THE IMPLEMENTATION OF FLIPPED CLASSROOM STRATEGY IN MATHEMATICS LEARNING TO COGNITIVE ABILITIES VIEWED FROM STUDENT'S LEARNING INTEREST

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ABSTRACK

The purpose of this research is to analyze : (1) the influence of the use of flipped classroom strategy to student's cognitive abilities, (2) the influence of student's learning interest to cognitive abilities, (3) the interaction between the use of flipped classroom strategy and student's learning interest to cognitive abilities. The populations are all students o grade XI IPA of 2013/2014 academic year in SMA Negeri 1 Surakarta. Sample taken in this research as many as two classes, consist of XI IPA 2 as experiment class with 32 students and XI IPA 1 as control class with 32 students. The sampling technique used in this research is cluster random sampling. Data collection method used are questionnaire method, method of test and documentation method. Data analysis techniques use two ways analysis of variance with unequal cells, a prerequisite test used the Liliefors method to normality test and the Bartlett method to homogeneity test. From the analysis of data with 5% of significant level, it is satisfied that : (1) there is no influence of the use of flipped classroom strategy to student's cognitive abilities with $F_A = 3,801$, (2) there is no influence of student's learning interest to cognitive abilities with $F_B = 2,242$, and (3) there is no interaction between the use of flipped classroom strategy and student's learning interest to cognitive abilities with $F_{AB} = 0,098$.

Keyword : Flipped classroom strategy, cognitive abilities, learning interest.

Introduction

In learning at school, determined a specified learning objectives. The purpose of of this study include three aspects, there are cognitive, affective, and psychomotor (Yamin, 2009: 27). In general, the cognitive aspects of learning outcomes include intellectual, and affective aspects with regard to attitudes, whereas psychomotor aspects with regard to the results of the skills and capabilities to act. On the formation and human resources, education in schools

divide students competencies in a subject. Mathematics is one of the subjects taught in schools in which there is a cognitive aspect.

Implementation of learning in the classroom is one of the main tasks of teachers. In conventional teaching pattern is more dominant role of teachers, so students tend to be passive. Conventional teaching pattern has set teachers teaching students to pay attention in class. Students tend to be quiet, listen, and record things that are important from the lesson. Students will be given an assessment for homework to show mastery of the topic.

Interest is one factor that plays an important role in learning achievement, especially in cognitive abilities. Interest is the tendency of individuals to do the deed. Students will be encouraged to learn when to have interest in learning. Interest in learning will be able to support students to produce something better than the previous conditions and achieve good learning performance as well.

A strategy that can be used as a reference for teachers in influencing interest in learning math learning strategies are flipped classroom, flipped classroom method because the students can learn from video tutorials given by the teacher. So that the students do not learn easily bored because just listening to the explanation from the teacher. Flipped classroom learning with students first learn the subject itself, typically using a video lesson created by the instructor or shared by other educators, such as those provided by the Khan Academy. In the classroom, students then try to apply knowledge to solve problems and do the practical work. The teacher's role is to provide assistance in learning when students are having trouble, not to provide early learning, so teachers can spend more time interacting with students, rather than teaching. This allows time in the classroom to be used for additional activities -based learning, including the use of differentiated instruction and project -based learning.

From the descriptive above, this study conducted aimed to analyze : (1) the influence of the use of flipped classroom strategy to student's cognitive ability, (2) the influence of student's learning interest to cognitive ability, (3) the interaction between the use of flipped classroom strategy and student's learning interest to cognitive ability.

Research Method

This study used an experimental research, that is research that will compare the result of two specific types of treatment, there are the experimental class and the control class. In this research, the independent variables are strategy of learning and learning interest. While, the dependent variable is student's cognitive abilities. In this case, the influence of application of flipped classroom strategy will be controlled and viewed to other variables, that is cognitive ability.

The research is conducted by dividing the subjects into two groups, experiment and control groups. The experiment group is given flipped classroom strategy in learning process, while the control group will be subject to conventional strategy.

The research is conducted in SMA Negeri 1 Surakarta located at Jalan Monginsidi No. 40 Surakarta. The population in this study is student of grade XI IPA of SMA Negeri 1 Surakarta in the odd semester, which consists of eight classes with an average of students per class is 32 people. The researcher takes samples two classes of grade XI IPA that are XI IPA 2 as an experiment class uses flipped classroom strategy and class XI IPA 1 as a control class uses conventional strategy in mathematics learning.

