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Mathematical Connections Based on Self regulated learningon MEAs Learning and Independent Learning with Module Assisted

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Abstract

This study aims to determine the effectiveness Eliciting Activities Models learning and independent learning with module assisted on mathematical connections of students and to know mathematics connection based on self regulated learning. This study uses mixed method with concurrent embedded. Subjects of this study were 7th grade students of MTs Islamiyah Blingoh 2018/2019 school year. In the quantitative stage. random sampling consisted of three classes. Two classes are used for the experimental class and one class is used for the control class. The results showed that the Eliciting Activities Models and independent learning with module assisted was effective against mathematical connection skills. Students with high self regulated learninghave very good connections by fulfilling three indicators. namely the connection between topics in mathematics. the connection between mathematical material and science other than mathematics and the connection between mathematics and everyday life even though there are insignificant errors in connection indicators between mathematical topics. Students with moderate self regulated learninghave good connections by fulfilling two indicators. namely connections between topics in mathematics are mastered with good categories and connections between mathematics and science other than mathematics are mastered by sufficient categories while connections between mathematics and everyday life are controlled in good categories. Students with low self regulated learning cannot attain a good mathematical connection indicator. connections between topics in mathematics and connections between mathematics and science other than mathematics are mastered by fewer categories while connections between mathematics and everyday life are controlled insufficient categories. In Eliciting Activities Models learning and independent learning with modules assisted are better equipped with apperception activities in order to be able to help students in terms of mathematical connections. especially to improve mathematical connection skills. especially students who have low self regulated learning.

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INTRODUCTION

Article 3 of the Law of the Republic of Indonesia number 20 of 2003 concerning the National Education System states that education is a conscious and planned effort so students actively develop themselves to have religious spiritual power. self-control. noble character and skills needed by themselves. society. nation. and country. Two major goals of education are helping children to be smart and good (Lickona. 2013). The teaching and learning process is a process in which there is the interaction between teacher and student and communication in educational situations in order to achieve learning goals (Rustaman. 2011). In the educational process. the teacher must be able to make students active and creative optimally by no longer applying the conventional style. In accordance with the opinion of Senjaya (2008) that as a facilitator. teachers play a role in providing services to facilitate students in the learning process activities.

Mathematical connection ability is one of the abilities that must be developed in mathematics learning. mathematical connection skills including high thinking skills. Based on NCTM (2003) mathematical connections are the ability of students to recognize. use and make connections between mathematical ideas and contexts outside mathematics to build mathematical understanding. The indicators of students' mathematical connection ability are 1) looking for relationships of various representations of concepts and procedures; 2) understanding and using relationships between mathematical topics and with other topics of discussion; 3) looking for the relationship of one procedure to another procedure in an equivalent representation; 4) using mathematics in other fields of study / daily life; 5) Making conjectures. arguments. defining. generalizing; 6) understand the equivalent representation of the same concept (Sumarmo. 2010)

In developing the mathematical connection skills MEAs learning was applied in this study. According to Lesh (2000). MEAs learning characteristics make problems realistic. by making problems realistic. overall mathematical concepts can be connected with student knowledge. MEAs is a learning model to understand. explain. and communicate concepts in a problem through the process of mathematical modeling (Yulianti. 2013). Through MEAs students are expected to be able to develop and develop conceptual mathematics that makes students feel a variety of mathematical experiences (Chamberlin & Moon. 2008).

In addition to MEA learning. independent learning can also foster student self regulated learningso that it can improve students' mathematical connections. According to Hidayati (2018). learning that involves students to actively build their own knowledge will be able to improve students' mathematical connection skills. Independent learning is a process in which students are involved in identifying what needs to be learned and being in control in finding and organizing answers (Handayani. 2013). So that the self regulated learning of student learning or self-regulated learning is important in the learning process (Risnanosantri. 2013). Indicators of self regulated learningare (1) learning initiatives. (2) diagnosing needs. (3) setting learning objectives. (4) choosing and using resources. (5) choosing and implementing strategies. (6) independent learning. (7) cooperating with others. (8) control themselves (Hendriana. 2017).

According to Ilahi (2012) an independent attitude will bring students to success in pursuing education. self regulated learning learning is a person's ability or students to realize their desires without relying on people other. According to the Ministry of National Education (2010) Independent character is an attitude and behavior that is not easily dependent on others in completing tasks. The

lack of student self regulated learning in the ability to work on mathematical questions causes students' self regulated learningto be low. resulting in low mathematical connection skills. In this case self regulated learning learning affects students' mathematical connection skills. The self regulated learning of student learning is an effort to improve mathematical connection skills. One of the tools used as an effort to improve mathematical connection skills is to apply teaching materials that can help improve mathematical connection skills. The teaching material in question is a module. Modules are a set of teaching materials that are presented systematically so that users can learn with or without a facilitator or teacher (Ministry of National Education. 2008). Module is designed in such a way as to help students complete mathematical connections. so that mathematical connection skills increase.

