4th ICRIEMS Proceedings
Published by The Faculty Of Mathematics And Natural Sciences
Yogyakarta State University, ISBN 978-602-74529-2-3

NHT with Problem Posing Approach to Increase Problem Solving Ability and Self-Confidence

Ni Made Intan Kertiyani

Department of Mathematics Education, Indonesia University of Education

intan.kertiyani@gmail.com

Abstract. This research was motivated by the final mathematics odd semester test score of student at junior high school in Mataram which still below of minimum standard. According to the observation which was conducted at one of the class, students' problem solving abillity and self-confidence when performing tasks still low. This research was aimed to explore whether the problem solving abillity and self-confident when performing Cube and Bar tasks at that class would increase through the application of NHT (Numbered Head Together) with Problem Posing Approach. There were 26 students involved in class 8th B, 19 female students and 7 male students. This classroom action research conducted in two cycles. Each cycles contain five phases which involved planning, doing, observing, evaluating, and reflection. The student's problem solving ability was measured by problem posing test and the student' self-confidence to performing tasks was measured by questionnaire which completed both by teacher and students. The result of this research showed that there was an increase of student self-confidence to perform a task's score from 21, 19 (very active) at the first cycle to 21, 46 (very active) at the second cycle. Student ability at solving problem's average score also increase from 82/100 at the first cycle to 87/100 at the second cycle.

INTRODUCTION

According to the data from one of mathematics teacher in SMPN (Junior High School) Number 12 Mataram, the learning outcomes of student grade 8th were not as expected. The average score of final mathematic odd semester test score of student at eight grade ranged from 43 to 54. This scores were categorized low because still below of minimum completeness standard which is 70/100.

The observation conducted at class 8th B showed that the teacher used group discussion method when learning activities occur. However, when presentation time, teacher tended to point out certain student to present the result of group discussion. Hence, not all student have the equal opportunities to present it .Furthermore, according to data from mathemathics teacher of class 8th B, the average score of student self-confidence at that class was 1, 53 out of 4.

The score used scale 1 to 4 where 1 categorized as not confident, 2 categorized as less confident, 3 categorized as confident, and 4 categorized as very confident. The student self confident average score of grade 8thB was lower than 2 which was categorized as not confident.

The student from class 8th B also had difficulties solving math word problem, such as determining the problem and solution which contain several steps to resolve. Based on interview which was conducted on student in that class, one of the reason which make student have difficulties in determining the problem on question was the question was not about problem they will encounter in daily life. Furthermore, the student rarely had the opportunity to express their difficulties in solving math word problem. Figure below show the percentage of numbers of student grade 8th B who answer word problem correctly at final mathematic odd semester test academic year 2014/2015.

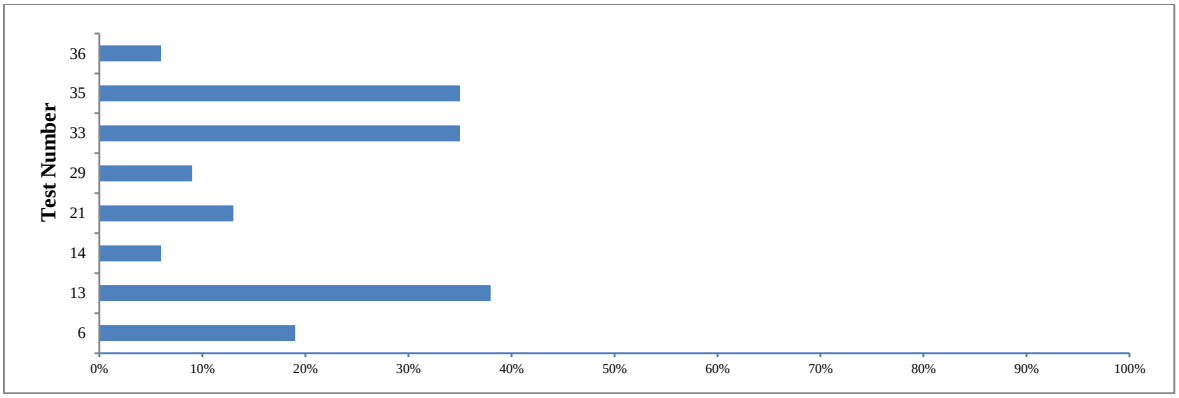

FIGURE 1 Percentage of Student who Answer Word Problem Correctly at Final Mathematic Odd Semester Test Academic Year 2014/2015

In final mathematic odd semester test, there were eight questions from 40 questions which were the word problem. From to the table above, percentage of the number of students who answer correctly less than 50%. Hence, the student problem solving ability still low.

