

EFFORTS TO INCREASE STUDENTS' LEARNING OUTCOMES THROUGH THE PROBLEM BASED LEARNING (PBL) MODEL WITH THE TPACK APPROACH ON THE MATERIAL OF INTELLIGENT CLASS VII SMP NEGERI 3 ONE ROAD OF IDAOTAE SOUTH NIAS DISTRICT

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ABSTRACT

This research started from the problem of the low mathematics learning outcomes of class VII students of SMP Negeri 3 One Roof Idanotae, South Nias Regency on the Integerate Number material, under the Minimum Completeness Criteria (KKM) which is 67. Of the 21 total students, only 9 students reached the KKM, which is approx. 44%. The purpose of this study was to improve the learning outcomes of eighth grade students of SMP Negeri 2 Mandrehe. This research is a classroom action research (CAR) which is carried out in two cycles. This research was conducted in class VII of SMP Negeri 3 One Roof Idanotae in the 2018/2019 academic year. Based on the results of the discussion and analysis, it is concluded that through the application of problem based learning (PBL) learning models can improve student learning outcomes in the Numbers material. The increase in teacher activity in the learning process is caused by the teacher using a problem based learning (PBL) learning model. Student learning outcomes have increased from cycle I to cycle II. Student learning outcomes before the action reached the KKM only 9 students with a classical average of 44%. Then in the first cycle, only 15 students reached the KKM with a classical average of 67%. Cycle II students who reach the KKM 19 students with a classical average of 93%

Keywords: Learning Outcomes, Problem Based Learning Model, Integers

INTRODUCTION

1.1 Background

Education aims to equip humans with a number of knowledge, attitudes and skills in order to meet the needs and demands of life. Advances in science and technology, especially information technology causes the flow of information to be fast and without limits. This has a direct impact on various fields including education. In an effort to improve the quality of education. The role of the teacher is very important because the quality of education is largely determined by the quality and ability of the teacher.

Mathematics learning needs to be prepared using various learning models, the learning model serves as a guide for teachers in carrying out the learning process. This is very important so that students can use their mathematical abilities optimally in solving mathematical problems. In addition, learning mathematics that is less interesting will cause students to not pay attention to lessons in class, so that students do not understand and

master mathematical concepts. As a result, they cannot solve math problems well which causes low math learning outcomes.

1.2 Identification of problems

Based on the foregoing, the authors identify problems in class VII SMP Negeri 3 One Roof Idanotae, including:

1. Lack of student participation when learning Integers takes place
2. The learning process is still dominated by the teacher
3. Has not provided direct experience that confronts students with a real problem as a basis for understanding the concept of learning.
4. The learning materials provided by the teacher still depend on textbooks so that students are not accustomed to thinking critically, are not sensitive to the problems encountered in everyday life,

From the problems above, many students' learning outcomes get scores below the specified Minimum Completeness Criteria (KKM). The following are the learning outcomes of class VII students of SMP Negeri 3 One Roof Idanotae in the first semester of the 2018/2019 academic year:

School year	Average score	Category	KKM Subjects
2018/2019	54.76	Not enough	70.00

From the description above, the authors are interested in making improvements in the form of actions by applying the Problem Based Learning learning model, because the learning model allows students to think critically in solving problems in the learning process. According to Arends & Kilcher, 2010, Problem Based Learning is a learning model that challenges students to learn how to learn, and to work in groups to find solutions to real-world problems. With regard to 21st century learning models that are considered potential to integrate technology and are flexible to be applied to the mathematics learning process, the author wishes to carry out scientific research with the title "Efforts to Improve Student Learning Outcomes Through Problem Based Learning (PBL) Learning Models With the TPACK Approach. Material for Integers for Class VII SMP Negeri 3 One Roof Idanotae, South Nias Regency.

1.3 Formulation of the problem

Based on the background of the problem identification above, it can formulate the problem as follows: Can Problem Based Learning (PBL) Learning Model With TPACK Approach on Integer Materials Can Improve Learning Outcomes of Class VII Students of SMP Negeri 3 One Roof Idanotae South Nias Regency?.

1.4 Research purposes

The research carried out aims to improve student learning outcomes on Integers in Class VII SMP Negeri 3 One Roof Idanotae, South Nias Regency through the Problem Based Learning PBL learning model with the TPACK approach.