Based on the previous description. this study aims to (1) find out the effectiveness of MEAs learning and independent learning on students' mathematical connection skills and (2) to know the mathematical connection based on learning self regulated learning.

METHODS

This research uses a mix method research type (a mixture of quantitative and qualitative). According to Creswell (2013) the combination research method is a study that combines or combines quantitative and qualitative forms involving philosophical assumptions. Application of qualitative and quantitative approaches by combining the two approaches in a study. The combination model used in this study is a type of concurrent embedded strategy. This strategy can be characterized as a mixed method strategy that applies a stage of quantitative and qualitative data collection at one time (Creswell. 2013).

The study had been done at MTs Islamiyah Blingoh with integer material. which are 7^{th} grade A as an experimental class that uses MEAs learning with Modules. which are 7^{th} grade B as an experimental class that uses independent learning with modules. and which are 7^{th} grade C as an control class that uses cooperative learning. The technique of collecting data of this study would be done by mathematical connection test. Mathematical connection tests would be conducted twice. which are before treatment (pretest) and after treatment (posttest). The other collection data for student skill based on self regulated learning learning would questionnaires and interviews.

The technique of data analysis on students' mathematical connections by MEAs Learning and Independent learning with module assisted would use prerequisite test of the initial capability test. the data included normality and homogeneity test and average similarity test. while the analysis of hypothesis testing used final ability test data includes normality test. homogeneity test. completeness test. average difference test. and difference difference average test.

RESULT AND DISCUSSION

Based on the results of data analysis showed that the three samples came from the population with normal distribution. had a homogeneous variance. and there was no difference in average. Thus. the three samples have the same conditions. In general. the description of students' mathematical connections is summarized in the descriptive statistics of mathematical connections in Table 1.

Table 1. Descriptive Statistics of Mathematical Connections

Descriptive Staitistic	Experimental 1	Experimental 2	Control
	MEAs &Moduls	Independent learning & Moduls	
Average	81.97	80.11	74.47
Variance	36.336	19.483	23.676
Standard deviation	6.028	4.414	4.866
Completeness(%)	90.6	90.6	62.5

The results showed that the mathematical connections of students in the class using MEAs learning and independent learning with modules reached a minimum completeness limit of more than 75%. This means that students in the class apply MEAs learning and independent learning with modules complete. Student learning completeness test using MEAs learning and independent learning can be seen in Table 2. Student learning completeness that occurs due to the support of modules that make time efficient in learning using MEAs learning and independent learning models. According to Majid (2006) the module is a systematic compiled book with the aim that students can learn independently without or with the guidance of the teacher. Module as a complement to MEAs learning and independent learning can lead to student self regulated learningfor mathematical connection skills.

Table 2. Output One Sample T-test (Completeness test)

	Test Value = 75					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Exsperimental 1	5.833	31	.000	5.313	3.45	7.17
Exsperimental 2	6.164	31	.000	5.438	3.64	7.24

Based on Table 2. the sig value = 0.000 was obtained in the class subject to the MEA learning model and the class subject to independent learning. Because 0.000 <0.05 or 0% <5%. the average value of completeness of students in the class subject to MEAs learning and independent learning with module assisted reaches completeness. In the one way ANOVA test that was used the differences in the average mathematical connection ability in MEA learning groups. independent learning with modules assisted and cooperative learning can be seen in Table 3.

Table 3. Output Uji One Way Anova Test

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	658.067	2	329.034	13.012	.000
Within Groups	2301.05	91	25.286		
Total	2959.117	93			

Based on the presentation in Table 3 obtained F_{count} = 13.012. Obtained a value of table with degrees of freedom α = 5%. dk numerator 2 and denominator 91 is 3.10. Based on the testing criteria. because $F_{(count)} \geq F_{(table)}$ then H_0 is rejected. meaning there are differences in the average mathematical connection ability of students given the MEAs model and

independent learning with module assisted. with cooperative learning. We can see these differences using further tests which can be seen in Table 4. The further test used is the Scheffe test. This advanced test was chosen because the number of members in each sample group was different and the data group had homogeneous variances (Sudjana. 2000).

