UJMER 7 (2) (2018) 161 - 166

Unnes Journal of Mathematics Education Research

http://journal.unnes.ac.id/sju/index.php/ujmer

Mathematical Connection Abilities and Self-Esteem of Students on Model-Eliciting Activities Learning with a Realistic Approach

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Article Info

Article History:
Received 15 July 2018
Accepted 19 September 2018
Published 23 December 2018

Keywords:
Mathematical Connection; Model-Eliciting Activities; Realistic Approach; Self-Esteem

Abstract

This study has purpose to (1) find out the quality of Model-Eliciting Activities learning with a realistic approach, (2) describe the ability of mathematical connection based on student's self-esteem. This research applied mixed method research type with sequential explanatory design, and sample in this study was students of grade VIII.1 and VIII.2 of SMP Negeri B. Srikaton in Musi Rawas District, South Sumatra. Data was done by observation, test, self-esteem scale, and interview. The results of the study showed that the quality of Model-Eliciting Activities learning with a realistic approach included in the good category, and students with high self-esteem had a very good mathematical connection abilities, then students with medium category of self-esteem had a good mathematical connection abilities, and one of subject with a low self-esteem has a poor mathematical connection abilities but there is one subject with a low self-esteem has a fairly good mathematical connection abilities.

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p-ISSN 2252-6455
e-ISSN 2502-4507

INTRODUCTION

Mathematics is a science that can be used by students to solve problems in everyday life, but in order to solve existing problems students must know the relationship between the problems and the mathematics itself. For example, if a student would make a cube-shaped bird cages, then the students should know the shape and the elements of the cube as well as the right to know the size of the enclosure so that it can be used. Therefore, the students need the ability to link the mathematical concepts that are known to real life. Ability is what is known as the mathematical connection capabilities.

According to the NCTM (2000) mathematical connection capability is a capability that must be achieved in mathematics. Students are said to have a good mathematical connection capability if the student is able to identify, use and establish connections between mathematical ideas in contexts outside of mathematics as a mathematical understanding (NCTM, 2003). One of the goals of mathematics in the curriculum today is to understand mathematical concepts, explain the link between concept and apply the concept is flexible, accurate, efficient and precise in solving the problem. According Malasari (2017) mathematical connections are grouped into three types, first, a mathematical relationship with other mathematical topics, both mathematical relationship with other disciplines, and the third is a mathematical relationship to real-world problems. According to Dewi (2013) mathematical connection capabilities needed for math is a unity, in which concepts relate to one another concept, in other words to learn a particular concept in mathematics necessary prerequisite of other concepts. Hendriana et al., (2014) also explain that the mathematical connection is important because it helps students improve relations between mathematical concepts with other science concepts.

Permendikbud 2016 number 21 explained that one of the competencies that must be achieved by students in math is to use symbols in modeling, identifying information, and use strategies to solve the problem. This shows that the students' mathematics learning requires the ability mateamatis good connection. Students should be actively involved during the learning process so that students can receive and process information directly. The fact the field indicate that there are teachers who designed the questions that are clear procedures using a specific formula. One of the learning that is able to facilitate students to be active during the learning process is model-eliciting Activities (MEAs). The model-eliciting activities activties are learning condition of students in real-life problems and presents a mathematical model as a solution. According to Amit (2013) involving students with non-routine mathematical problems through model-eliciting Activities can improve mathematical connections. According Hanifah (2015) Model-eliciting Activities are learning to understand, explain and communicate the concepts contained in a study of the problem through the modeling process matematika.Tekin (2017) explains that the activity in model-eliciting Activities learning requires students to evaluate the truth of the solution, fix, explain and if necessary to review the solutions that have been made by students. According Doruk (2016) Model-eliciting Learning Activities to improve mathematical connections. Hidayat (2014) explains in his research that the mathematical connection capability of the students in the learning model-eliciting Activities better than students who received conventional learning. Prasetyo (2017) in his research shows that the ability of mathematical connections in the learning model-eliciting Activities that are in either category.