1.5 Benefits of research

The expected benefits from the results of this study are:

1. For students to be able to improve students' understanding of concepts in Integers material.
2. For teachers, it is useful to know whether applying the Problem Based Learning teaching model with the TPACK approach can improve students' understanding of concepts. And also as an alternative method for guiding students to learn.
3. For schools as information to make the right decisions in improving the quality and innovation of teaching.
4. Information material for further researchers.

DISCUSSION

2.1 Definition of Learning Model

The learning model is a framework that provides a systematic description for carrying out learning in order to help students learn in certain goals to be achieved. The same thing was stated by Suprihatiningrum (2013, p. 145) which states that the learning model is a conceptual framework that describes learning procedures systematically to manage student learning experiences so that certain desired learning goals can be achieved.

According to Kardi & Nur in Ngalmun (2016, pp. 7-8) the learning model has four special characteristics that distinguish it from strategies, methods or procedures. These characteristics include:

1. The learning model is a logical theoretical rationale compiled by the creators or developers.
2. In the form of a rationale about what and how students will learn (having learning and learning objectives to be achieved).
3. The learning behavior required for the model to be implemented successfully; and the learning environment needed so that the learning objectives can be achieved.

The function of the learning model is a guideline in the design to the implementation of learning. This statement is in line with the opinion of Trianto (2015, p. 53) who argues that the function of the learning model is as a guide for teacher designers and teachers in implementing learning. Therefore, the selection of the model is strongly influenced by the nature of the material to be studied, the objectives (competencies) to be achieved in the learning, and the level of students' abilities.

2.2 Problem Based Learning

Problem Based Learning (PBL) is a curriculum model that deals with students' real world problems. The selected problem has two important characteristics, first the problem must be authentic related to the social context of the learner, the second problem must be rooted in the subject matter of the curriculum.

The main characteristics of the Problem Based Learning (PBL) model are: it is a series of learning activities, meaning that in the implementation of PBL there are a number of activities that students must do, students not only listen, take notes, then memorize the subject matter, but through problem based learning (PBL) models. students become active in thinking, communicating, searching and processing data, and finally making conclusions. In addition, learning activities are directed at solving problems. Problem based learning puts the problem as the key word of the learning process. This means that without problems learning will not be possible to take place. And the last characteristic is problem solving using a scientific thinking approach.

According to Nurhadi (2004: 65) "Problem based learning is an activity of interaction between stimulus and response, is the relationship between two directions of learning and the environment". The environment provides input to students in the form of assistance and problems, while the brain's nervous system functions to interpret the assistance effectively so that what is faced can be investigated, assessed, analyzed, and searched for a good solution. PBL is a learning approach that presents contextual problems so as to stimulate students to learn. PBL is a learning model that challenges students to learn, work in groups to find solutions to real-world problems. This problem is used to bind students to curiosity about the learning in question.

Based on the description above, it can be concluded that Problem Based Learning is a learning that confronts students with real world problems to start learning. Problems are given to students, before students learn the concept or material relating to the problem to be solved. Thus to solve the problem students will know that they need new knowledge that must be learned to solve the given problem.

As for Syntax (steps) Problem Based Learning (Problem Based Learning) include:

1. Student orientation to the problem
Educators explain what the learning objectives are, how the learning process will be carried out, and motivate students to be involved in problem solving activities that can be selected.
2. Organizing students
Educators help students define and organize learning tasks related to the problem (setting topics and assignments). The definition of the problem must meet the criteria of being authentic, clear, easy to understand, broad according to learning objectives, and useful.
3. Guiding individual and group investigations
Educators help students to collect appropriate information, experiments to get explanations and problem solving, data collection, hypotheses, and problem solving. Educators act as facilitators who encourage each student to find solutions from technological ways, think critically, and utilize creativity. Educators also play a role in encouraging students educatively if there are indications of boredom and despair in the problem solving process.
4. Develop and present the work
Educators assist students in planning and preparing appropriate works such as reports and demonstrations
5. Analyze and evaluate the problem solving process
Educators help students to reflect or evaluate their investigations and the processes used

2.3 Implementation of Problem Based Learning on Pythagorean Theorem Material

The objectives of problem-based learning are the ability to apply concepts to real problems, integrate the concept of Higher Order Thinking Skills (HOTS), desire to learn, direct self-study, and skills.