The sampling technique used in this study is cluster random sampling, where the population is divided into several groups based on specific areas or groups (clusters) and finally taken entirely at random as the sample. Before being given a treatment, both groups should be used to test whether the experiment class and the control class in a state of balance.

Data collection methods used are questionnaire method, method of test and documentation method. Before test and questionnaire are used, they need to be examined whether it is feasible to use in research. Test used is the validity and reliability test. To determine the validity of achievement test and questionnaire, it uses Product Moment Correlation formula. Whereas, the level of reliability of achievement test and questionnaire use Alpha Cronbach formula.

The technique of data analysis uses two-way analysis of variance with unequal cells. Before doing analysis of variance, prerequisites analysis test must

be conducted. It consist of normality test uses tha Liliefors and homogeneity test uses Bartlett.

Result and Discussion

The implementation of research, researcher collects data to be processed. Before the sample is given treatment, researcher does the balance test to determine whether experiment and control class are balance. Data for balance test are taken from the score statistic evaluation.

Instrument in the research include multiple choice test on the subject of permutation and combination of student's cognitive abilities and questionnaire of student's learning interest. The multiple choice test consists of 20 questions and the questionnaire consists of 25 question that have been adapted to the lattice. After being arranged the instrument research, it is tested to 28 students of XI IPA 5 SMA Negeri 1 Surakarta in the odd semester. The result of tryout instruments are tested validity test and reliability test. Items are used to obtain data from the respondent is valid and reliable items, the invalid and unreliable test are not used. There are 16 items of cognitive abilities and 21 items of learning interest used in this research.

The instrument of research qualified is tested in the experiment and control class. The data of cognitive ability and student's learning interest is obtained from score of test after doing treatment. The maximal score of cognitive abilities in control class is 94 and the minimal score is 50. The average of control class is 74,74 and a standard deviation is 12,030. The maximal score of cognitive abilities in experiment class is 94 and the minimal score is 50. The average of experiment class is 80,48 and a standard deviation is 10,201. There is 11 students have high learning interest, 11 students have medium learning interest, and 9 students have low learning interest in experiment class. In control class, there are 9 students in high learning interest, 12 students have medium learning interest and 10 students have low learning interest.

The data from each variable collected is used to test the research hypothesis. Ater the normality test and the homogeneity test can be fulfilled then the analysis of variance can be done. Normality test is intended to determine whether a sample

comes from a population that is normally distributed or not. The method used in the normality test is Liliefors method in 5% of significant level. Homogeneity test to find out that the populations being compared have the same variance. The homogeneity test in this research uses Barlett method with 5% of significant level. From the calculation of normality test and homogeneity test are obtained that samples come from population in normal distribution and the independent variable have the same variance or homogeneous.

Analysis of variance uses the analysis of variance two ways wih unequal cell. From the calculation, it's the following summary:

Table 1

The Summary of Analysis of Variance Two Ways with Unequal Cell

Tests of Between-Subjects Effects

Dependent Variable:Kemampuan_Kognitif

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1081.438[a]	5	216.288	1.757	.137
Intercept	367701.169	1	367701.169	2.987E3	.000
Strategi	467.941	1	467.941	3.801	.056
Minat_Belajar	551.865	2	275.932	2.242	.116
Strategi * Minat_Belajar	24.088	2	12.044	.098	.907
Error	6893.272	56	123.094		
Total	381448.000	62			
Corrected Total	7974.710	61			

a. R Squared = ,136 (Adjusted R Squared = ,058)

Based on Table 1 above then the result of analysis of variance two ways with unequal cell is satisfied that: (1) there is no influence of the use of flipped classroom strategy to student's cognitive ability with $F_A = 3,801$, (2) there is no influence of student's learning interest to cognitive ability with $F_B = 2,242$, and (3) there is no interaction between the use of flipped classroom strategy and student's learning interest to cognitive ability with $F_{AB} = 0,098$.

In the experiment class 2 or class XI IPA 2 (with the use of flipped classroom learning strategies) gained an average cognitive abilities at 80.48 while the control class or a class XI IPA 1 (with the use of conventional learning strategies) obtained an average cognitive abilities at 74.74. This suggests that the average distance the experimental class students scores higher than control class. The results of this study are similar to Cara A. Marlowe (2012) in his study entitled The Effect Of The Flipped Classroom On Student Achievement And Stress shows that the value of half of the students showed improvement, but test scores did not show significant improvement.

