

# Application of Problem Based Learning Model Assisted by Cabri Software to Improve Problem Solving Ability of Mathematics Students

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**Abstract.** This study aims to determine how the increase in mathematical problem solving ability (KPM) Nurul Hikmah junior high school (MTs) students through the application of learning models aided Problem Based Learning (PBL) Software Cabri and evaluate the response of junior high school students Nurul Hikmah field against learning PBL assisted Software Cabri. The subjects were students of class VIII MTs Nurul Hikmah Tinjowan field totaling 24 people consisting of 14 men and 11 women. The results showed that there was an increase in mathematical problem solving ability of students are evident from the results of the pretest and posttest. On the pretest results showed that students who scored more than 70 number only 4 people or by 16.7% and students who scored less 70 some 20 people or 83.3%. And the average value of students in the pretest was 55.7. Then, after the learning process using the model-assisted learning PBL Software Cabri results indicate an increase in the students who scored more than 70 number only 14 people or by 58.3% and students who scored less 70 some 10 people or 41.7 %. The average value of students in the pretest was 70.2. Comparison hail pretest to posttest are students who experienced an increase amounting to 19 people or 79.2%, of students who experienced a decrease amounted to 4 people, or 16.6% and continuing students that do not decrease or increase amounted to 1 or 4.2%. And based on observations conducted by researchers of the students. The response shown by students very well, the students feel interested when teachers use learning model PBL that were active learning because teachers give LAS containing the real problems is done in groups and students are very interested when the teacher explains the use of the Cabri Software in material cube.

**Keywords:** *mathematical problem solving ability, problem based learning, software cabri*

## I. INTRODUCTION

The rapidly changing technological and information developments currently required by ready and responsive human beings. One of the means to produce human is education. Human as an object of education is expected to follow every change with quality life. [1] affirms that the realization of quality society is the responsibility of education, especially in preparing learners to be the subject

that increasingly plays a showcase of her strong, creative, independent and professional self in their respective field.

Complete human resources are more likely to be generated by school educational institutions. As educational institutions, schools also have a great impact on the existence of children's knowledge. Comfort and tranquility of students in learning is determined by the conditions, social and environmental conditions are conducive. In this case [1] revealed, the need for school preparedness as the spearhead of the implementation of education operations at lower levels.

According to Law no. 20 Year 2003 on National Education System, Education is a conscious and planned effort to create learning atmosphere and learning process so that learners actively develop their own potential. In education and everyday life, very closely related to the mastery of science, especially mathematics. Mathematics is one of science that refers to rational proof and deduction which become means of thinking. Mathematics is also used to build scientific theories to solve the problems encountered, and then communicate the scientific results correctly, clearly and briefly. In the early stages, to help deductive thinking requires real and inductive examples and illustrations. Through observation and experiment (inductive) then we can understand the nature or characteristics of an object which is then generalized and proven by deductive. Besides being deductive, mathematics is also a structured science; starting from undefined elements, then to a defined element, then becoming an axiom / postulate and eventually becoming a theorem.

To improve mathematical achievement it needs KPM to solve the problems that exist in math. Given the importance of mathematical problem-solving abilities, these abilities have been the focus in mathematics learning in various countries. This is in accordance with the recommendation of [2] that "problem solving must be the focus of school mathematics" or problem solving should be the main focus of school mathematics. The students' ability in problem solving was central to the teaching of mathematics in the United States of the 1980s [3] then also applied to the elementary and middle school mathematics learning in Singapore. Good problem solving skills are obtained from the learning process of mathematics in schools that focuses on problem solving as the

main activity. In Japan to improve problem-solving skills by using open-ended questions aimed at replacing closed questions that have only one answer [4]. Similarly, the Indonesian government also views important problem-solving skills, so the 2006 curriculum places the ability to solve mathematical problems as one of the capabilities targeted at almost every standard of competence at all levels of the educational unit. The formulation of the problem in this research is how to improve the KPMM skills of students MTs Nurul Hikmah Tinjowan through the implementation of PBL model assisted software cabri? and how the response of MTs student Nurul Hikmah Tinjowan in the process of learning PBL aided by cabri software ?. And the purpose of this research is to know how to improve the KPMM students of MTs Nurul Hikmah Tinjowan through the implementation of PBL model of assisted software of cabri and to know how student response MTs Nurul Hikmah Tinjowan in the process of PBL software cabri.

