattern of responses raised through the lens of the indicator (high, medium, low), a lot of mistakes, and unique answers. Analysis of the difficulties in solving mathematical problems students will find the appropriate level of consciousness thinking (metacognition) mathematical students. Results of interviews with subjects related to consciousness thinking (metacognition) through questions posed approached exactly with a written response.

4.3.1 Analysis of Difficulty Metacognition in Problem Solving on High Performance Students:

Students with high performances on problem solving ability have a good awareness in several stages metacognition. Based on interview results, showed that: 1) Phase develop a plan of settlement. At this stage students have no trouble facts, which the students can understand and use appropriate symbols to represent mathematical problems. This can be seen from a mathematical model that the students are correct. 2) Stage set or monitor resolution. At this stage students have no difficulty in understanding the concept, it appears that students are able to design a mathematical model of the problem of properly. Students also understand the principle that is able to apply a method of elimination and substitution in problem solving. 3) Phase evaluate problem-solving action. At this stage, students also do not have difficulty in mathematical procedures. This can be seen from the steps of the student problem solving is cascading and right, and has been doing the calculations correctly.Based on the triangulation of data obtained from the description of the answer sheets and interviews on students with a score of solving the low category, then the characteristics of the consciousness of thinking is as follows: 1) Subject aware of the capabilities it possesses, 2) The subject is generally know what they do, 3) subject can provide arguments to support his thinking, and 4) the subject is able to give a convincing explanation as to what they make. Based on these characteristics, the subjects with a score of solving the high category at the level ofmetacognition ability of *strategic use.*

4.3.2 Analysis Of Difficulty Metacognition In Problem Solving On Medium Performances Students:

Students with low performances onproblem-solving ability have a good awareness in several stages metacognition. Based on the results of interviews showed that: 1) the stage of developing a plan of settlement. At this stage it appears that the students do not have trouble facts, which the students can understand and use appropriate symbols to represent mathematical problems. It is seen from the student can change the given mathematical problems into mathematical models. 2) Stage set or monitor resolution. At this stage, students

have no difficulty in understanding the concept, it appears that students are able to design a mathematical model of the problem of properly. In terms of the principles of mathematics, students have difficulty in performing calculations in integer operations, resulting in solving problems students have not done right. 3) Phase evaluate problem-solving action. At this stage students have difficulty in mathematical procedures. This is evident from the inaccuracy of students in presenting the problem solving that problem solving was not obtained effectively and efficiently.Based on the triangulation of data obtained from the description of the answer sheets and interviews on students with a score of solving the low category, then the characteristics of the consciousness of thinking is as follows: 1) Subject aware of the capabilities it possesses, 2) The subject is able to give a convincing explanation as to what they make, 3) the subject realizes its weakness when troubleshooting. 4) Subject begin to know what is not realized. Based on these characteristics, the subjects with a score of solving the category at the level ofmetacognition ability of *aware use.*

4.3.3 Analysis of Difficulty Metacognition in Problem Solving onLow Performances Students :

Students with low performances on problem-solving ability have a good awareness in several stages metacognition. Based on the results of interviews showed that: 1) Phase develop a plan of settlement. At this stage the difficulties students know and understand the facts in mathematics, namely the difficulty in understanding the use of mathematical symbols. Students do not have trouble facts, where students are not able to understand and use appropriate symbols to represent mathematical problems. This is evident when students are not able to change the given mathematical problems into mathematical models. 2) Stage set or monitor resolution. At this stage, students have difficulty understanding the concept, it appears that students are not able to design a mathematical model of the problem of properly. Likewise in the case of the principles of mathematics, students have difficulty in performing calculations in integer operations, resulting in solving problems students have not done right. 3) Phase evaluate problem-solving action. At this stage students have difficulty in mathematical procedures. This is evident from the inaccuracy of students in presenting the problem solving that problem solving was not obtained effectively and efficiently.

Based on the triangulation of data obtained from the description of the answer sheets and interviews on students with a score of solving the low category, then the characteristics of the consciousness of thinking is as follows: 1) The subject is less aware of the capabilities it possesses, 2) The subject has a weakness in providing convincing explanation as to what he made, and 3) subject less aware of its weaknesses when troubleshooting. Based on these characteristics, the subjects with a score of solving the low category at the level ofmetacognition ability of tacit use.