The use of conventional and flipped classroom startegies well received by students because basically students have good mathematical skills. In addition, the material in the video tutorials only explain the general formula of permutation there is permutation of r elements from n elements, so that students in the experimental class difficulty working on the cyclic permutation and permutations with some elements are same. However, the limited frequency of researchers in implementing flipped classroom strategies in experiment class then the influence of the use of flipped classroom strategy does not seem significant to the achievement of the cognitive abilities of students. Besides the fact that researchers found that given that students can view video lectures on their own computers , the conditions in which they are likely to see the video lectures becomes ineffective learning (eg students can view video while listening to music) and students do not watch or understand the video because that they are not ready or are not quite ready for a face-to- face activities. This is similar to the opinion of Natalie (2012) which states that the flipped classroom strategy also has some limitations in its application. This condition causes no effect on the use of strategies flipped classroom cognitive abilities of students in learning mathematics in students of SMA Negeri 1 Surakarta.

The results showed that the level of learning interest different students (high, medium, low) has no effect on student's cognitive abilities. Students who have a high level of learning interst is not necessarily to get the achievement of high cognitive abilities as well and vice versa students who have a low level of

learning interest is not necessarily to get the achievement of lower cognitive abilities also.

This is contrast with the results of the study Achmad (2012) which states that learning to use instructional media CD e-learning high school math include discussion and presentation method is more effective than conventional learning in terms of learning interest. This is because diferent subject taken. Researchers found that the student's interest in the SMA Negeri 1 Surakarta not necessarily affect cognitive abilities because there are several other factors that affect the outcome of student's cognitive abilities such opinion JS Renzulli in Yuliani (2009: 18) that is easy to capture subjects, good memory, sharp reasoning, power good concentration, control of many materials about various topics, quickly solve the problem, and quickly find errors or mistakes.

Disadvantages interaction between learning strategies and learning interest can be seen in the graph in Figure 1, the graph average cognitive abilities of students in the experimental class and the control was not cut. It states that the differences between the characteristics of the flipped classroom and conventional strategies at each level of student interest is consistent. Then, learning strategies and student interest does not occur in a systematic interaction on students' cognitive abilities.

Table 2

Mean of Cognitive Abilities and Learning Interest

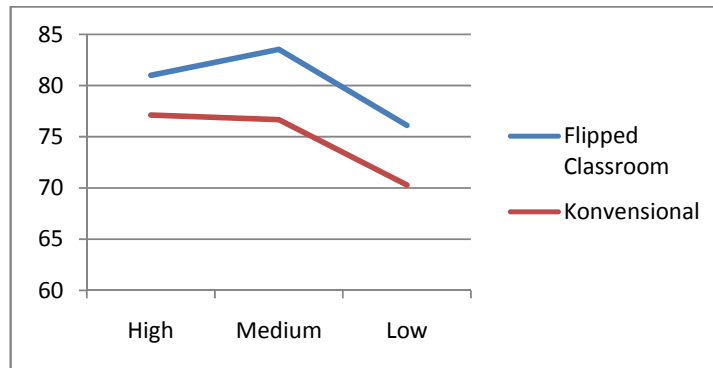| Class	Learning Interest			Marginal Average
	High	Medium	Low	
Experiment	81,000	83,545	76,111	80,218
Control	77,111	76,667	70,300	74,693
Marginal Average	79,055	80,106	73,2055	

Figure 1

The Average of Student's Cognitive Abilities

In Experiment and Control Class

Viewed from Learning Interest

Conclusion

Based on the result of analysis and discussion done in the previous chapter with 5% significant level. It can be concluded that: (1) There is no influence of the use of flipped classroom strategy to student's cognitive abilities in SMA Negeri 1 Surakarta with $F_A = 3,801$, (2) There is no influence of student's learning interest to cognitive abilities in SMA Negeri 1 Surakarta with $F_B = 2,242$, and (3) There is no interaction between the use of flipped classroom strategy and student's learning interest to cognitive abilities in SMA Negeri 1 Surakarta with $F_{AB} = 0,098$.

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