The student self-confidence when performing tasks issue can resolved by provide equal opportunities to solve the problem or present the group discussion result. The learning activities model which provide that equal opportunity is one of the advantages of NHT (Numbered Head Together). NHT refer to learning activitieswhich form small heterogen groups and each student in groups have a number. Afterward, there are some questions disscusioned among the member of the group and the student who will present the result of the disscusion randomly selected by lottery from teacher [10]. Therefore, student have the same opportunities to support team in order to obtain the maximum score [5]. This same opportunities cause student to always be prepared. The student will trained to understand all the results of their grup disscusion and present it. The students will trained to express their opinion about the alternatif solution of the problem so that student self-confidence will increase.

The student ability to solve problem issue consists of two main problem, that is determining the problem and searching for the solution. The determining problem's issue can resolved by providing the opportunities for students to express their difficulties by making some questions which they are interested in. By making question the are interested in, student will have high motivation to solve it. The learning activities which provide the opportunity to student to formulate a question is the the characteristics of Problem Posing. Problem posing is explaining the problem in the form of question[9]. It classified into three types, 1) presolution posing : student make a question from situation which given, 2)within solution posing : the student form a simplier question from the original question which will be solved in order to to make the solving process easier, 3) post solution posing: student modify the aim of the condition in the question which have been solved in order to make a new question. Problem posing give the opportunity for student to do independent learning by formulate their own problem and solve that problem by themselves. When students get the answer of their own problem, they will more motivated to find another problem and solve that problem by theirselves. Then, the student ability to solve the problem will enhance [7].

According to explanation above, the formulation of this paper is "How the application of NHT with Problem Posing approach enhancing student confidence to perform a task and student ability to solve problem when performing Cube and Bar tasks at class 8th B Junior High School 12 Mataram." The purpose of this research is to explore the application of Cooperative Learning Model Numbered Head Together with Problem Posing Approach on increasing students' problem solving ability and self-confidence when performing Cube and Bar tasks at class.

RESEARCH METHOD

This research was action class research within two cycles which conducted at one of Junior High School in Mataram. The subject of this research was the student of 8th B class in the second semester study year 2014/2015 consisted of 26 students which is 7 male students and 19 female students. The resources of data in this research were students and mathemathic teacher of 8th B of Junior High School Number 12 Mataram study year 2014/2015.

The instrumentswhich used in this research were a)questionaire of student self confidence data filled both by students and teacher in each cycle, b) student activities data observation sheet filled by observer in every

meeting at each cycle. After students self confidence data obtained, data was analyzed by calculate the average score of self-confidence.

The score of student ability to solve problem were analyzed by calculating the average score of student ability to solve problem with formula $\bar{x} = \frac{\sum KM}{JS}$, $\bar{x}$=the average score of student ability to solve problem, ,$\sum KM$= the sum of all student ability to solve problem score which use scale from 0 to 100, andJS= the number of all student. Moreover, the students classical completness was also determined with formula $PKM = \frac{JK}{JS} \times 100\%$, $PKM =$ the stundent ability to solve problem classically, JK= the number of student who get test score ≥ 70, dan JS = the number of all student [1].

This research was categorized succes if the average score student self-confidence when perform a task enhance to category confident and the average score of stundents ability to slve problem enhance to $\geq 70$and the the classical completness equal or more than 85.

RESULT AND DISCUSSION

The activity which conducted in class followed some steps. At the introduction step, the teacher asked students to sit with their group and each student had their own different number with other student in their group. Then, the teacher gave informations about the goal and the systematic of the study. At the aperseption phase, the teacher asked student about the number and the shape of cube and bar side and the formula of rectangle and square. The teacher also gave some information about the application of this study in daily life in order to enhance the motivation of the student.

