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Bengkulu, November 13th 2021

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Theme "Continuous science learning during the Covid-19 pandemic and towards the era of society 5.0"

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THE EFFECT OF REALISTIC MATHEMATICS LEARNING APPROACH BASED ON ETHNOMATEMAMATICS USING ANIMATION VIDEOS ON THE REPRESENTATION ABILITY OF VIII CLASS STUDENTS OF SMP NEGERI 2 BENGKULU CITY

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Abstract

The purpose of this study was to determine the effect of the Ethnomathematical-based Realistic Mathematics learning approach using animated videos on the ability to think creatively and mathematical representation of class VIII SMP Negeri 2 Bengkulu City. This type of research uses the Quasi Experiment method. Data collection is done through tests. Data analysis using Ancova test. The sample of this research is students of SMP Negeri 2 Bengkulu City, namely class VIII B and VIII C.

Keywords : *Realistic Mathematics Learning, Ethnomathematics, Animated Videos, Representation skills*

INTRODUCTION

The Ministry of National Education (2006) states that mathematics is a science that underlies the development of modern technology and has an important role in various disciplines. Strong mastery of mathematics is required so that this subject needs to be given to all students starting from elementary school. Through learning mathematics, students are expected to have logical, analytical, systematic, critical and creative abilities and have the ability to work together.

Mathematics is one component of a series of subjects that have an important role in education. Mathematics is one of the fields of study that supports the development of science and technology. Today, many feel mathematics as a difficult subject, not fun, even a frightening specter. This is because there are still many who feel and experience difficulties in doing math problems (Sundayana, 2015: 2).

Based on the experience of researchers during teaching mathematics, it was found that several students had instilled in themselves that mathematics was a difficult subject to understand and understand, this was because the mathematics learning material covered too many numbers and formulas, rather than material that had been contextually based. meetings, making students afraid rather than happy when learning mathematics, as well as teaching materials and mathematics learning media provided are still considered less attractive, so that boredom and reluctance in learning mathematics are embedded in these students.

Ethnomathematical mathematics learning also requires learning media that can clarify the teaching material to be delivered by the teacher, so that the teaching material delivered is more quickly understood and understood by students, as well as learning that is assisted by learning media to make abstract mathematical objects can be converted into a form. more concrete.

The animated video learning media was chosen by researchers because animated videos are considered more interesting than other learning media, the existence of mathematical stories conveyed in animated videos is expected to help students understand the mathematical material presented. According to Rusman (2012: 170) animated video learning media is included in the audio visual aids (AVA) type of media which does not contain much sound elements, but is equipped with image elements that can be viewed continuously so as to be able to create amazing vision from a video. video display created by recording magnetically on a video tape as well as audio recording.

According to Yanti (2018: 267), mathematical concepts can be conveyed using tools or media that are culturally easy to understand by students. Cultural characteristics in learning mathematics can be related to ethnomathematics. Culture is something that has been inherent from generation to generation in everyday life, because culture is a complete and comprehensive unit that applies in a community. This allows for mathematical concepts to be embedded in practice and recognizes that everyone develops a particular way of doing mathematical activities called ethnomathematics.

The ethnomathematics-based learning approach becomes a medium for students to understand the knowledge provided by the teacher, in the implementation of ethnomathematics-based learning, the teacher plays a role in guiding and directing the potential of students to explore various known cultures, and can develop these cultures. Ethnomathematics in this study is the activity of a society in which there are mathematical concepts and use them in their own cultural life.

Students' thinking activities cannot be separated from everyday life. Students have the ability to think, especially in solving a problem, with this thinking ability students can find the right way to make a decision. In the Mathematics Curriculum (2013) the ability to think creatively mathematically is an essential mathematical ability that needs to be mastered and developed in students who are studying mathematics.

According to Munandar (2009:88) in learning mathematics students are required to learn creatively. Creative learning is an ability that reflects fluency, flexibility and originality in thinking and the ability to collaborate on an idea. In this it can be said that in the teaching and learning process students must be more active, independent, and not always centered on the teacher giving material to students and it can be said that mathematical creative thinking is the ability of students to determine new or varied answers in a given problem.

