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Mathematical representation ability on geometry material viewed from interest for learning in jigsaw cooperative learning performance assessment

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Abstract

This research aimed to test whether learning with cooperative Jigsaw material geometry with performance assessment achieve mastery learning, test whether the ability of the mathematical representation of students with cooperative learning model Jigsaw material geometry with the assessment of the performance is better than the ability of the representation of the students on the model of Discovery Learning, a description of the ability of the mathematical representation students on cooperative learning model Jigsaw with the assessment of performance in terms of student interest. This study is a mixed methods research. The subjects were students of class VIII-A one of junior high school in Kaliwungu. The data collection method with tests, questionnaires and interviews. The results showed that: mathematical representation abilities of students who receive Jigsaw cooperative learning on geometry material with performance assessment fulfill the completeness of learning, mathematical representation abilities of students on geometry material in Jigsaw cooperative learning with performance assessments better than mathematical representation abilities of students on Discovery Learning, and descriptions of mathematical representation abilities students in the Jigsaw cooperative learning with performance assessments in terms of students interest learning that students with high learning interest are able to fulfill indicators of mathematical representation ability is very well, students with learning interest are able to fulfill indicators of mathematical representation ability well and students with low learning interest are less able to fulfill the indicators of mathematical representation ability.

1. Introduction

The mathematical representation is one way to solve mathematical problems. Each individual can choose the type of representation in accordance with their ability to interpret the problem. According to the National Council of Teachers of matematics (NCTM) 2000, the representation is a translation of a problem or idea in a new form, including on the image or a physical model in the form of symbols, words or sentences. According Sabirin (2014) representation is a form of interpretation of students thinking to a problem, which is used as a tool to find a solution to these problems. Use of representation by students can help students to solve a complex problem that is considered to be simpler if the strategy and the use of mathematical representations used in accordance degan problems. According to Dewi, Sarangih, and Khairani (2017), the ability of the mathematical representation is the ability of students in solving mathematical problems as measured by four indicators: (1) solve problems involving mathematical expression, (2) presents the data or information from one representation to table representation, (3) create a picture to clarify issues and facilitate their resolution, and (4) make the problem situation based on the

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data or representations of data to write the explanation given. The ability of the mathematical representation eighth grade students at one of junior high school in Kaliwungu still not optimal. Based on interviews with one of the teachers of mathematics students are still unable to develop the power of representation held in solving problems faced.

According BSNP (2018) absorption in the National Math Exam in 2018 the national level and district / city material and measurement geometry lowest among other capabilities that are tested are 41.40% and 36.74%, while at the provincial level 43.07% and the school level is 36.08%. Therefore, in this study the researchers chose the material geometry geometrical flat side. According to the observation of the student is still difficult to be consulted, only certain students are discussed in addition to the students also feel bored in learning. This is resulting in less pahamnya students about the material being taught. In this case the role of the teacher is very important in the ability to create a mathematical representation that learners who have good mathematical representation capability, so as to obtain a satisfactory learning outcomes and learning objectives can be achieved with good. Besides affecting the ability of representation is applied learning by teachers in the learning process. Teachers need to consider that the learning process is not only the interaction between teachers and students, but also teachers are required to be able to create a comfortable atmosphere for the students and the students can be motivated in learning so that students can understand the concepts of the material being taught. One alternative in the improvement of learning model that is with cooperative learning. Cooperative learning is an instructional model that prioritizes the groups. Each student in the group has the ability levels vary. Stahl in Isjoni (2010: 24) argues, through a cooperative learning model, students can obtain the knowledge, skills sebafai considerations to think and determine and act and participate socially.

There are several variations of types of cooperative learning, one of Jigsaw. Jigsaw cooperative learning is one method that can develop the activity of thinking, foster social behaviors are positive that can be developed through discussion and group work. Slavin (2010) states the cooperative model Jigsaw technique is one type of cooperative learning model that consists of teams of 4-5 heterogeneous learning the learner is responsible for control of parts of the study material and able to teach sections of the material to the other team members, and the education of students at the end of the quiz. In cooperative learning of Jigsaw technique there are three characteristics: (a) a small group; (b) learn together; and (c) a learning experience. The essence of cooperative Jigsaw technique lies in the responsibility of a group, so that in the self-contained attitude positive interdependence. In addition to the learning process that affects the ability of representation is interest in learning.