According Permendikbud No. 22 of 2016 is to improve the learning principles and physical balance (hardskills) and mental skills (soft skills). Each student has the confidence and the different efforts in solving mathematical problems. Students who have postiif confidence in solving mathematical problems, will affect the work done. Confidence and business students in solving the so-called self-esteem issue. Afari (2012) self-esteem is a human behavior that affects one's efforts to get a good performance. Happy and Widjajanti (2014) suggested that self-esteem has become an important concern due to a number of factors associated with life, and one of them is a student's success in school.

Based on the above explanation, the purpose of this study include: (1) find out the quality of Model-Eliciting Activities learning with a realistic approach, and (2) describe the mathematical connection ability based on student's self-esteem.

METHOD

This research applied mixed method type with sequential explanatory design. The quantitative research was done to determine the quality of Model-Eliciting Activities learning with a realistic approach, whereas the qualitative research was done to analyze the mathematical connection abilities based on student's self-esteem by using self-esteem scale. The research was conducted in SMP Negeri B. Srikaton in Musi Rawas Distict, South Sumatra in grade VIII academic year of 2017/2018, by using bascube and cuboid material. Sample of the quantitative research was grade VIII.1 taken as the experimental class that got model-eliciting activities learning with a realistic approach, and grade VIII.2 taken as the control class that got a problem based learning. The quality of learning was analyzed by quantitative method, where the quality of learning is seen from three stages namely, planning, implementations and assessment.

The analysis of the planning stage was carried out by validating the designed learning device, then the analysis at the implementation stage is carried out by measuring the learning feasibility, and the analysis at the assessment stage is carried out by testing (1) the minimum completeness criteria and the proportion of completeness (2) achievement and improvement of mathematical connection ability, (3) achievement and improvement of self-esteem, (4) correlation between mathematical connection ability and self-esteem.

Mid-test values for both classes are used as data on students' initial mathematical abilities. Data on students' initial mathematical abilities were then tested for normality, homogeneity and average similarity to know that both classes had the same mathematical abilities, so that both classes could be used as research samples. Prerequisite test results can be seen in Table 1.

Table 1. The Result of Prerequisites Test

Prerequisites Test	Score	Sig	Result
Normality Test	0.200	0.50	Normal distribution of data
Homogeneity Test	0.157	0.50	Data homogeneous
Similarity Averager Test	0.057	0.50	Both class has the same mathematical ability.

Subjects of the qualitative method that used was only the experimental class, where the subjects was selected based on teh results of final self-esteem scale which was then categorized into three, namely high self-esteem, medium self-esteem, and low self-esteem in which two students were selected for each category, then an interview is conducted to find out the mathematical connection ability.

RESULTS AND DISCUSSION

The result of quantitative research is that learning Model-Eliciting Activities with a realistic approach has good quality, this is shown through the results of the analysis of three stages of learning quality. The first stage is the planning stage, based on the results of the validation of the learning device by three validators that the learning device is said to be valid. The results of the validation of learning devices by three validators can be seen in Table 2.

Tabel 2. The Validation Results

Aspect	Means	Category	Results
Silabus	4.1	Good	Valid

RPP	4.3	Very Good	Valid
LKS	3.98	Good	Valid
Test	4.20	Good	Valid
Self-Esteem Scale	3.97	Good	Valid
Interview Guidlines	4.03	Good	Valid

The second stage is the implementation, based on the results of the analysis, the implementation of Model-Eliciting Activities learning with a realistic approach carried out during four meetings including good categories. The results of the calculation of the overall learning implementation sheet can be seen in Table 3.

