

**STUDENT'S MATHEMATICS CONCEPTUAL UNDERSTANDING: THE EFFECT OF PROBLEM
POSING LEARNING ASSISTED VISUAL STUDIO APPLICATIONS****Muhammad Habib Manan**

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e-mail : tatagsiswono@unesa.ac.id**Abstract**

This study aims to describe the effect of problem posing learning with Visual Studio applications-assisted toward the student's mathematics conceptual understanding. The topic of study is Cube and Cuboid for grade 8th students of academic year 2017/2018. This research uses Pre-Experimental Design method with One Group Pretest-Posttest Design type. The sample of this research is 30 students and given treatment in the form of problem posing learning with Visual Studio applications-assisted. The instruments used in this research are the pretest-posttest and student activity observation sheet. The data were analyzed using normality test, Wilcoxon Sign Rank test, and N-gain test. The results of the study show significant effect toward conceptual understanding ability. The student's activity observation indicates active student activity during problem posing learning with Visual Studio applications-assisted.

Keywords: *problem posing, conceptual understanding, Visual Studio*

INTRODUCTION

Students need a lot of things to be able to successfully learn mathematics. In case of factors outside the student, such as the teacher, curriculum, and environment / class, there are also important factors of the students themselves which are very instrumental in supporting their success in learning mathematics. These factors are mathematical proficiency. This mathematical proficiency, according to Kilpatrick (2001) consists of (1) conceptual understanding; (2) procedural fluency (procedural fluency); (3) strategic competence; (4) adaptive reasoning (adaptive reasoning); and (5) productive disposition. Mathematical skills should be developed in an integrated and balanced way for students who study mathematics (Kilpatrick, 2001).

According to Kilpatrick (2001: 116), conceptual understanding is the ability to understand concepts, operations and relations in mathematics. According to the Ministry of National Education (2006), mathematics subjects aim to make students have understanding mathematical concepts, explaining the relationship between concepts and applying concepts or algorithms, flexibly, accurately, efficiently and precisely, in problem solving. In accordance with the above mathematics learning objectives, after the learning process students are expected to be able to understand a mathematical concept

so that they can use these abilities in dealing with mathematical problems in their real life.

According to the 2015 TIMSS (Trend in International Mathematics and Science Study) analysis, Indonesia's ranking in mathematics is in the 45th position out of 50 countries. Trends in the International Mathematics and Science Study (TIMSS) conducted by the International Association for the Evaluation of Educational Achievement (IEA) in 1999, 2003, 2007 and 2011. During their participation, the value of Indonesian junior high school students was always below average. TIMSS value standard. In TIMSS 2011, Indonesian students only ranked 38 out of 42 countries with a score of 386 far from the average score of 500.

The problem in TIMSS consist of 2 (two) dimensions, namely: content domain consisting of numbers, algebra, geometry, and data processing. The other is cognitive domains which consist of knowledge, applying and reasoning. Knowledge which includes facts, concepts and procedures that student should know. Applying which focuses on the ability of students in applying their knowledge and concepts for solving the problem. Reasoning which focuses on solving non-routine problems, context complex and take steps solving many problems. The secret of countries whose students achieve high mathematics achievement in TIMSS is because mathematics learning is carried out by emphasizing more on aspects of reasoning and problem solving. In contrast

to what happened in Indonesia where students were generally only given material by the teacher, then they were given examples of problems and solutions, and students were asked to work on similar problem. This certainly does not provide an opportunity for students to develop reasoning and problem solving skills represented by conceptual understanding in mathematical skills. There needs to be an effort to improve the curriculum so that this situation gradually improves.

As we have seen, the 2013 curriculum applies student-oriented active learning. This means that the role of students and teachers in the context of active learning becomes very important. The teacher plays an active role as a facilitator that helps facilitate student learning, as a manager who is able to design and carry out meaningful learning activities, and manage the learning resources needed. Students are also involved in the learning process with the teacher because students are guided, taught and trained to explore, look for questioning something to investigate the answers to a question, manage and convey the results of their acquisition communicatively. Students are expected to be able to modify new knowledge received with the experience and knowledge they have received. Through an active learning approach, students are expected to be able to recognize and develop their learning capacities and potential. For this reason a learning is needed that can facilitate the improvement of students' mathematical skills.