Interest is very big influence on the ability representation, as if the lessons learned material is not in accordance with the interests of students, then students will not learn well because these subjects do not interest him. Lesson material that interests students will be more easily understood and more easily learned by the students. if high student interest students will also be more active in the learning process. Poerwanto (2010: 66) says that interest is an important basis for a person to perform activities well that urge someone to do.

Slameto (2010: 180) explains that the interest is more like a taste and a sense of interest in a thing of activity, without being told. Ity is interest in the acceptance of a relationship between myself with something outside of yourself. The stronger or near such relationship, the greater the interest. With the interest owned to something that happens can make a person pay attention and understand what he saw. So thus the interest in learning can be interpreted as an encouragement or focusing on an issue or topic to be discussed. In addition to student interest in learning to encourage students to be more active is the assessment.

Assessment is a process of information gathering is done systematically without referring to a decision about the value. Assessment of the performance of an assessment process conducted by observing the activities of the students do assignments / motion (Sari, 2010). According Masrukan (2013: 426) performance assessment is a procedure of assignment to the students in order to gather information about the extent to which the student had recently learned. With the assessment of the performance, the students will be motivated to become more active in the learning process because the assessment will be conducted on the activities of students as occurred. Through performance assessment can help students in getting used to demonstrate its performance during the learning process to understand and solve a problem. The performance assessment is also able to encourage students to be more active and responsible, because students had to answer questions or complete the tasks assigned by the teacher in the form of the problems found in real life (Winarti, Rochmad, & Waluya, 2018). Throughassessment of competence is not only

measured performance memory, comprehension and application, but also analysis, synthesis, and evaluation, not only cognitive, affective and psychomotor aspects measured (Handayani, Agoestanto, & Masrukan, 2013).

Based on the above problems, the purpose of this study was to examine whether learning with cooperative Jigsaw material geometry with performance assessment achieve mastery learning, test whether the ability of the mathematical representation of students with cooperative learning model Jigsaw material geometry with the assessment of the performance is better than the ability of the representation of students on Discovery learning models, the description of the mathematical representation abilities of students in cooperative learning model Jigsaw with the assessment of performance in terms of student interest.

2. Methods

This study used a mixed methods kind of concurrent embedded design. The division method in this research is quantitative method as the primary method and qualitative method as a secondary method. Quantitative research methods used to determine whether the ability of the mathematical representation of students using cooperative learning with performance assessment Jigsaw achieve mastery learning and whether the ability of the mathematical representation of students using cooperative learning is better than learning Jigsaw Discovery Learning. While qualitative methods are used to determine how the description of Jigsaw cooperative learning with performance assessment in terms of student interest.

Quantitative research design used in this study is Posttest-Only Control Design. Results midterm tests values are used as initial data of the study. To determine the learning outcomes of students in both classes conducted posttest samples by using questions that have been tested and have analyzed the validity, reliability, level of difficulty, and distinguishing matter.

The study population was all students in grade VIII one of junior high school in Kaliwungu. Sampling with random cluster sampling technique and obtained a sample class VIII A as an experimental class acquire Jigsaw cooperative learning with performance assessment and VIII D as a learning gain control classes Discovery Learning. Each sample group consisted of 32 students. In this study, two classes of samples received the same material that is geometrical cubes and blocks.

Data collection methods used were the questionnaire method, method of tests and interviews. Questionnaires given when first learning and then analyzed and categorized into 3 categories: high, low and medium learning interest.

Analysis of the data in this research is the analysis of initial data, test data analysis capabilities mathematical representation and analysis of the results of qualitative data in the form of questionnaires and interviews. Test the preliminary data including normality test to determine whether the two groups of samples come from populations with normal distribution, homogeneity test to determine whether the sample group have the same variance or not, test the equality of two average to determine ata least similarity average-ability students two sample groups. Initial data normality test using Kolmogorov-Smirnov test, Levene homogeneity test using the test, and the similarity of the two average test Independent-Sample T-Test with SPSS 16.0. Provided that the two samples come from populations with normal distribution.