Tabel 3. The Result of Implementation Learning

Meetings	Score	Category
1	3,4	Good
2	3,4	Good
3	3,6	Very Good
4	3,7	Very Good

The last stage is assessment, based on the results of data analysis obtained (1) t_{value} = 0.454 whereas the t_{table} = 1.68 then t_{value} <t_{table} it can be concluded that the mathematical connection ability of students in the experimental class has not reached the minimum completeness criteria, but when viewed statistically descriptive the average mathematical connection ability of the experimental class students is 72.25 exceeding the minimum completeness criteria. Then z_{value}= 2.5 whereas z_{table} = 1.645 then z_{value}> z_{table} so it can be concluded that the proportion of students completeness in the experimental class reaches for 80%. (2) The results of the average difference test achievement of students' mathematical connection ability is t_{value} = 4,455 whereas t_{table} = 1,67 then t_{value}> t_{table} then it can be concluded that the achievement of mathematical connection abilities of students who get Model-Eliciting Activities learning with a realistic approach more than achievement of the ability of the maematistic connection of students who get learning with the PBL model. Then the results of the average difference test of increase in students 'mathematical connection ability is z_{value} = 5.645 whereas z_{table} = 1.645 then z_{value}> z_{table} so it can be concluded that the improvement of students' mathematical connection ability that gets Model-Eliciting Activities $_{value}$ with a realistic approach is better than an increase in mathematical connection ability students who get PBL learning.

Subsequent results (3) the average difference test results of achieving self-esteem obtained by t_{value} = 3.715 whereas t_{table} = 1.67 then t_{value}> t_{table} then it can be concluded that the achievement of students' self-esteem in the Model-Eliciting Activities learning with a realistic approach better than the achievement of students' self-esteem in the class that gets learning with PBL model. Then the results of the average difference test of increasing student self-esteem is z_{value} = 0.378 whereas z_{table} = 1.645 then z_{value} < z_{table} so it can be concluded that increasing self-esteem of students in Model-Eliciting Activities learning with a realistic approach equal to self-esteem students improvement in classes that get learning with PBL models. (4) The results of the acquisition of correlation tests between mathematical connection abilities and student self-esteem can be seen in Table 4.

Table 4. The Results of Correlation Test between Mathematical Connection Ability and Self-Esteem

Correlation			
		Mathmematical Connection Ability	Self-Esteem
Mathmematical Connection Ability	Correlation Pearson	1	0.588
	Sig		0.000
	N	32	32
Self-Esteem	Correlation Pearson	0.588	1
	Sig	0.000	
	N	32	32

Based on Table 4 obtained a significant value is 0.000 <0.05, it can be concluded that the relationship between mathematical connection ability and self-esteem of students who get Model-editing activities learning with a realistic approach is a positive relationship, and seen from the pearson correlation value is 0.588 or 58.8% shows a large percentage, that means a positive relationship occurs between mathematical connection ability and student self-esteem that is 58.8%.

The results of qualitative analysis, the ability of mathematical connections based on self-esteem shows that subjects with high self-esteem have very good mathematical connection abilities. Subjects with high self-esteem are able to associate concepts between mathematical topics, are able to associate mathematical concepts with other disciplines and subjects are also able to associate mathematical concepts with everyday life. Then the subject with self-esteem is having sufficient mathematical connection ability, meaning that there are indicators that the subject has not been able to achieve, namely the subject has not been able to link concepts between mathematical topics well. One subject with low self-esteem has a fairly good mathematical connection ability, it is shown that the subject has not yet linked concepts between mathematical topics, and is only able to solve 1 of 2 questions with indicators linking mathematical concepts to everyday life, while the subject with other low self-esteem has a low mathematical connection ability which is indicated by the subject only able to associate mathematical concepts with other disciplines.

The results of the research described above are supported by several other research findings, according to Pranawestu (2018) through the learning

of Model-Eliciting Activties, students' mathematical connection ability in geometry is better than the mathematical connection ability of students who obtain expository learning. Jacobs et al (2017) also stated that learning Model Eliciting Activties was able to increase low self-esteem and change the way students view mathematics. However, according to Fauzan (2016) to improve self-esteem, students maximally need habituation for a long period.

CONCLUSIONS

Based on the analysis and discussion, it can be concluded that Model-Eliciting Activities learning with a realistic approach has good quality. This is shown through the validity of learning devices, Model-Eliciting Activities learning with a realistic approach is well implemented, and through Model-Eliciting Activities learning with a realistic approach, the average mathematical connection ability of

students exceeds the minimum completeness criteria and the proportion of students completeness is high, achievement and the improvement of students' mathematical connection abilities that receive Model-Eliciting Activities learning with a realistic approach is better than students who get learning with PBL models, the achievement of self-esteem students who get Model-Eliciting Activities learning with a realistic approach better than students who get learning with PBL model and the existence of a positive relationship between mathematical connection ability and students' self-esteem through Model-Eliciting Activities learning with a realistic approach.

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