Problem posing is a learning model that reflects student-oriented active learning. Problem posing is learning that emphasizes on students independently to formulate problem based on information or situation given. The information is processed in mind and once understood, students will be able to ask questions. Brown and Walter (2005) state that posing problems has two important stages, accepting and challenging stage. The accepting stage is an activity where students can accept predetermined situations or situations given by the teacher. In addition to accepting the situation, students must also understand the situation. The challenging stage is an activity in which students challenge the situation given by the teacher in the context of formulating a problem. Students make problem based on the situation or information that is already available, then the problem is solved by students. In the practice of learning, this stage can be modified with students exchanging problem between individuals or groups. Students will try to make difficult problem so that no one can solve it. In this study, using the problem posing learning syntax according to Falach (2016) with the following 5 phases. 1. Selection of starting point 2. Digging for information from a given problem or situation 3. Making a question based on information obtained 4. Getting a solution from the

problem 5. Discuss the results of the compilation of problem and solutions. With the problem posing task, this learning is expected to lead to the formation of a more solid conceptual understanding of students about the topic that has been given. The activity of posing a problem will make students more active and creative in shaping their knowledge and ultimately student's understanding of mathematical concepts increases. Problem posing learning can be used as an alternative in developing students' mathematical skills.

In the 21st century era, the development of information and communication technology progressed rapidly. No exception in the field of education. Many media / software used by educational practitioners to support classroom learning. Unfortunately, the use of media in learning is still minimal because of the limitations of computer science owned by the teacher. Researchers are interested in using the Visual Studio application as a support for learning. Visual Studio is a programming language-based application that is very easy to learn and allows users to create better in producing an application program. In this study, an application based on Visual Studio added to the learning process for assisting teacher during learning activity. The lesson topic is cubic and cuboid. Student activity is an activity carried out by students during learning. Based on an explanation of the problems described above, it was concluded that understanding mathematical concepts is an important components in solving a mathematical problem for students. While problem posing learning with Visual Studio applications-assisted is expected to have an impact on student's mathematical conceptual understanding.

METHODS

This research is a quantitative approach research. This study uses Pre-Experimental Design research with the form of One Group Pretest-Posttest Design meaning that there is a group treated and then observed the results, but before being treated there is a pretest to determine the initial condition. Thus, the results after treatment can be compared with the conditions before being treated.

The research design "One Group Pretest-Posttest" as follows:

P1 X P2

P1: Pre-test

X: treatment

P2: Post-test

This research was carried out at SMP Negeri 1 Gresik in the even semester of 2017/2018 school year. The research sample is determined randomly. The sample of this study was class VIII F with 30 students. Data collection techniques conducted by researchers include observation methods and test methods. The observation method was

carried out by an observer by using observation sheets to obtain data about student activities during the problem posing learning in the experimental class. The test method is used to measure the initial and final abilities of students mathematics conceptual understanding. Tests are given twice, namely pretest and posttest. The pre-test and post-test questions are in the form of 2 items. The questionnaire method is used to determine the response of students after problem posing learning with Visual Studio applications-assisted. The data were analyzed using normality test, t-paired test, and N-gain test. If the data is not normal through normality test then the analysis use non parametric test, Wilcoxon Sign Rank test. The hypothesis in this study is:

H_0 = Problem posing learning with Visual Studio applications-assisted has no effects toward students' conceptual understanding.

H_a = Problem posing learning with Visual Studio applications-assisted has significant effects toward students' conceptual understanding.

RESULT AND DISCUSSIONS

This study has the aim of describing the the effect of problem posing learning with Visual Studio applications-assisted toward the student's conceptual understanding. This research was carried out in SMP Negeri 1 Gresik, 8th grade (VIII F) with a total of 30 students.