Analysis of test data capabilities mathematical representation used to answer the problem formulation completeness cooperative learning of Jigsaw assessment of the performance for the ability of the mathematical representation and the ability of the mathematical representation of students in cooperative learning jigsaw assessment of performance when compared to the Discovery Learning to use the test for normality using the Kolmogorov-Smirnov test of similarity variance Levene test, two different test average and the proportion test.

Analysis of qualitative data in the form of analysis of results of questionnaires and interviews. The results of the interview process of reduction, data presentation and verification. Test the validity of the data in this study through triangulation techniques.

3. Results & Discussions

Here the researchers present concise data with reviews using narrative text, tables, or drawings. Remember only the results presented, there is no interpretation of data or conclusions from the data in this section. The

data collected in the table / picture should be accompanied by a narrative text and presented in an easily understandable form. Do not repeat at length the data presented in tables and drawings.

In this section, researchers interpret data with observed patterns. Any relationships between experimental variables are important and any correlation between variables can be seen clearly. The researcher should include a different explanation of the hypothesis or results that are different or similar to any related experiments performed by other researchers. Remember that every experiment does not necessarily have to show a big difference or a tendency to be important. Negative results also need to be explained and may be important to change in your research.

3.1. Implementation of Treatment and Classification of Research Subjects

Jigsaw cooperative learning with performance assessment was conducted over two sessions. Before learning students are asked to complete a questionnaire beforehand. This questionnaire aims to find out how the students interest towards mathematics. Inside there is a 25 item questionnaire questions with 5 possible answers: (1) strongly disagree, (2) do not agree, (3) undecided, (4) disagree (5) strongly agree.

At the first meeting of the materials discussed are the elements and nets cube beam and the second meeting of the material covered is the surface area and volume of a cube beam. Learning to use the media worksheets, performance assessment sheets and props. Students work on worksheets. After the learning process is completed, we then conducted tests to determine the ability of students mathematical representation. tests given in the description which amounts to about 6 items. The next activity after the completion of the test was the interview, the interview conducted after the calculation of interest questionnaire each student's learning and after a mathematical representation abilities test results.

Subject selection is based on the results of questionnaires student interest. Questionnaire learning interest is calculated and then categorized or grouped into three, namely learning interest high, medium and low. Of the 32 students, found that 25% of students have high learning interest, 60% had moderate learning interest and 15% have a low learning interest. Then from each category selected two subjects to be interviewed, the electoral provisions subject (1) student learning interest high is taken from the group who completed the test the ability of the mathematical representation and into the category of interest in learning high, (2) students interest in learning are being taken from group who completed the test the ability of the mathematical representation and into the category of interest in learning medium, and (3) low student interest in learning drawn from groups who completed the test the ability of the mathematical representation and into the category of low interest in learning. The research subjects were diwaancarai shown in Table 3.1

Table 3.1 Research Subjects

No.	Student code	**Category**
1	E-20	High
2	E-06	High
3	E-03	Medium
4	E-21	Medium
5	E-19	Low
6	E-29	Low

3.2. Mathematical Representation Ability completeness Cooperative Learning Jigsaw Students with Performance Assessment

Based on the test results obtained by the ability of the mathematical representation that the test results mathematical representation capability experimental class VIII-A with the highest value of 93, the lowest score of 65 and the proportion of completeness 90.625%. While the class representation abilities test results VIII-D contro highest value obtained was 85 and the lowest value is 61, and the proportion is 50% ketuntasannya. Furthermore, the data from the test results that have been obtained representation capability is analyzed through several tests, including the prerequisite test, then test the hypothesis 1 (mastery learning).

Before the test mastery learning normality test first to find out whether the data derived from the test scores are normally distributed population. Ne normality test used the Kolmogorov-Smirnov test with SPSS 16.0. Based on the calculation results obtained by value normality test sig = 0,451 the experimental class and sig = 0,830 the control class. That is the final test result data representation of students mathematical abilities in normal distribution.