Kartini (2009:36), says that knowledge cannot be transferred from teacher to student, except through the student's own activity to reason, active students to construct continuously, so that there is always a change in concepts towards more complex ones, the teacher just helps provide suggestions and situations. so that the student construction process runs. According to Neria (2010: 409), it is very possible for students to try various representations in understanding a concept. In addition, representation also plays a role in the process of solving mathematical problems. A successful problem-solving process depends on problem-presenting skills such as constructing and using mathematical representations in words, graphs, tables and equations, solving and manipulating symbols.

In 21st century learning, there are many students with various races, differences, uniqueness and ethnic and cultural diversity in one class. In addition, the use of technology in the classroom such as computers, LCD, television, computer networks, OHP and video is very helpful for a teacher in delivering material in class. However, there are still schools whose facilities and infrastructure are still incomplete, to improve the quality of learning to make students more creative, independent, able to work together, have a leadership spirit, empathy, tolerance and have life skills will be very helpful (Sabrinatami, 2018:1-3) .

According to Wardoyo (2015: 8-9), learning media that are suitable for the needs of students in the 21st century today are computer-based learning media, one of which is animated videos and visual simulations to build student interest and interest in the material taught by the teacher, media This learning emphasizes the concept of contextual learning.

Before conducting the research, the researcher first conducted interviews with mathematics teachers at SMP Negeri 2 Bengkulu City, this was intended so that researchers knew the level of creative thinking ability and representation of class VIII students of SMP Negeri 2 Bengkulu City. In the interview data, it was found that student learning outcomes are still low, if low learning outcomes will be in line with low creative thinking skills and mathematical representation. This is reinforced by documentation of the results of the first semester exams in the 2019/2020 school year, the data can be seen in the following table:

Table 1.1
Grade VIII Even Semester Final Exam Scores at SMP N 02 Bengkulu City

No.	Class	Value (x)		Total
		75≤ x 100≤	0 ≤ x 75<	
1	VIII . A	4	21	25
2	VIII . B	3	22	25
3	VIII . C	4	21	25
4	VIII . D	5	20	25
5	VIII . E	7	18	25
Amount		23	102	125

Based on Table 1.1, it can be seen that most of the student learning outcomes are still low. The low student learning outcomes are thought to be due to direct method learning, making it difficult for teachers to control the activities and success of all students, in classroom learning there are students who actively think, analyze the problems posed and some are passive. Teachers of SMPN 2 Bengkulu City still apply learning using the lecture method, namely conveying mathematical concepts by giving examples, and then practicing, if not finished, the teacher gives questions for assignments at home. This learning process is generally used in other schools, apart from SMPN 2 Bengkulu City. The learning is an informative learning, where the teacher gives an explanation of the subject matter,

Thus, it can be seen that the students' creative thinking ability and mathematical representation are still low. So that students still have difficulty understanding mathematics in the abstract. The chosen effort by researchers to improve students' creative thinking skills and mathematical representation is to design mathematics teaching materials in the form of animated videos. The mathematical animation video was chosen because this teaching material has the advantage that it can give messages that students can receive more evenly, animated videos are very good for

explaining a process that is more interesting, can overcome space and time limitations, and can be repeated, stopped as needed

Based on the description of the background above, the authors designed the mathematics learning media, namely animated videos by applying an ethnomathematical learning approach. For ethnomathematics that will be used by the author is Bengkulu City culture which focuses on Bengkulu typical food products which are used as examples in learning instruments. These food products are Bay Tat cake and Perut Punai cake, where Bay Tat cake is a cake made from wheat flour and pineapple jam in the middle with a soft and sweet Bengkulu city taste, so Bay Tat cake is officially made an Icon of the city's pride food product. Bengkulu as well as Perut Punai cake, Perut Punai cake is a cake made from rice flour and brown sugar with a distinctive taste of the city of Bengkulu, namely savory, crunchy and sweet, so that the Perut Punai cake is also officially used as an icon for the pride of Bengkulu City's food product. Therefore, a study was conducted entitled "The Effect of an Ethnomathematical Learning Approach Using Animated Videos on the Mathematical Representation of Class VIII Students of SMP Negeri 2 Bengkulu City"

RESEARCH METHODS

A. Types of research

This type of research is experimental research (Iskandar, 2009: 64), experimental research is a research that demands manipulation research and controlling one or more independent variables and observing the dependent variable, to see the difference according to the manipulation of the independent variable or research that looks at the relationship causation to two or more variables by giving more treatment to the experimental group

B. Research subject

This research was conducted at SMP Negeri 2 Bengkulu City, in the even semester of 2019/2020 FY, where there were 48 heterogeneous students from gender, ability, race, and ethnicity, the study was conducted in this class because this class got the best average score in school. this.