This problem-based learning model can also be applied to the Integer material as follows:

1. Learning can be started by giving story questions about Integers. The story questions are written in the Student Worksheet (LKPD) which will be discussed by the group of students. The giving of story questions is directly related to the daily life of students

2. Learning does not stop at proving the Integer formula. Students are also given the opportunity to complete the initial problem with additional stimulus. For example, if one side is increased or decreased in length, how will it affect the length of the other side. This will make students learn and think more creatively and critically.
3. The learning was continued by presenting the results of the students' discussions. Each group representative presented the results of their discussion. This presentation is important to do to develop the character of students to dare to express their opinions.
4. Through presentations, students are also trained to respect different opinions. Other groups are given the opportunity to respond to the presentation group. Responses can be questions, comments, or something else. The teacher's role as a facilitator.
5. At the end of the lesson, the students together with the teacher conclude the learning that has been done. Through this learning, the 4C components, namely collaboration, communication, critical, and creative can be integrated in the presentation of learning materials.

2.4 Learning outcomes

Learning outcomes are a benchmark for measuring the success of students in mastering the subject matter presented during learning. This will be determined by the occurrence of behavioral changes in students after the learning process ends. Bloom (in Suharsimi 2008:117) broadly divides learning outcomes into three categories, namely:

1. Cognitive domain, with regard to intellectual learning outcomes,
2. Affective domain, with regard to attitude
3. Psychomotor domain, with regard to skills and ability to act

2.5 Framework of thinking

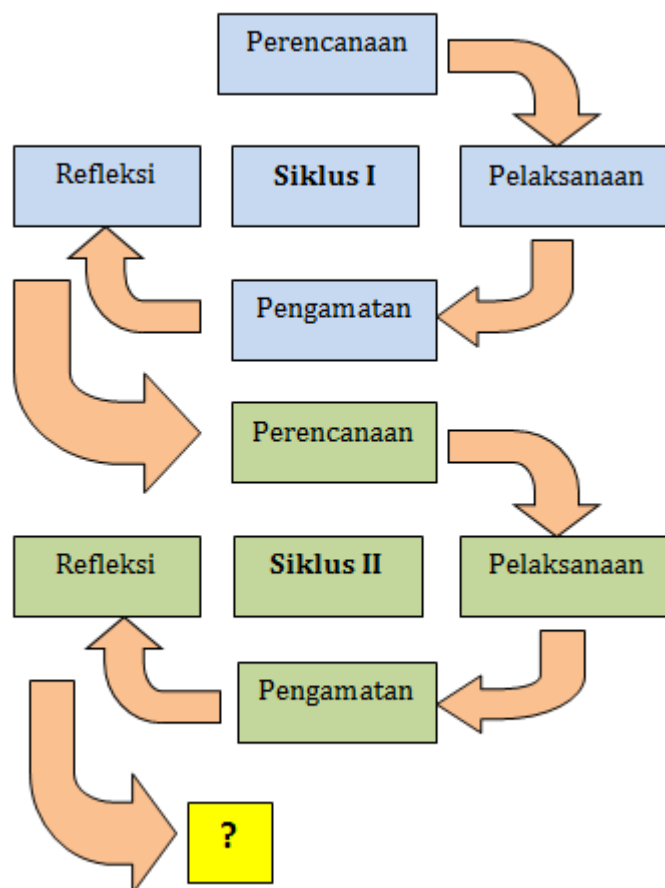
The right learning model in the mathematics learning process will affect the problem solving ability of students. Competitive and individualistic learning as is still widely applied in schools has several weaknesses, including unhealthy competition between students and low-ability students will be less motivated and increasingly left behind, even students who have not been able to solve problems will increasingly do not understand.

SMP Negeri 3 One Roof Idanotae South Nias Regency is a first-level school in South Nias Regency, North Sumatra, which uses curriculum 13 and in the learning process, especially mathematics, still uses conventional learning models with the lecture method. This makes students only depend on the teacher's explanation without wanting to develop their knowledge and skills in problem solving.

This research was carried out using Classroom Action Research (CAR) Wardani, et al (2004:14) suggested that: "Classroom action research is research conducted by teachers in their own classrooms through self-reflection, with the aim of improving their performance as teachers, so that student learning outcomes to be Improved. Based on the above circumstances, the authors offer a problem-based learning model based on real-world problems that consistently presents how students learn and achieve learning outcomes and make students more comfortable and enjoyable by not feeling bored when the learning process takes place.

The advantages of the PBL (Problem Based Learning) learning model are expected to apply the learning model in SMP Negeri 3 One Roof Idanotae, South Nias Regency in effective mathematics learning on students' problem solving abilities on Integers material.