Classical completeness test was performed using the test right proportions. In this research study Jigsaw cooperative with performance assessment classical completeness is said to achieve if the number of students who were able to complete the test the ability of the mathematical representation of more than 75% of the students in the class. Based on the calculation of the proportion of the right party obtained $zhitung$ = 2,041 with $ztabel$ = 1,64. So $zhitung > ztabel$. That is the result of a mathematical representation abilities test students on the material side of the room got up flat with Jigsaw learning model performance assessment achieve mastery learning.

The completeness of Jigsaw cooperative learning with performance assessment shows that Jigsaw cooperative learning with performance assessment can be used to enhance the ability of the mathematical representation. The completeness is affected by several things during the learning process. With the expert group of students can construct their own knowledge, then discuss to combine the ability of individuals to the group's ability to resolve a problem. After that each student there is a group of experts for teaching skills to members of the original group, with expertise to teach the material can be increased skills in communicating, it can help students in the ability of the representation or written words.

Cooperative learning with performance assessment led to students being more active and responsible in completing a given task within the group. This is in line with the statement Sa'dijah (2009: 95) that learning is more effective use of performance assessment because it is integrated in the process and students develop the knowledge and skills of students. Masrukan (2008), suggest that there are significant interaction between assessment of the performance of the cooperative learning model that mathematical problem solving ability junior high school students who obtain assessments of mathematics learning with better performance than in the final assessment only. With the assessment of performance of the material geometry able to assist students in making the image of the problems given in accordance with appropriate procedures, so that students can find out how the steps are performed correctly. Thus, it means using performance assessment can help students in improving the visual representation of the students. Through these measures given task in the assessment of performance is able to help students make mathematical equations related to mathematical problems. Therefore, the use of suitable performance assessment to improve students mathematical representation. Through these measures given task in the assessment of performance is able to help students make mathematical equations related to mathematical problems. Therefore, the use of suitable performance assessment to improve students mathematical representation. Through these measures given task in the assessment of performance is able to help students make mathematical equations related to mathematical problems. Therefore, the use of suitable performance assessment to improve students mathematical representation.

3.3. Comparison of Mathematical Representation Capabilities

Testing is done with an average difference test, to determine whether the ability of the mathematical representation of students with learning model Jigsaw assessment of performance was better than the ability of the mathematical representation with Discovery Learning. Before the test the average difference, variance equality test done first, to determine whether the test data representation capabilities have the same variance or not and is obtained sig = 0,820. This means that the data obtained by the value of the mathematical representation abilities test scores of the students have the same variance.

The average difference test is done by using the right side. The average difference test is performed to determine that the average posttest mathematical representation capability in the class using cooperative learning model Jigsaw assessment of the performance more than the average posttest ability of the mathematical representation of students in the class using a model of Discovery Learning. Based on the calculation of the average difference test t-test is obtained t = 4,324 with $t1-a$ = 1,998. So, $t > t1-a$. It means that the average posttest mathematical representation ability in the class using Jigsaw cooperative learning performance assessment more than the average posttest mathematical representation ability of students in the class using Discovery Learning.

Proportion test conducted using the test right. Test aims to determine the proportion that the proportion of students who completed study on the class using cooperative learning model Jigsaw assessment of the performance more than the proportion of students who completed study in a class that uses a model of Discovery Learning. Based on the calculation of the proportion of different test right parties obtained $zhitung$ = 3,56 with $ztabel$ = 1,64. So $zhitung > ztabel$. This means that the proportion of students who have compeled learning in class using the Jigsaw cooperative learning performance assessment more than the proportion of students who completed study in a class that uses a model of Discovery Learning.

3.4. Description of Mathematical Representation capabilities in terms of Interests in learning in Jigsaw Cooperative Learning Performance Assessment

Data mathematical representation abilities test results matched with the results of interviews with six research subjects. Indicators of the ability of representation that will be analyzed include (1) makes the image geometry to clarify issues and facilitate their resolution, (2) make the equation or mathematical models and other representations given, (3) write down the steps to resolve the problem with the words and (4) develop a story line with a representation presented. Based on the results the percentage of students with moderate learning more interest than students with high learning interest. It shows that the majority of students classified as having moderate learning interest, whereas according to Kiptiyah as quoted in Hudojo (1998) is a kind of motivation that interest described someone wants something, so the interest in learning is needed.