Based on the results of observations of students of MTs Nurul Hikmah Tinjowan, students' mathematical problem solving ability is still low. This can be seen from the students' answers that have not varied about a matter that measures the ability to solve mathematical problems as follows:

Ahmad has a Tulipware branded food place that is often used to bring food to school. Tulipware is a cube with a long rib 12 cm.



- a. Find the surface area of the Tulipware. Calculate the Tulipware volume.

Figure 1.

Student answers can be seen in Figure 2 as follows:

A. ~~12 x 12 x 6~~  $S \times S$   
 $= 12 \times 12 \times 6$   
 $= \frac{864}{12}$

B.  $S \times S \times S = 12^3$   
 $= 1228$

Figure 2.

From the student's answer, it can be seen that students' KPMM is still low. The student does not first identify the problem by giving it a known, asked in question. students directly solve the problem by using a formula that he knows, and the results of the multiplication is not listed unit. So the result is not clear because the students did not list the units on the result.

From the above problems, it is assumed by ordinary learning applied by teachers in the classroom, where

learning is still teacher centered (teacher-centered) so that learning tends to be passive.

According to [5] there are four basic steps to solve a problem, namely:

1. Understanding the problem (Understanding the Problem)  
Activities that can be done in this step are what things are known, what is unknown (asked), make notation of the elements that are known and asked.
2. Plan the Completion (The Vising a Plan)  
Activities that can be done in this step is to try to find or recall problems that have been resolved that have similarities with the problem to be solved, look for patterns or rules, develop a settlement procedure (Create Conjecture).
3. Solve the problem according to plan (Carring out The Plan)  
The activity that can be done in this step is to run the procedures that have been made in the previous step to get the settlement.
4. Re-examining the procedure and results of the completion (Looking Back)  
The activities that can be done in this step are to analyze and evaluate whether the procedures implemented and the results obtained are correct, whether there are other more effective procedures, whether the procedures are made can be used to solve similar problems.

The innovative PBL program was first introduced by the Faculty of Health Sciences of McMaster University in Canada in 1966. The hallmark of PBL implementation in mcmaster is a community-oriented, human-focused philosophy of education, branches of science and learning based on problems.

[6] defines PBL as "The learning that results from the process of working towards the understanding of a resolution of a problem. The problem is encountered first in the learning process. "While Cunningham et.al. defines PBL as

"... PBL has been defined as a teaching strategy that" simultaneously develops problem-solving strategies, disciplinary knowledge, and skills by placing students in the active role as problem-solvers confronted with a structured problem which mirrors real-world problems"

Based on developed theory [7] explain the characteristics of PBL are:

1. Learning is student-centered  
The learning process in PBL focuses more on students as people learn. Therefore, PBL is supported also by constructivism theory where students are encouraged to be able to develop their own knowledge.
2. Authentic problems form the organizing focus for learning

The problem presented to students is an authentic problem so that students are able to easily understand the problem and can apply it in their professional life later.

3. New information is acquired through self-directed learning

In the process of problem solving, students may not know and understand all the prerequisite knowledge, so that students try to find their own through the source, either from books or other information.

4. Learning occurs in small groups

In order for scientific interaction and exchange of ideas in a collaborative effort to build knowledge, Problem Based Learning is implemented in small groups. The group created demands clear division of tasks and clear goal setting.

5. Teachers act as facilitators.

In the PBL implementation the teacher only acts as a facilitator. However, even so teachers should always monitor the development of student activities and encourage students to achieve targets to be achieved.

II. METHODOLOGY

This research was conducted in MTs Nurul Hikmah Tinjowan, District of Simalungun. The subjects of this study are class VIII, amounting to 25 people with the details of 14 men and 11 women. The object of this research is the learning of cube material by using PBL model of software assisted by cabri.