In carrying out this research, the researcher planned 2 (two) cycles. In the first cycle, the researcher planned learning activities using Integer Counting Operations submaterial, with problem based learning syntax, the steps of which were written in the lesson plans. The second cycle with Fractional Numbers material was carried out after evaluating the learning outcomes of students in the first cycle.



2.6 Learning Theory

1. Behavioristic theory, learning is a change in behavior as a result of the interaction between stimulus and response.
2. Constructivism Theory is defined as learning that is generative, namely the act of creating something meaning from what is learned.
3. Piaget's theory is a genetic process, which is a process based on the biological mechanism of the development of the nervous system.

2.7 Initial Condition

1. Lack of student participation when learning Integers takes place
2. The learning process is still dominated by the teacher
3. Has not provided direct experience that confronts students with a real problem as a basis for understanding the concept of learning.

4. The learning materials provided by the teacher still depend on textbooks so that students are not accustomed to thinking critically, not sensitive to the problems encountered in everyday life.

2.8 Action Learning Problem Based Learning

1. Educators organize students to be able to identify what is known and stated from the Integer problem
2. Students are guided to find proof of the truth of the Pythagorean theorem with problems in everyday life.
3. Students are guided to understand these problems through discussion so that each student has a better orientation.
4. Students are invited to develop the Pythagorean theorem problem, then present it in a work and can present it in front of the class
5. Students are accustomed to reviewing what they have learned and re-examining the process of solving the Pythagorean theorem and then interpreting the solution.
6. Through contextual learning, students are trained to solve problems related to everyday life
7. Learning by discussing and asking questions
8. At the end of the lesson, students are invited to conclude learning the Pythagorean theorem

2.9 Action Hypothesis

The action hypothesis is a prediction of the results of the actions taken by the researcher. The action hypotheses in this study are:

1. With the application of the Problem Based Learning learning model, it will increase student activity in the learning process
2. With the application of the Problem Based Learning learning model, it will improve student learning outcomes, especially on Integers material.

2.10 Success Indicators

The success of learning implies completeness in the learning process. The success criteria is a measure of the level of learning achievement that refers to the basic competencies and competency standards that are set that characterize mastery of concepts that can be observed and measured.

In general, the criteria for learning success are:

1. The success of students in completing a series of learning processes in the form of summative tests and skills tests
2. Each success is associated with basic competency and competency standards that refer to the minimum completeness criteria (KKM) or the ideal completeness criteria (KKI) 75%
3. The achievement of skills depends on the KKM or KKI, while the indicators are a reference to determine whether students have succeeded in mastering the competencies.

According to Djamarah (2002: 121 – 122), explains that learning success is divided into several levels or levels, namely:

1. Special / maximum, namely if all the subject matter being taught can be mastered by students.

2. Very good / optimal, that is, if most (76% - 99%) of the subject matter taught can be mastered by students,
3. Good / minimal, that is, if the material being taught is only 60% - 75% that is mastered by students.
4. Less, that is, if the subject matter taught is less than 60% mastered by students.

Based on the research above, the authors set a target percentage of the success of the learning process, which is 75% or classified as good. If the results of the reflection show that the learning outcomes have reached the set targets, then the problem is solved.

RESEARCH METHODS

3.1 Action Plan

This research was conducted using the Class Action Research (CAR). The focus of this research is on actions to improve the learning process and increase student activity in learning mathematics in general and the Pythagorean theorem in particular. In carrying out this research, the writer collaborated with other teachers. Researchers as implementers of learning activities, while other teachers are appointed as observers.

This research was conducted at SMP Negeri 3 One Roof Idanotae, which is located in Awoni Village, Idanotae District, South Nias Regency with the research subjects being class VII students, totaling 21 students, but due to the COVID-19 pandemic situation, based on the adjustment of learning policies during the pandemic covid 19, which is for the green zone area to be able to carry out the face-to-face learning process with a ratio of 50% of the number of students in the class, then the number of students who are the subject of this research is 16 students.

The stages of implementing this classroom action research are as follows:

a. Planning (Planing)

At this stage the author plans learning activities by asking for cooperation with colleagues, namely teachers in the field of study who are cognate with the author, namely Mathematics subject teachers as observers. Plan activities and determine the time and method of presentation, determine alternative actions that can be taken, prepare tools and technical data analysis. The plans prepared by the author include:

- Learning Implementation Plan (RPP) in accordance with the Problem Based Learning (PBL) model
- Teaching materials
- Learning Media
- Student Worksheet (LKPD)
- Evaluation Instrument

b. Action (Action)

At this stage the authors carry out actions based on predetermined plans, namely learning activities by applying the Problem Based Learning learning model.

c. Observation (Observation)

During the learning process, the teacher who was appointed as an observer paid attention to the implementation of the learning carried out by the author.

d. Reflection

After completion and all the data collected, the researcher describes the results that have been achieved and analyzes the weaknesses that occur to be corrected in the next cycle.