The following is an example of result of the work of students with interest learning high, medium and low on number 3.

(1) Students with high learning interest

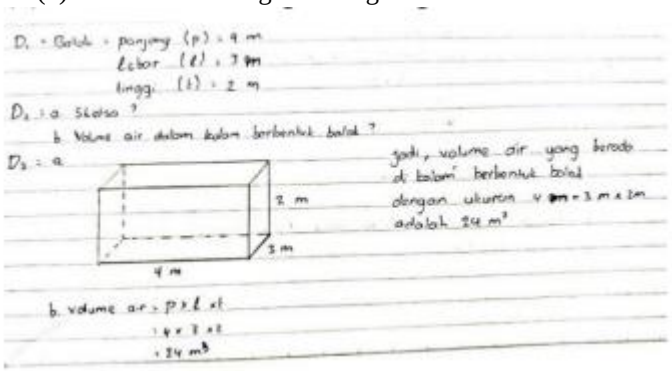

Figure 1. Example of Student Work Interest in Learning High

Based on the results of student progress and analyze the results of interviews, On indicator makes the image geometry to clarify the problem and facilitate resolution. the subject is able to create an image with precise geometry with size. On indicators make the equation or mathematical model of other representations are given, the subject is able to make the equation or mathematical model of proper representation and the write indicator measures the mathematical problem solving with the words, subjects were able to write down the steps to resolve correctly.

(2) Students with an interest in learning was

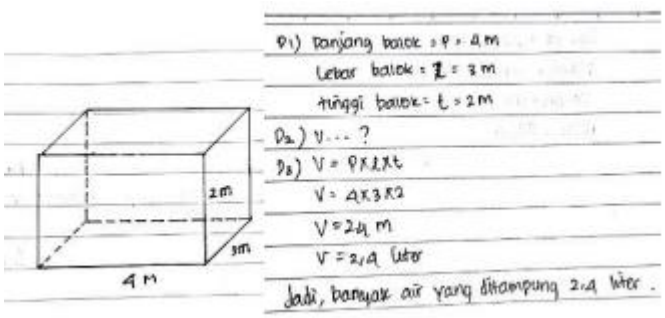

Figure 2. Example of Student Work Interest in Learning Medium

Based on the results of student progress and analyze the results of interviews, On indicator makes the image geometry to clarify the problem and facilitate resolution. the subject is able to create an image with precise geometry with size. On indicators make the equation or mathematical model of other representations are given, the subject is able to make the equation or mathematical model of proper representation and the write indicator measures the mathematical problem solving with the words, subjects were able to write down the steps to resolve correctly.

(3) Students with low learning interest

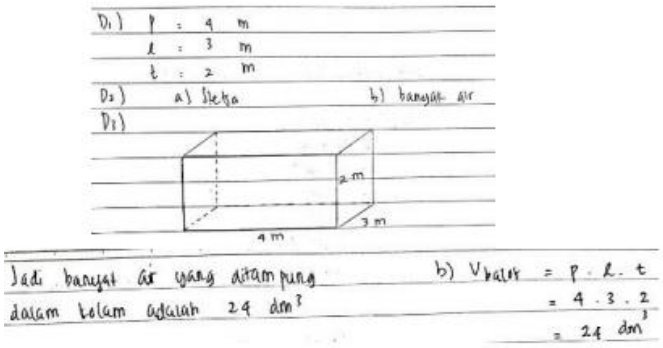

Figure 3. Example of Student Work Interest in Learning Low

Based on the results of student progress and analyze the results of interviews, On indicator makes the image geometry to clarify the problem and facilitate resolution. the subject is able to create an image with precise geometry with size. On indicators make the equation or mathematical model of other representations are given, the subject is able to create a mathematical equation right, but the subject immediately write down what is known in the form of symbols. Then the write indicator measures the mathemati.cal problem solving with the words, subjects were able to write down the steps to resolve correctly.

Based on the results obtained information that students with high learning interest capable of meeting the indicator makes the image geometry to clarify the issue and facilitate its completion very well. On indicators make the equation or mathematical model of other representations are given, one subject in either category and one subject with a category quite well. On the indicator has the story according to an other representation presented subjects with a high interest in learning is able to meet degan has the story very well. Then the write indicator measures the mathematical problem solving with the words high interest in learning the subject categories capable of meeting very well.

