THE INFLUENCE OF *VIDEO-AIDED FLIPPED CLASSROOMMODEL ON STUDENTS' REASONING SKILLS MATHEMATIC IN* SMP N 6 PEKALONGAN

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ABSTRACT

The teaching mathematics in Indonesia has not achieved satisfying results. This can be seen from some survey findings of Indonesian students' learning achievement in mathematics which show that students' average scores in mathematics test were still low. The teaching process of mathematics in SMP N 6 Pekalongan faced some problems. When students solve mathematics problems which relate to their reasoning ability. One of the ways to solve the problems is the use of a learning model called video-aided Flipped Classroom. The objectives of the study are: (1) to find out the differences of students' reasoning ability between those who learn through the Flipped classroom and those who learn through expository classroom; (2) to find out the reasoning ability of the students who learn in the video-aided Flipped Classroom. The data were collected through the use of reasoning ability test. T test and proportion test were used to analyse the data. The result shows that the reasoning ability of the students who learn in Flipped classroom is higher than the ability of those learning in expository classroom. Besides, the reasoning ability of those learned in the Flipped Classroom can achieve all of the learning targets.

Keywords : Flipped Classroom, Video, Reasoning Ability

A. INTRODUCTION

Mathematic learning in Indonesia today has not shown satisfying result. It can be seen from some surveys of Indonesian students' achievement which showed that the mean of mathematic test score were still in low level. For example, some surveys conducted by *trend in International mathematics and Science study* (TIMSS) and Program for International Study Assessment (PISA) showed the unsatisfying result. This survey was carried out once in four year. In 1999, Indonesian position was in 34 from 46 countries. In 2007, Indonesia was in 36 from 49 countries. In 2011, Indonesian was in 36 from 40 countries. While the result of PISA in 2006 showed that Indonesia was in position of 50 from 57

countries with the mean score of Indonesian only 391. In 2009, the result of survey conducted by PISA did not show better position. Indonesia only placed in 61 from 65 participants with score 371. In 2012, the result of survey conducted by PISA showed worse result compared to previous position; it was 64 from 65 countries participate with the score 375. Even in 2012, Indonesia was in the second last position.

From the result of survey conducted by both TIMMS and PISSA, Indonesian students' achievement in mathematics was not getting better but decreasing. The students' achievement did not improve but dropped drastically. It cannot be ignored or else it will be much worse. Thus, the betterment in education must be done so that next Indonesian students may reach achievement in international level.

Some affords have been done in education field by government such as by changing curriculum form KTSP (school based curriculum)to curriculum of 2013 and will be finalised into National Curriculum. This policy was taken in order to improve students' abilities in reasoning and problem solving. However, the policy in curriculum changing will not give effects significantly if it is not balanced with teacher affords to hold the learning process in mathematic learning in school.SMP N 6 Pekalongan is one of the schools which has implemented curriculum 2013. The learning process in this school may be considered as good. Students' achievement in mathematics also reached minimum completion standard (KKM) as expected with score 75. The students also had high motivation and enthusiasm in the learning process. However, the process of learning of mathematic in SMP N 6 Pekalongan cannot be separated from the problems such as doing exercises which need reasoning ability. Students still experienced difficulties when they didn't get teacher help in doing the exercises. It was based on the interview with the teachers who said that when students were given exercises with reasoning ability, teacher had to give a lot of guidance to do it so that students can find how to solve those exercises. Besides, to solve the exercises which need knowledge of previous material, some students needed to be reminded the material teacher had thought. That was not effective considering the lack of time in class to train

students solving the exercises with high order thinking like reasoning. Therefore, we needed teaching and learning process which was efficient in time so that the result would be maximal.

One alternative to solve the problem of learning process in SMP N 6 Pekalongan was the use of video-aided Flipped Classroom Learning Model. According to Bergmann and Sams (in Yuliety et al., 2015: 7) the concept of learning through Flipped Classroom modelwas basically transforming the learning held in the classroom into the activities performed at home, while the activities that should be done at home were transformed into classroom learning activities. This learning, in practice included Student Worksheets (LKS) and videos that can be accessed offline at home. This video contains a tutorial on the Quadrilateral material. Thus, teachers can minimize the amount of direct instruction in classroom learning and can maximize the interaction between students and teachers and students with other students (Johnson, 2013). In addition, the use of the video made it easy for students to remember past material by playing back their learning videos. This would certainly make teachers able to manage the time in class so that they can use the time efficiently. The attempts to train students' reasoning ability also can be maximized. According to Berrett D. (in Yuliety, et al., 2015: 7) the advantages of this Flipped Classroom model were: (1) the students are more independent in studying the subject matter at home before the teacher presents in the class, (2) the students study the subject matter in the comfortable situation and conditions for students, (3) when students experience difficulties in doing the tasks / exercises, students will get maximum attention from the teacher, (4) students can learn various learning content from video, book, or website.