V. Discussion

This study focuses on the analysis of students 'metacognition abilities in students' mathematical problem solving. Metacognition is thinking about thinking (Aljaberi&Gheith, 2015). Metacognition is a capability which is the object of thinking is the thought process that occurs in yourself. Hamzah (2007) states "The ability of metacognition is a skill to regulate and control the thought processes". In this case, metacognition ability involves knowledge and awareness of one's own on cognitive activity or anything related to cognitive activity.Metacognition can be fostered through problem solving. As Hoe, *et al* (2001) states "is one of the important components involved in solving the problem". In solving the problem, the ability of metacognition can be seen through the three basic elements. As noted NCREL (2007) that "the three basic elements of metacognition in particular in dealing with tasks, namely: (i) develop an action plan, (ii) regulate or monitor the actions, and (iii) evaluate the action". In this study, each of the basic elements in the learning metacognition ability trained to ask questions metacognition.

According to Ozcan&Erktin (2015),"metacognitionquestions can be incorporated into homework assignments to avoid the problems of implementing new methods inclassrooms".That is the questions metacognition can avoid problems at the time of applying new methods in the classroom. Through a given student metacognition questions directed and trained to be familiar and able to be aware of their own thinking process in solving the problem. To be able metacognition in solving problems students should be accustomed to doing on learning activities. The learning model used by teachers affect students' ability to solve problems (Pimta, *et al*, 2009). The learning model is most appropriate to familiarize students metacognition in problem solving is problem-based learning model. Eggen and Kauchak (2012) states "problem-based learning is a teaching model that uses a set of issues as a focus to develop problem solving ability". In line with this, Arends (2008) which states that the problem based learning model is a model of learning in which students work on authentic problems with a view to construct their own knowledge. " Based on some expert explanation above, it can be a problem-based learning learning alternatives that can develop students' metacognition abilities.In previous mathematics learning process (through interviews with teachers) that the study of mathematics has been centered on the teacher while the students serve as the object, the students do not have enough time to construct their knowledge in mathematics, concepts, and principles in mathematics. Hudoyo

(Sinaga, 2007) states that the custom of students in teaching conditions the conventional passive students receive knowledge, and teachers provide the concepts and principles of mathematics in the form of "intact" to the students, as well as familiarize students do not solve the problem will cause many problems. Added again by Sinaga (2007) that teachers are less able to manage learning because of poor understanding of teachers on learning theories based constructivist view.

Learning with PBL modelscontribute to the development of students (Tan, 2015). Learning PBL also suggests that teachers as facilitators (Williams and Paltridge, 2016). In PBL learning, learning activities begins with the provision of authentic problems. The criteria of the authentic problem is a problem that departs from the cultural environment of students, useful, related materials, and invite interested students. With the presence of PBL learning in the lives of students, where the teacher as facilitator is expected to invite the interest of students, fostering the nature of student inquiry, retention of concepts to be strong, and to foster problem solving ability *(problemsolving).*Savery (2006) also stated PBL is an instructional (and curricular) learner-centered approach that empowers learners to conduct research integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem. Based on this research, it appears that the application of PBL learning can train and develop students in metacognition on problem solving.

VI. Conclusion

Based on the analysis and discussion in this study, put forward some conclusions as follows:

1. The extent to which students' metacognition in problem solving of mathematics than 36 students with problem-solving ability of mathematical higher by 25% at the level of metacognition ability StrategicUse,the problemsolving ability of mathematics being as much as 41,67% at the level of metacognition ability AwareUse,and mathematical problem solving ability as much as 33.33% lower at the level of metacognition ability TacitUse.
2. Metacognition difficulties experienced by students in solving mathematical problems are:

a. Difficulty fact, the difficulty in understanding the use of mathematical symbols in solving problems, and difficulty in representing mathematical symbols to design a mathematical model of a given problem.
b. Difficulty concept, namely the difficulty in applying the method of substitution, elimination, mixed methods, and methods determinant to resolve the problem.
c. Difficulty in principle, namely the difficulty in applying the formulas and rules of mathematics as well as difficulties in connecting the concepts given to resolve the problem.
d. Difficulty procedure, namely the difficulty in presenting step-by-step problem solving for cascading and correctly, inaccuracy in the presentation of problem-solving, as well as difficulties in formulating problem solving strategies effectively and efficiently.

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