In the core activity, the teacher gave some information about cube and bar using visual aid and explained how to make problem based on situation given. Then, the teacher explain to student how to solve these problem. To expand students knowledge about kind of question student can make, the teacher asked student to answer some question in the worksheet with their group. Then, the students together with their group made a question based on the situation on worksheet and made solution of their question. Another group did correction about problem and also answer the question that another group had made. The teacher asked the student who will present the result of their group discussion randomly and the student who will give feedback about the presentation

In the Problem Posing phase, the student did both post-solution problem posing and pre-solution problem posing. First, the student did post-solution problem posing to get students accustomed to making question. Then, students did pre-solution problem posing. The students made question based on situation given in worksheet. The situation was " Yulia want to make cube framework from woods. The length of cube edges is 80 cm. The price of woods is Rp. 5.000/ meter. Yulia has money of Rp 100.000. Figure below show the question which was made by students.

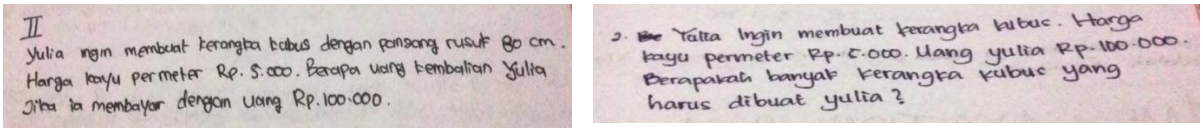

FIGURE 2. Question Which was Made by Students.

The question which was made by students was structured type question which consists known and unknown data [2]. The question need more than two steps to solve, hence it was not the question which can be answer directly. Complexity of question which was made student give description about their ability in solving problem. Student problem solving ability test score at cycle I (82/100) to cycle II (87/100) was increasing. This result agree with statement that problem posing and problem solving have positive correlation [7]. Furthermore, after made a question, the student also made the solution of the question they made. It made student have to understand the question they made. This agree with the statement that making a question/problem means the first step of solving problem, that is determining problem are already passed. Hence the next step to solve the problem will be easier. Therefore, making a question or problem is one alternative way to strengthen the ability to solve problem [3].

The summary of the research result such as the data of student problem solving ability and self-confidence when performing a task in each cycle are presented in table below.

TABLE 1. The Summary of Research Result

Cycle	The Ability of Student Problem Solving		The Student Self-Confidence When Performing a Task	
	Average Score	Classical Completness	Average Score	Category
I	82	80%	21,19	Very Confident
II	87	96%	21,46	Very Confident

The average scores of students problem solving ability at cycle I was 82 with classical completness was 80%. Student problem solving ability increased in cycle II, that was 87 , with classical completness 96 %. Meanwhile, student self-cofidence was categorized very confidence from cycle I.

The application of NHT with Problem Posing approachcould not directly increase the ability of student to solve problem due to some issues. There was some reflection from cycle I which was providedin table below.

TABLE 2. The Reflection of Cycle I

Obstacles	Possible Reason	Solution
The students tend to use the number card as game tool.	The number card was look like the card which often use at some games	The teacher changed the number card
Many student came late when the learning activity at class begun	There were no punishment for student who come late	The teacher gave the punishment, that is the reduction of group score in case of the member of group come late or do not participate in group discussion. Each score reduction was written in the whiteboard.
Some member of group did not participate properly in group discussion and the other member did not ask that member to join the discussion .	The cohesiveness of group was low	
Student participation in noting presentation was low.	The student assume participation do not affect their score.	Gave reward to student and their group who participate actively giving feedback to another group presentation. Each reward was written ini the whiteboard.
Student respon/feed back to other student presentation was low.		
Some student had difficulties to write down the answer of the question sistematically.	Students did not learn the worksheet properly	The teacher emphasized the steps to answer the question and gave some homework in the form of worksheet about next meeting theme in order to execute next learning activity. .