Research on the application of Flipped Classroom model had been done by Yuliety, et al. (2015: 17) which resulted in a significant difference between students taught by using Flipped Classroom learning model with minimum completion standard 71.56 better than those who were taught by using discovery learning model. Thus this learning model can be appropriately used to improve students' reasoning abilities. Based on this background, the application of video-

aided Flipped Classroom model can influence the reasoning ability, which is indicated by: 1) is the students' mathematical reasoning ability in the quadrilateral material in SMP N 6 Pekalongan who learn through video-aided Flipped Classroom model better than thosewho learn through expository learning? 2)) is the students' mathematical reasoning ability with video-aided Flipped Classroom achieve minimum completion standard.

B. RESEARCH METHODS

The type of research used in this study is quasi experimental research (quasi experiment). In this study, the respondents were divided into two groups. The first group is the experimental group that is the group of students who received the treatment of mathematics learning with video-aided Flipped Classroom model. The second group was the control group, the group of students who learned mathematics through the expository model. The design used in this research was Pre-test -Post-test design of random control group. Pre-test was used to see whether the two groups as research samples weretreated of equivalent or not. The population of this research was all students of seventh grade of 2nd semester of Junior High School 6 Pekalongan in academic year 2016/2017. The sampling used random sampling technique.

The instrument used to obtain the data in this study was the reasoning ability test. Before it was used in research, the test instrument was validated by two lecturers and one math teacher. After the validation phase, the instrument wastested in the experimentation class to meet the requirements of a good research instrument, which was valid, reliable, not too easy or difficult, and significant differentiation. Based on the instrument analysis, five of the six test items were eligible to be used. Techniques of data analysis (hypothesis test) used wereaverage variance test and completion that is t test with help of SPSS -19 for Windows.

C. FINDING AND DISCUSSION

After it was found that the two groups were from the same situation, they were treated differently.The experimental group was treated by using video-aided Flipped Classroom model while the control group using expository learning. The lesson was conducted in four meetings with the first meeting discussing the properties of rectangles, square, and parallelograms. The second meeting discussed the properties of rhombus, kite, and trapezoid. The third meeting discussed the area and perimeter of rectangles, squares, and parallelograms. The fourth meeting discussed the area and perimeterofrhombus, kitesand trapezoids.

The learning in the experimental class appliedvideo-aided flipped classroom model. Teachers provided videos and worksheets to students to be studied at home. The video contained quadrilateral material. Students were in charge of studying the content of the video, completing the worksheet, and writing down problems they did not understand yet from the video. Through the video, students were more ready to receive lessons and more independent. This corresponded to one of the advantages of Flipped Clasroom model (Barrelt, D., 2012). In class, students already understood some of the materials that would be taught, and they just asked questions about the thing they didn't understand yet. Then teachers formed groups of three or four students. The teacher gave a class worksheetcontained the exercises done in groups. Those worksheets were used as a group discussion material and to measure the extent to which the material already understood by students. Classroom learning couldfocus more on practicing reasoning skills. When there were difficulties,some studentscould ask the teacher. In the application of the Flipped Classroom model, the teacher's job was only as a facilitator. This was in accordance with Vygotsky's interaction theory of social constructivism. These interactions could include group discussions, group work, and teacher functioned as facilitator (Baharudin, 2008: 124). These interactions could help students understand and solve reasoning problems.

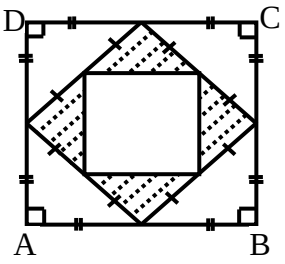
At the first meeting, a student was given the opportunity to convey the conclusions of the video watched at home and other students could ask the material in the video they didn't understand. The activities continued by grouping

the students and giving them Worksheet for class discussion. To complete the assignment on the worksheet, students could use the book or a summary they made. Some students had difficulties in opening a video because they didn’t have computer / laptop at home so that there were individual tasks the students hadn’t done yet. Thus, the learning process could not go well because teacher should start the class by explaining the material first. In addition, students were still difficult in completing the group task which contained the problem of reasoning from preparing the assumption to drawing conclusion. Thus the role of teachers in guiding students was still very dominant.

In the second meeting, the grouping of students was done from the beginning of the lesson. Students had opened the video given at home in groups but the taskwas still done individually. In the class, the discussion went well. It can be seen from the activity of students in completing worksheet in groups. The difficultyin the second meetingwas when the student could not manipulate the mathematical form; it was shown when they had to determine the angle if the ratio of the other angle is known. In addition, students also had difficulty in making assumptions and providing reasons, or evidence when they were asked to determine a parallelogram which had a diagonal perpendicular to each other is a rhombus. The teacher's role started to decrease because the students were actively discussing in their group.