Students with an interest in learning medium, the indicator makes the image geometry to clarify issues and facilitate their resolution, the subject was able to make drawings and write the complete and correct size. On indicators make the equation or mathematical model of other representations given subject is able to meet quite well. While the indicator has the story according to an other representation is presented, the subject is able to meet very well and the subject is able to meet quite well. Then in indicator write steps to resolve the problem with the words mathematical subjects of interest categories studied were able to fulfill it well.

Based on the above obtained information that the subject on learning interest groups were able to meet the four indicators capability with good mathematical representation. Often students in the learning interest groups are doing little mistakes, like not describe what is being asked and the number 6 wrong in counting. According Sriyatun, Masrukan and Wardono (2018) students in mathematics learning interest groups moderate category have good literacy skills of mathematical criteria for representation component.

Students with an interest in learning is low, the indicator makes the image geometry to clarify the problem and facilitate resolution. Subjects with low learning interest groups are able to make drawings and write the complete and correct size. On indicators make the equation or mathematical model of other representations given subject on a low learning interest groups often write what is known directly in the form of symbols. While the indicator has the story according to an other representation presented, subjects on a low learning interest group is able to write about the story properly, but the subject in low learning interest groups do not describe what is being asked.

Furthermore, based on the three categories of interest to learn the above, it can be concluded that students with an interest in learning the high capable of meeting the indicator of the ability of representation very well, for students with an interest in learning is being able to meet the indicator of the ability of representation well and students with an interest in learning the low is less able to meet the indicator of the ability mathematical representation. Thus the difference in the interest level of mathematics learning there is no difference in the ability of the mathematical representation. It also happened on research conducted Kiptiyah, Masrukan and Son (2016) on the ability of creative thinking in problem based learning ethnomathematics interest-based learning concludes that based on the different levels of students interest in learning mathematics are also differences in the stages of creative thinking.

In addition, according Wardiana (2004: 149) that students who have a high interest in learning to conduct more and more quickly, than students who are less motivated. Meanwhile, according to Millah as quoted in Mustaqim, et al (2013), students with high interest have better learning achievement than students with moderate learning interests, and students with moderate learning interests have better learning achievement than students with low learning interest. Siagian (2012) also suggested that a high student interest will be higher the academic achievement. Therefore, in the learning process, teachers should be able to increase student interest and learning using group work load. So the ability of students mathematical representation can be increased. As disclosed Yuningsih and Rohaendi (2017), that learning using Jigsaw model is able to improve student representation. therefore regards the learning that can be applied to improve the mathematical representation of students with interest in learning different is Jigsaw cooperative learning with performance assessment. This is evident because Jigsaw cooperative learning with proven performance assessment due to the ability of students mathematical representation. therefore regards the learning that can be applied to improve the mathematical representation of students with interest in learning different is Jigsaw cooperative learning with performance assessment. This is evident because Jigsaw cooperative learning with proven performance assessment due to the ability of students mathematical representation. therefore regards the learning that can be applied to improve the mathematical representation of students with interest in learning different is Jigsaw cooperative learning with performance assessment. This is evident because Jigsaw cooperative learning with proven performance assessment due to the ability of students mathematical representation.

4. Conclusion

Based on the discussion of the results of research,the ability of the material mathematical representation geometry in terms of interest in learning the Jigsaw cooperative learning performance assessment, be concluded that the ability of the mathematical representation of students who receive Jigsaw cooperative learning material meets the performance assessment geometry with mastery learning, the ability of the mathematical representation of students who receive Jigsaw cooperative learning geometry material with better performance assessment of the ability of the mathematical representation of students on the model of Discovery Learning, Description of the mathematical representation ability of students in cooperative learning model jigsaw with the assessment of performance in terms of student interest are the results of student interest VIII-A one of junior high school in Kaliwungu show that students with high learning interest capable of meeting the indicators of the ability of the mathematical representation very well, for students with an interest in learning is being able to meet the indicators of the ability of the mathematical representation well. And students with low learning interest less able to meet the indicators of the ability of the mathematical representation.

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