According to reflection of cycle I, there were two main obstacles in applied NHT with problem posing approach, that is group cohesiveness and the case of answer the question sistematically. Group cohesiveness was the cause of more than 50% obstacles which was found in cycle I. In the case of answer the question sistematically, when discussed about cube and bar net, the student still found difficulties at specifying the thing that known and the thing that will be asked in the question particularly in answer the question which does not need the application of formula. Moreover, some groups understood the way to solve the problem but they could not write it sistematically and could not write the conclusion of the answer properly. Though, student had difficulties in answering the question sistematically, but the student did not have difficulties in correcting another group question and answer to question which they made.

To resolve the issues about group cohesiveness, teacher gave reward and punishment to the group and emphasized that the score of one member will affect the score of all group member. Write down the group who obtain plus point or minus point was one powerful way to increase group cohesiveness. Furthermore, to resolved the issues about answer the question sistematically, the teacher asked the student to learn their worksheet properly, the teacher emphasized about the stages of a systematic problem solving. After the improvement was applied, the group cohesiveness and the student ability to answer problem systematically was increased. The proof could be seen from the enhancement of the score of student problem solving test and the classical completeness in cycle II. This result agrees with the statement that making a question or problem is one alternative way to strengthen the ability to solve problem [3].

Learning with NHT provide an equal opprtunities to present their group discussion result[5] Moreover, cooperative learning with assesment system which is the score of the group depend on their member and the score of one member affect the score of all of the group member make student have the high resposibility to the group. So that they will really prepare theirself to do the presentation [8]. The responsibility and the preparation

which student did make their self-confidence increase. This founding agrees with Siswono (2000: 1) that the advantages of NHT is making students ready. It is proven proven from student self confidence of class 8th B which was categorized very confident in cycle I and it increase at cycle II.

CONCLUSION

The conclusion of this research :NHT with Problem Posing approachment was able to increase student confident to perform a tasks and ability at solving problem, by following these phases/steps/circumstance: 1) the teacher asks students to sit with their group and each student has their own different number with other student in their group; 2) the teacher gives informations about the goal and the systematic of the study; 3) the teacher gives informations about cube and bar with visual aid or student worksheet and tells students in class how to make problems based on situasion given; 4) students make a problem and the answer with their group, 5) each group do correction about problem that another group have made then answer that problem, 6) the teacher asks a student randomly to present the result of their group discussion, 7) the student presents the result of their group discussion.

REFERENCES

1. Arikunto, Suharsimi, *Prosedur Penelitian Suatu Pendekatan Praktis*(PT. Rineka Cipta, Jakarta, 2003), pp. 336.
2. Elwan, Abu. *The Development of Mathematical Problem Posing Skills for Prospective Middle School Teachers* (Proceedings of the International Conference on Mathematical Education Into the 21st Century: Social Cha llenges, Issues and Approaches, (Vol. II, pp. 1-8), Cairo Egypt , 1999) pp. 156
3. English, L.D, *Promoting a Problem Posing Classroom*, (Teaching Children Mathematics Journal, 1997). pp 192-197.
4. Nurkencana, W, and Sunartana. *Evaluasi Hasil Belajar* (Usaha Nasional, Surabaya, 1990). pp 103.
5. Shoimin Aris, *68 Model Pembelajaran Inovatif dalam Kurikulum*. (Ar-ruz Media, Yogyakarta, 2014), pp 108.
6. Siswono, Tatag Y.E. *Problem Posing :Sebuah Alternatif untuk Pembelajran yang Demokratis*(Surabaya State University, Surabaya, 2000) pp 1.
7. Siver, E. &Cai, J, An *Analysis of Aritmatic Problem Posing by Middle School Students* (Journal for Research In Mathematics Education, V.27, 1996), pp. 292.
8. Suherman, Erman, *Strategi Pembelajaran Matematika Kontemporer* (UPI Press, Bandung, 2003) pp. 260.
9. Suryosubroto, B., *Proses Belajar Mengajar di Sekolah* (PT. Rineka Cipta, Jakarta, 2009), pp. 213.
10. Trianto, *Model-Model Pembelajaran Inovatif Berorientasi Konstruktivistik* (Prestasi Pustaka, Jakarta, 2007), pp. 62.