At the third meeting the difficulties students had in doing worksheet was is the difficulty of students in operating the formula. Another difficulty was in determining the perimeter of the plane which was combination of some planes. This showed the ability of students in doing mathematical manipulation was still lacking. In the process of classroom learning there were no problems at all but when students were asked to solve the problems in the worksheet, there were still a lot of students who found it difficult in determining the area or perimeter of the plane. This problem appeared because it required good mathematical manipulation skills. However, with the role of teachers in guiding students in the classroom, those the students' difficulties could be solved very well.

At the fourth meeting, the video could be understood by the students well. It could be seen from the summary that could help students in the completion of worksheet. Students' ability to apply perimeter and area material on kite, rhombic, and trapezoidal materials was good. Classroom learning could run smoothly. Group discussions and class discussions could work well. The role of the teacher was not too dominant as before. While working on class worksheet, there was difficulty the students have to determine the area and perimeter of shaded areas as shown below.



Problems given in class worksheet aimed to train students' reasoning skills. This was done to train students' reasoning skills to be better. However, because classroom learning focused only on practicing reasoning skills and students already understood the material at home, students had enough time to work in the classroom. A little guidance given by the teacher could lead students to find a solution to the problem. Thus, students were accustomed to solve the problem of reasoning ability.

Implementation of learning in experimental class run smoothly. After both groups were given treatment, the next step was to give them the final test. This final test is a reasoning ability test. The test consisted of five questions. Based on the result of the final test with t test, the asymp sig (2 tailed) value was 0,007 <0,05 then H_0 was rejected. This means that there was a difference in reasoning ability between students who received learning with the video-aided Flipped Classroom model with those who acquired expository learning model. When we saw from the average of the two classes it was found that the average of experimental class reasoning ability was 76.45 greater than the average of control class reasoning ability which was only 68.52. This showed that learning with video-aided Flipped Classroom model was better thanthat with expository learning in improving students' mathematical reasoning ability in rectangular material.

The occurrence of differences in reasoning capability was due to the application of video-aided Flipped Classroom model. The use of videos could help students to understand the material. This was in line with Piaget's theory that every student tried to seek and build his own knowledge (Muhsetyo, 2009: 1.9). When students built their own knowledge it would make it easier for them to remember the material. Thus, in the classroom teacher didn't need to explain the material in detail. This could make teacher spend time more efficiently. Classroom learning can be maximized to train students' reasoning skills. Students were conditioned to discuss in groups to solve problems of reasoning ability. The interaction between students and the interaction between students and teachers could overcome the difficulties of students in solving the problem of reasoning ability. While in the control class, time was spent more on describing the material. Students also did individual exercises and when they had difficulties, students usually just waited for an explanation from the teacher.

In this study, besides aiming to find out which one was better in the average of reasoning ability between experimental class and control class, it also aimed to know how mastery of reasoning ability of experiment class. Based on the test of completeness in the experimental class, we obtained asymp sig (2 tailed) value of 0.402> 0.05 then H_0wasaccepted. It means that the students' reasoning ability treated by using video-aided Flipped Classroom model was equal to 75. This means that the reasoning ability of the experimental class could reach minimum completion standard. The result of this study was in line with the research conducted by Adhitiya, et al (2015) which showed that the results of problem solving ability of eighth grade students who obtained learning by using Traditionaltype Flipped Classroom model and Peer Instruction Flipped can achieve standard of minimum completion.

The research conducted by Natalie (2012) showed flipped classroom model provided many benefits. These benefits can also be seen in this study, among others, with the application of video-aided Flipped Classroom model, students can repeat the material anytimethey need. The video was equipped with worksheet, so the teacher can measure the extent to which students can understand the materials

and problem they have been learned at home. With the video, students were more independent because they had the opportunity to learn itat home. In class, students had more time to discuss the problems, especially those that require high-level thinking. Therefore, the application of video-aided Flipped Classroom model can improve students' reasoning ability. Thus, it can be concluded that the application of video-aided Flipped Classroom model on rectangular material gave effect to students' reasoning ability in SMP 6 Pekalongan. It was proved by the students 'mathematical reasoning ability treated by using video-aided Flipped Classroom model were better than those treated by using expository learning and their reasoning ability treated by video-aided Flipped Classroom model can reach minimum completion standard.

D. CONCLUSION

Based on the results of study above, it can be concluded that:

1. Students' reasoning ability of SMP N 6 Pekalongan in quadrilateral material treated by using video-aided Flipped Classroom model was better than those who learned through expository learning model.
2. Students' reasoning ability of SMP N 6 Pekalongan in quadrilateral material invideo-aided Flipped Classroom learning model can reach minimum completion standard.

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