Table 4. Output One Way Anova Test

Multiple Comparisons

(I) class	(J) class	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower	Upper
MEAs with Module	Indepent learning with module	-.125	1.257	.775	-3.25	3.00
	cooperatif	5.612*	1.278	.000	2.43	8.79
Indepent learning with module	MEAs with Module	.125	1.257	.775	-3.00	3.25
	coperatif	5.737*	1.278	.000	2.56	8.92
cooperatif	MEAs with Module	-5.612*	1.278	.000	-8.79	-2.43
	Indepent learning with module	-5.737*	1.278	.000	-8.92	-2.56

Based on Table 4. the results show the significance value of the mathematical connection ability between the MEAs learning group and the cooperative learning group is 0.000 <0.05. That is. statistically the average mathematical connection ability of students in the MEAs learning group and independent learning assisted by modules with cooperative learning is different. Students in MEAs learning and independent learning have the same average mathematical connection abilities. In Table 1. the average mathematical connection ability of students in MEAs learning and independent learning with module assisted is 81.97 and 80.11 more than the average mathematical connection ability of students in cooperative learning which only reaches 75.47. This is also reinforced by looking at the increase in the experimental class presented in Table 5. In the MEA class and module assisted independent learning the percentage is approximately 75% of students who experience improvement.

Table 5. Summary of Gain Test Results

Class	Kriteria *Gain* Decline occurred	Constant	Low	Medium	High
Experimental 1	0	1	3	26	2
Experimental 2	0	1	3	25	2

Based on Table 5. MEAs learning and independent learning with modul assisted are better than cooperative learning. In accordance with Dzulfikar (2012) in his research explained that learning Eliciting Activities Models are able to provide good results for students in solving mathematical problems. And Prasetyo's research results (2017) mathematical connection ability of students in learning mathematics Eliciting Activities Models are in a good category.

Mathematical Connections

Mathematical connections of students are described based on the results of mathematical connection tests and interviews to answer the problem statement. Interviews were conducted on six research subjects. namely two students who had high learning self regulated learning. two students who had moderate learning self regulated learning. and two students who had low learning self regulated learning. The study of mathematical connections includes four aspects. namely mathematical connections. connections

between topics in mathematics. connections between mathematical material and other fields of mathematics and connections between mathematics and everyday life. In high group students can fulfill three aspects of mathematical connections. namely interopic connections in mathematics. namely students can connect between concepts or procedures with other material. In the second aspect. the connection between mathematical material and science other than mathematics. Students with high self regulated learning groups can apply concepts to other fields of science using integer material concepts or procedures. In the third aspect. namely the connection between mathematics and everyday life. students can apply problems in everyday life using integer material concepts and procedures.

In students who are able to fulfill two aspects of the first mathematical self regulated learning. the connection between topics in mathematics is controlled by good categories. students can understand the concepts or procedures in integer material. In the second aspect. the connection between mathematical material and science other than mathematics. Medium group students can apply concepts to other fields of science by using integer material concepts or procedures with sufficient categories. In the third aspect. namely the connection between mathematics and everyday life. students are able to apply problems in everyday life using integer material concepts and procedures and can apply problems in everyday life using integer material concepts and procedures.

In students with low self-reliance groups. students cannot apply concepts and procedures to integer integers that are interconnected. In the second aspect the connection between mathematical material and science other than mathematics. Students cannot apply concepts to other fields of science using integer material concepts or procedures and are less able to apply concepts to other fields of science using integer material concepts or procedures. In the fourth aspect. namely the connection between mathematics and everyday life. students can apply problems in everyday life using integer material concepts and procedures to apply problems in everyday life using integer material concepts and procedures.

The results of test analysis based on mathematical connection ability of grade students of MTs Islamiyah Blingoh showed that high group students could understand three indicators of mathematical connections. moderate group students could understand two mathematical connection indicators. and low group students could understand a mathematical connection indicator. This is in accordance with research conducted by Vendiagrys (2015) high group students can solve problems in real life contexts.

CONCLUSION AND RECOMMENDATION

Based on the analysis and discussion. it can be concluded that MEAs learning and independent learning with module assisted are effective against mathematical connection skills. Students who have high self regulated learning can fulfill three aspects of mathematical connections. namely inter-collaborative connections in mathematics. connections between mathematical material with science other than mathematics. and can apply concepts to other fields of science using integer material concepts or procedures. Students who have moderate self regulated learning can fulfill two aspects of mathematical connections. namely connections between topics in mathematics can understand concepts or procedures in integer material. Students who have low self regulated learning cannot apply concepts and procedures in integer material that are interconnected. In MEAs learning and independent learning with modules assisted are better equipped with apperception activities in order to be able to help students in terms of mathematical connections. especially to improve mathematical connection

skills. especially students who have low self regulated learning.

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