3.2 Research procedure

3.2.1 Cycle 1

a. Planning (Planing)

At the planning stage, the author makes preparations consisting of a Learning Implementation Plan (RPP) and student assignment sheets. While the data collection instrument used in the study was the teacher activity observation sheet and the student activity observation sheet in learning. The use of the Problem Based Learning (PBL) model in planning mathematics learning is realized in the form of a learning design, namely the Learning Implementation Plan (RPP). This planning is based on semester 1 according to the ongoing research. Lesson planning is arranged for one meeting or 2 x 30 minutes. The material is taken from the 13th Curriculum of the Ministry of Education and Culture Revised 2017 for Mathematics class VII semester 1.

b. Action (Action)

At the first cycle meeting, the researcher will try to complete the indicators that have been set. The implementation of the actions taken is referring to the learning scenario that has been designed using the PBL model consisting of several stages, namely: starting with the teacher saying greetings, preparing students to study, praying, and taking student attendance. Perform apperception by inviting students to look at objects in the form of right triangles around them. Next, convey the learning objectives to be achieved. The orientation of students to the problem, the teacher gives a problem about proving the truth of the Pythagoras theorem then the teacher explains the picture of learning about the material to be taught in outline. In this case the teacher does not fully explain but the teacher also conducts questions and answers with students, so that students take an active role in learning. Organizing students to be ready to learn, the teacher conducts a series of demonstrations using media and defines the tasks that students will do. Guiding individual/group experiences, the teacher divides students into several groups. Each group is distributed teaching materials and student worksheets (LKPD) that have been provided by the teacher. Observing, students are asked to solve problems that exist in the LKPD. During the learning process, students ask questions that are not understood. The teacher supervises student work and provides guidance or direction to straighten things that are still not understood. Students collect information about the problems contained in the LKPD with the help of learning media in the form of pictures. Develop and present the work, the teacher guides students in designing, and making reports on group work and presenting the results of group discussions that have been carried out. Analyze and evaluate the problem solving process, with reference to student answers, through question and answer. In the closing activity, students with the guidance of the teacher conclude the learning activities together. by referring to student answers, through question and answer. In the closing activity, students with the guidance of the teacher conclude the learning activities together. by referring to student answers, through question and answer. In the closing activity, students with the guidance of the teacher conclude the learning activities together.

c. Observation (Observation)

At this stage it is carried out by the observer. The main task of the observer is observing the activities carried out by the teacher and students according to the observer sheet provided. From the observer's observations in the first cycle, it was reported as follows: in learning students were still less active, this was proven by students still not being

able to answer the questions asked by the teacher. Then when students solve problems in the discussion, there are still groups of students who are not active in their group discussions, because there are students who do not participate in the discussion so that the teacher motivates students who are passive in group discussions. The results of the observation of student activities are quite adequate because the results of observations of teacher activities have not been carried out properly. In implementing the PBL model steps, the teacher has not fully implemented it because the teacher is not used to implementing the PBL model. The expected completeness of learning values has not been achieved in accordance with the set, which is 75%, while the completeness achieved is only 60%.

d. Reflection

Reflection is done collaboratively between class teachers and practitioners as observers at each end of the lesson. On this occasion, the findings and observations of the researchers were discussed together. The reflection of the first cycle of action includes reflection on the planning, implementation, evaluation and results obtained by students. The researcher and the teacher reflect to analyze the advantages and disadvantages during the learning process. The results of the analysis are also used as planning material for the next cycle by making a new action plan to make it even better.

3.2.2. Cycle II

a. Planning (Planing)

The results of the reflection analysis in the first cycle at the first meeting showed that it was necessary to continue to the second cycle. In the second cycle, several things are planned, including preparing the Learning Implementation Plan (RPP) in accordance with the steps of the PBL learning model. Planning is arranged for 2 meetings, where the time allocation for one lesson is 2×30 minutes. The material taken for learning material in cycle two is a continuation of the material in cycle one. Basic Competencies to be achieved, namely students can use Integers to solve problems in everyday life.

b. Action (Action)

The implementation of the actions taken is referring to the learning scenario that has been designed by using the Problem Based Learning learning model, which consists of several stages, namely: starting with the teacher saying greetings, preparing students to study, praying, and checking student attendance. Perform apperception which then conveys the learning objectives to be achieved.

