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The Implementation of Advance Organizer Model on Mathematical Communication Skills in terms of Learning Motivation

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Abstract: Students' low mathematical communication skill is influenced by several factors such as learning models applied by teachers in the classroom and the students' learning motivation. Advanced organizer Model is appropriate to improve the students' low ability. This study aims to determine whether: (1) there is an influence of advance organizer model toward the mathematical communication skill; (2) there is an influence of learning motivation toward the students' mathematical communication skill, and; (3) there is an interaction between learning model and motivation toward mathematical communication skill. This research employs quasi-experimental design and the statistical analysis used is the two-ways variance with unequal cells. The result of this research shows that: (1) there is an influence of advance organizer model toward mathematical communication skill; (2) there is an influence of learning motivation toward students' mathematical communication skill, and ; (3) there is no interaction between learning model and motivation toward mathematical communication ability.

INTRODUCTION

Every human being needs both formal and informal education (Anwar, 2017; Kholid, 2013). Education is an effort to develop a power in acquiring intelligence, personality, and skills necessary in everyday life (Khayota, Sitti, & Sonnsusap, 2015; Putra, 2016; Wulandari, Suarsini, & Ibrohim, 2016). Education can also be said as a process of changing attitudes and behavior of a person in an effort to mature themselves through teaching and learning (Erlinda, 2017; Widyawati, 2016). The educational world cannot be separated from the learning process, teaching and learning process is a communication process between the delivery of messages from the source of the message through a channel or a particular media to the recipient of the message (Sardiman, 2012). One of the learning processes found in the world of education today is the mathematics teaching and learning process. Mathematics has an important role because it is the basis of the logic or reasoning and quantitative solutions used in other lessons (Nugroho, Putra, Putra, & Syazali, 2017). Learning mathematics not only to understand the concept or the procedure but many things that can arise from the learning process of mathematics (Putra, 2017; Susanto & Nurmaya, 2015). One of the skills that must be possessed by learners is the mathematical communication skill because this ability is part of mathematical potency.

From the results of pre-study on April 23, 2017, the authors obtained data from the test results of mathematical communication skills. It showed that 73.5% of students scored less than 75. Low ability is suspected caused by the application of learning models conducted by the teacher. Based on the observation when the pre-research was conducted, the teacher was still using conventional learning models.

One of the cooperative learning models that can be applied to increase the students' problem-solving abilities is learning through advanced organizer model. Advance organizer model is a short presentation of visual and verbal information that does not contain any specific content or material of new material to be studied (Atomatofa, 2013; Chuang & Liu, 2014; Nurhayati, 2017; Pietzner, 2014). The application of this learning model has been done by several researchers and gives positive impact in improving students' learning outcomes (Panggabean, 2013; Silaban & Napitupulu, 2016). In addition to learning models, other factors that affect the low ability of students is the motivation to learn (Fatchurrohman, 2017; Hamdu & Agustina, 2011; Kertamuda, 2008; Kiswoyowati, 2011), because motivation is an internal factor of every human being that is very easy to change. Based on the presented argument, the researchers conducted a research entitled the implementation of advance organizer model on mathematical communication skills in terms of learning motivation.

METHOD

This research used the quantitative method with Quasi-Experimental Design. The subjects were the seventh-grade students of MTs Mambaul Ulum Margoyoso, Lampung Province. This research instrument was in the form of a test of mathematical communication skill and a questionnaire on learning motivation. The test of mathematical communication skill was in the form of a description test consists of 8 questions and the questionnaire of learning motivation was in the form of a Likert scale that contained 30 statements. Hypothesis test used was two-ways ANOVA with unequal cells.

RESULT AND DISCUSSION

Research data that had been successfully collected was then analyzed using two kinds of statistical techniques, namely descriptive and inferential statistics. Descriptive statistics were used to describe the state of the data and classify learning motivation data into three categories. For this purpose, statistical analysis was done to determine the minimum, maximum, mean, median, standard deviation and, mode. Inferential statistics used were prerequisite tests, two-way ANOVA with unequal cells and Scheffer test. The prerequisite tests encompassed the normality and a homogeneity test. The experimental class was taught using the advance organizer model assisted by Macromedia flash, and the control class was taught using the conventional learning model.

Table 1. Calculation of Two-way ANOVA

Class	Motivation			
		High	Medium	Low
Experiment	N	6	22	6
	Σx	536	1595	307
	xbar	89 333	72 500	51 167
	Σx^2	47 916	116 671	15 805
	C	47 883	115637.500	15 708
	Ss_{ij}	33 333	1033.500	96 833
Control	N	8	20	7
	Σx	686	1433	249
	xbar	85 750	68 238	49 800
	Σx^2	58 872	98 477	12465
	C	58 824	102674.450	8857
	Ss_{ij}	47,500	-4197.450	3607.714

Table 1 shows that the average score of students taught using an advance organizer model assisted Macromedia flash is greater than the average score of

the students who were taught using the conventional learning model. The hypothetical test used in this research was two-ways ANOVA with unequal cells. The following tables summarize the results of the test.