Student's mathematics conceptual understanding

After problem posing learning with Visual Studio applications-assisted is complete, the results of the pretest and posttest are obtained. The following table shows the average score of conceptual understanding at the pretest and posttest:

Table 1 . Data

Test	Min	Max	SD	Mean
Pretest	35	85	13.70	61.33
Posttest	55	100	13.56	85.66

From table 1 above shows that the value of ability on the results of pretest and posttest changes. The mean of conceptual understanding from posttest (85.66) is greater than pretest (61.33). To find out whether there is an effect of problem posing learning with Visual Studio applications-assisted in the form of differences between the average values before being given treatment (pre-test.) with an average value after being given treatment (post-test) by using t-paired test. Because the data collected is not in normal distribution, the data were

analyzed by non-parametric test, Wilcoxon Signed Ranks by SPSS 25. The test result showed the Asymp.Sig values <0.05. This proves that H_0 is rejected and H_a is accepted which means there is a significant difference between the average pre-test value and the average post-test score. This indicates that problem posing learning with Visual Studio applications-assisted affect student's mathematics conceptual understanding. The positive rank indicated by the Wilcoxon Signed Ranks test means that the effect is an improvement in students' conceptual understanding. In line with Siswono (2018) state that problem posing stimulates an improvement in students' mathematical abilities. Problem posing methods was statistically effective in improving student's conceptual understanding. Student mathematics N-gain test result showed conceptual understanding with score 0.61 and categorized as medium.

Problem posing learning emphasizes the formulation of problem, making each student compete in formulating a problem and solving it en on the problem posing sheet. Learning activities are not teacher-centered, but more demanding student activities so that students' interest in learning is greater and students are easier to understand the problem because they practice making their own problem. All students are motivated to be actively involved in making problems and solving them. By creating or constructing a problem that can be solved, students always build new understanding based on available information. The problem that are generated often become the trigger for the ability to form a better understanding of concepts in students.. To support learning activities, assisted with the Visual Studio Application with Cube and Cuboid topic.

Factors that cause learning with problem posing shows the results better because it has two stages cognitive activities that support students to active learning. Both stages are accepting (accepting) and challenging (challenging). The accepting phase is an activity students accept given situations teacher or predetermined situations. In this case, through the worksheet assisted with Visual Studio Application. The challenging stage is something student activities challenge the situation inside framework for formulating problem. Student posing a problem in group and exchange their problem with the other group.

Results of Student Activity Observations

Researchers used student observation sheets to find out the activities of students during the problem posing learning with Visual Studio applications-assisted. Obtaining data on student activity is carried out by observers using an observation sheet. Based on observations, data on student activity obtained as follows.

Table 2 Recapitulation of Student Observation Results

Aspect that observed	Percentage
Ask an opinion to the teacher or to another student	61.67%
Respond to teacher questions or instructions	40%
Discuss or participate in groups	93.33%
Do the student worksheet	86.67%
Participate in the stage of formulate problem	80%
Use existing learning resources	68.33%

Based on the observations of student activities in this study, it can be concluded that the activities of students during the problem posing learning with Visual Studio applications-assisted are active. In line with Utama (2014), student learning activities during the learning process with problem posing approach categorized as active. The active involvement of student in a learning activity allows them to gain in-depth understanding of the topic being studied, and will be able to improve student's conceptual understanding of the topic. In general, students become happy with the problem posing learning method because there is a new through the "posing problem" activity.

CONCLUSIONS

Based on the results of the research and discussion above about the effect of problem posing learning with Visual Studio applications-assisted on conceptual understandings of students can be concluded that:

1. Problem posing learning with Visual Studio applications-assisted affects students' conceptual understanding.
2. Based on observations of students' activities during the learning process of problem posing learning with Visual Studio applications-assisted is quite active and most students want to participate in the learning process.

Based on the results of research, the researchers gave the suggestions that for further research with Problem posing learning with Visual Studio applications-assisted, to pay attention to the time allocation and prepare LCDs and laptops so that learning runs smoothly. In research it is better to use a larger study

population so that the conclusion result of students ability improvement are expected to be more generalized. The results of this study are expected to be an idea for other researches to carry out advanced research that has the potential to improve students's conceptual understanding, in mathematics learning and other aspect such as creative thinking (Siswono, 2007)

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