The instruments in this study is a problem-solving test. Test the ability to solve mathematical problems in the form of pretest and posttest on the essay material in the form of essays. Data dianalisis untuk melihat peningkatan hasil pretest dan posttest secara deskriptif.

III. RESULT

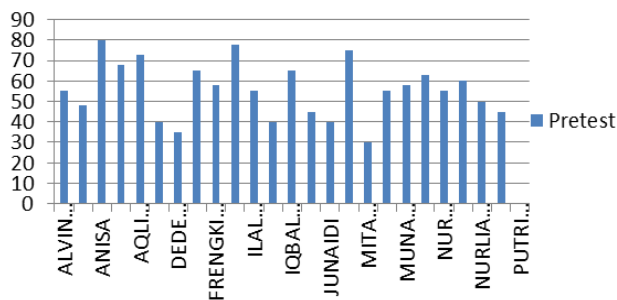


Figure 3. Graph of pretest result

From the graph above we can know that students who got the value of  $\geq 70$  a total of only 4 people or equal to 16.7% and students who scored  $<70$  a number of 20 people or equal to 83.3%. And the average score of students on pretest is 55.7. Then after the posttest, the researchers held a learning by using learning model PBL Software Cabri on the material cube. After doing the learning process then the researcher gives the student posttest to the students and posttest results can be seen in the graphic image below.

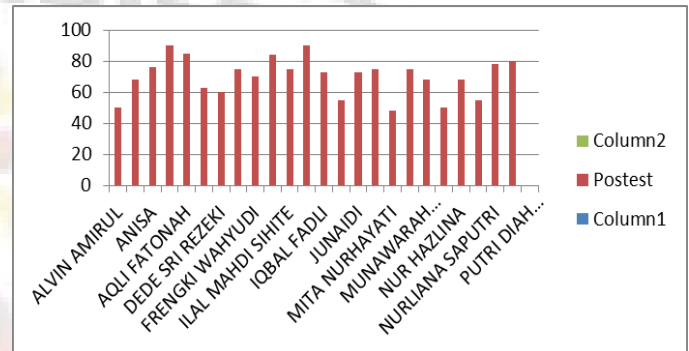


Figure 4. Graph of posttest result

From the graph above we can know that students who got a value of  $\geq 70$  a total of only 14 people or by 58.3% and students who scored  $<70$  a number of 10 people or by 41.7%. The average score of students on pretest is 70.2 or we can see that student outcomes are better than pretest. Then to see the comparison of pretest and posttest values can be seen in the graphic image below:

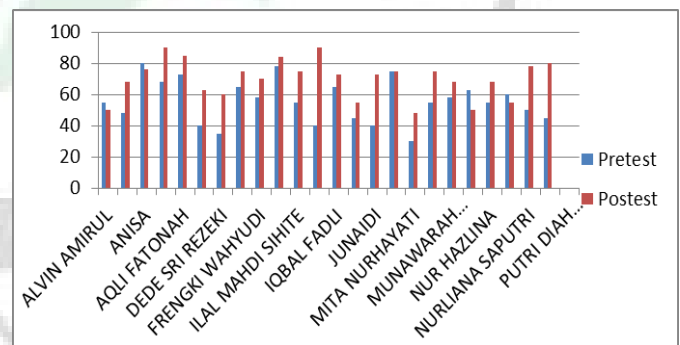


Figure 5. Comparison of pretest and posttest

From the graphic above the students who experienced an increase of 19 people or 79.2%, students who experienced a decrease of 4 people or 16.6% and students who remained no decrease or increase amounted to 1 person or 4.2%.

And based on observations made by researchers to students. The response shown by the students is very good, the students feel interested when the teacher uses the PBL model so that the learning looks active because the teacher gives the Student Active Sheet (LAS) which contains real problems that are done in the group and the students are very interested when the teacher explained the use of cabri software on the material of the cube.

#### IV. CONCLUSION

Based on the results of research and discussion can be concluded that:

1. Application of Learning PBL model with Software Cabri can improve the problem solving ability of mathematic students of MTs Nurul Hikmah Tinjowan.
2. There is a response of students MTs Nurul Hikmah is very good when applied PBL model assisted Software Cabri.

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