Table 2. The Summary Two-ways ANOVA with Unequal Cells

Source	JK	Dk	RK	$F_{critical}$	F_{table}	Conclusion
Experiments (A)	121.81	1	121 811	12:15	3996	H_0 rejected
Controls (B)	11849.13	2	5924.568	591.09	3,145	H_0 rejected
Interaction (AB)	19 747	2	9873	0985	3145	H_0 accepted

Based on the analysis of variance in table 2, it shows that:

1) In the main effects of A learning model (Advance Organizer assisted Macromedia flash) shows that the $F_{critical} = 12.153 > F_{table} = 3.996$, it means that H_{0A} is rejected. So it can be concluded that there is an influence of application of Advance organizer model assisted by Macromedia flash toward students' mathematical communication skill.
2) In the main effect of B obtained the result that $F_{critical} = 591.093 > F_{table} = 3.145$ which means H_{0B} is rejected. It can be concluded that there is an influence on learning motivation toward students' mathematical communication skill.
3) On the interaction effect of AB (learning model and learning motivation) obtained the result that $F_{critical} = 0.985 < F_{table} = 3.145$ which means H_{0ab} is accepted. So that the conclusion that there is no interaction between learning model and learning motivation toward students mathematical communication skill.

Table 3. Mean of Marginal Data from Each Cell

Learning Strategies	Learning Motivation			Mean
	High	Medium	Low	Marginal
AO + MF	89 333	72.5	51 166	71 000
Conventional	85.75	68 238	49.8	67 929
Marginal Mean	87 541	70 369	50 483	

Based on Table 1 of the first hypothesis shows that H_0 is rejected, which means there an influence of Advance Organizer Model assisted by Macromedia flash toward mathematical communication skill. Since the compared groups have only consisted of two groups, so post-ANOVA test was not needed. Based on Table 3, the result of or Advance Organizer Model assisted by Macromedia flash has an average score greater than the average score of the group of that used conventional learning models so that it can be concluded that Advance Organizer Model assisted by Macromedia Flash provides better mathematical communication skills than learning through the conventional model. The result of this study is in line with previous research which states that Advance Organizer Model gives a better result than conventional learning model (Melati, 2012; Panggabean, 2013; Silaban & Napitupulu, 2016).

Then in the second hypothesis, to see which category of learning motivation has a better effect on the understanding of mathematical concepts, there should be

multiple comparison tests between rows using the *Scheffe* method. The result of multiple comparison tests between rows can be seen in Table 4.

Table 4. Summary of multiple Comparison Test

No.	H_0	$F_{critical}$	F_{table}	Desc.
1	μ_1 vs μ_2	309.07	6,290	Rejected
2	μ_1 vs μ_3	19.69	6,290	Rejected
3	μ_2 vs μ_3	923.64	6290	Rejected

Description:

μ_1 : high motivation levels

μ_1 : medium motivation level

μ_3 : low motivation level

Based on Table 4, in the first null hypothesis, it can be concluded that there is a difference in the effect of learning motivation on mathematical communication skill of the learners. Based on Table 3, it can be concluded that the mathematical communication skill of the students who have high learning motivation is better than students who have medium learning motivation. In the second null hypothesis, it can be concluded that there is a difference in the effect of learning motivation on mathematical communication skill of the students.

Based on Table 3, it can be concluded that learners who have high learning motivation are better than learners who have low learning motivation in regard to the mathematical communication skill. In the third null hypothesis, it can be concluded that there is a difference between the effect of learning motivation on the students' mathematical communication skill. Based on Table 3, it can be concluded that learners who have high learning motivation are better than students who have low learning motivation toward the mathematical communication skill. The results of this study are in line with some previous research which states that the motivation to learn affects the learning outcomes of learners (Fatchurrohman, 2017; Hamdu & Agustina, 2011; Kertamuda, 2008; Kiswoyowati, 2011).

In the third hypothesis, based on the two-way ANOVA with unequal cells H_{0AB} is accepted, so no need for multiple comparison tests between cells. Based on this, it can be concluded that in each category of learning motivation, advanced organizer model produces better mathematical problem-solving abilities than the conventional learning model. This is alleged because teachers often do not use cooperative learning in teaching and learning. When the researcher applied advanced organizer model, students with high learning motivation were more interested in learning, so the application of advance organizer model provides better mathematical problem-solving skill than the conventional learning model.

In the third hypothesis also, it can be concluded that in each model of learning, students with high learning motivation have better problem-solving skill than students who have low and moderate learning motivation, while students with medium learning motivation were better in problem-solving than students who have low learning motivation. In the application of advance organizer model, students with different categories of learning motivation also follow learning in different ways so that the results obtained are as described.

The results of these studies prove that that advance organizer model is appropriate to use. While paying attention to the category of motivation to learn will also greatly help teachers to choose a more innovative learning model.

CONCLUSION

Based on the results of the analysis and discussion on the influence of advanced organizer model toward mathematical communication skill in terms of learning motivation at the seventh grade students of MTs Mambaul

Ulum Margoyoso on the mathematical sets material, it was found that: (1) there is an influence Advance Organizer model on the students' mathematical communication skill; (2) there is an influence of learners' motivation toward the mathematical communication skill, and; (3) there is no interaction between learning treatment with the students' mathematical learning motivation category. The other researchers who want to use the Advanced Organizer Model in their research, it is suggested to add the number of meetings in learning so that each learning process can be conducted optimally.

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