The teacher orients students in a problem, in this case the teacher does not fully explain but the teacher also conducts questions and answers with students, so that students take an active role in learning. namely organizing students to be ready to learn, the teacher conducts a series of demonstrations using media and defines the tasks that students will do in group discussions. Guiding individual/group experiences, the teacher divides students into several groups. Each group is distributed learning teaching materials and LKPD that have been provided by the teacher. Next, observe students to solve problems that exist in the LKPD by observing the image media provided by the teacher. During the learning process, students ask questions about the problems they are facing. The teacher supervises student work and provides guidance or direction to straighten things that are still not understood by students in problem solving. Collecting information about the problems contained in the LKPD with the help of learning media in the form of pictures. The teacher helps students process the information that has been found in the picture. Develop and

present the work, the teacher guides students in designing, and making reports on the group's work in accordance with the LKPD and media that have been given by the teacher as the main steps that must be carried out in the PBL model. The teacher helps students process the information that has been found in the picture. Develop and present the work, the teacher guides students in designing, and making reports on the group's work in accordance with the LKPD and media that have been given by the teacher as the main steps that must be carried out in the PBL model. The teacher helps students process the information that has been found in the picture. Develop and present the work, the teacher guides students in designing, and making reports on the group's work in accordance with the LKPD and media that have been given by the teacher as the main steps that must be carried out in the PBL model.

In the implementation of learning in cycle II, it appears that students have been able to solve problems related to the Pythagorean theorem, as evidenced by the group work reports that will be presented by students. Analyze and evaluate the problem solving process, with reference to student answers, through question and answer, teachers and students discuss problem solving. And learning is closed by concluding the lesson and giving awards by the teacher to students who get good grades.

c. Observation (Observation)

Observations carried out in the second cycle of learning were analyzed through teacher activity observation sheets and student activity observation sheets. From the results of several findings of collaborators and researchers are as follows, from the teacher's point of view, the learning time can be used properly from the beginning of learning to the end of learning. The steps of the PBL model have been carried out well so that student activities are also in the very good category.

Based on the analysis of student activity observation sheets, students have been able to solve problems related to money, this is evident from the increased activity of students in the learning process. Students have dared to express opinions and ask questions in the problem solving process. Develop and present the work in the form of a report on the results of group discussions that have been developed and presented properly. In line with the increase in student activity in the learning process using the PBL model, the results of the student's mathematics evaluation increase. The results of the classical percentage reach 90% with a Minimum Completeness Criterion of 70.

d. Reflection

Reflection activities are carried out collaboratively between researchers as observers and partner teachers as practitioners at the end of each lesson. Based on the results of the collaboration, it is known that the implementation of learning using the Problem Based Learning (PBL) learning model in class VII can be said to be successful. In this second cycle the teacher has implemented the lesson plan as well as possible according to the plan that has been made.

At the time of the implementation of learning, the teacher has succeeded in fully awakening student learning activities, it can be seen that all students are ready to receive lessons, students are actively participating in lessons during the learning process. Students have been able to solve problems related to the Pythagorean theorem. Students can already absorb the material that has been studied, this can be seen from the increase in the results of the learning tests that have been carried out. The value obtained by the students has

given satisfactory results, both the value of group discussions and the results of the evaluation and classical student learning completeness.

CONCLUSION

Based on the results of the analysis and discussion above, it can be concluded that the results of observations on teacher activities in applying the Problem Based Learning (PBL) model for two cycles have increased in each cycle, it can be seen that the PBL model is able to increase teacher activity in carrying out learning including guiding students in solving problems. problems given either individually or in groups, giving responses to the presentation of the results of the discussion. Based on the results of the analysis of student activity observation sheets, it can be seen that students are more active in the learning process using the PB1 model, this can be seen from students who have been active in the learning process, dare to express opinions and ask questions about things that students do not know.

From the results of the analysis of teacher activity observation sheets and student activity observation sheets, an increase was obtained so that there was an increase in student learning outcomes from cycle I to cycle II, namely classical completeness from 78% to 93% with 20 students who had reached the KKM. This is evidence of the successful implementation of the research that has been carried out in class VIII of SMP Negeri 3 One Roof Idanotae, South Nias Regency.

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