C. Research procedure

Data collection tools that can be used in research are teacher notes, and documents related to research procedures which consist of several stages: the preparation stage, the implementation stage, and the analysis stage.

RESULTS AND DISCUSSION

Description of Research Data

The following is a description of the data obtained from the results of the pretest and posttest of students' understanding of representational abilities in the experimental class and control class.

Mathematical Representation Ability Experiment Class

Table 1. Description of Experimental Class Mathematical Representation Ability Statistics

Statistics	Experiment Class	
	Prettest	*Posttest*
Maximum Value	50.00	90.00
Minimum Value	10.00	55.00
Average	30.83	73.96
Variant	118.84	115.17
Standard Deviation	10.90	10.73

(Source: Research data analysis)

From the table above, it can be seen that the lowest value of Pretest is 10.00 with the highest value is 50.00. For the average value of 30.83 with a standard deviation of 10.90. As for the Posttest value, the lowest value is 55.00 and the highest value is 90.00. For the average value of 73.96 with a standard deviation of 10.73.

Then the Pretest and Posttest data are classified based on the interval class to find the frequency. From the calculation results of the experimental class Pretest data, it was found that the class interval K = 1 + 3.3 log n = 1 + 3.3 log 24 = 5.56 = 6. The data range is r = 50 – 10 = 40. For class width obtained$\frac{40}{5,56}$= 7,207. The following table presents the distribution of the Pretest after knowing the number of classes, ranges and class widths.

Table 2. Prettest Frequency Distribution Mathematical Representation Ability

No	interval	Mathematical Representation Ability	
		Frequency (Pretest)	% (Pretest)
1	10-17	4	16.67
2	18-25	4	16.67
3	26-33	4	16.67
4	34-41	8	33.33
5	42-49	3	12.50
TOTAL		24	100

From the table above, it is known that the highest frequency in the Pretest was found in a score of 34-41, namely as many as 8 students or 33.33%. For the lowest frequency, there is a score of 42 - 49, namely as many as 3 students or 12.50%. Pretest data on students' mathematical representation abilities in the experimental class in the frequency distribution table above, when presented in the form of a histogram diagram, is as shown below.

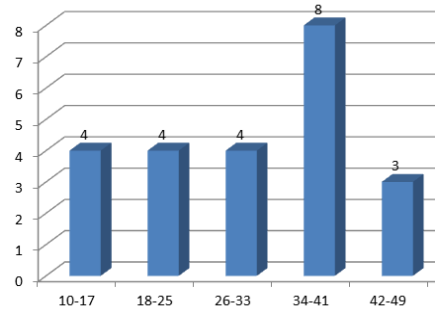

Figure 1. Pretest Frequency Distribution of Experimental Class Mathematical Representation Ability

Meanwhile, from the results of the posttest data calculation for the experimental class, it was found that the class interval K = 1 + 3.3 log n = 1 + 3.3 log 24 = 5.56 = 6. The data range is r = 90 – 55 = 35. For class width is obtained $\frac{35}{5,56}$ = 6.3 = 6. The following table presents the distribution of the Posttest.

Table 3. Posttest Frequency Distribution Experimental Class Students' Mathematical Representation Ability

No	interval	Mathematical Representation Ability	
		Frequency (Posttest)	% (Posttest)
1	55-60	4	16.67
2	61-66	4	16.67
3	67-72	4	16.67
4	73-78	1	4.17
5	79-84	5	20.83
TOTAL		24	100

From the table above, it is known that the highest frequency in the Posttest is found in a score of 79 - 84, namely as many as 5 students or 20.83%. For the lowest frequency, there is a score of 73 - 78, which is 1 student or 4.17%.Posttest data on students' mathematical representation abilities in the experimental class in the frequency distribution table above, when presented in the form of a histogram diagram, is as shown below.

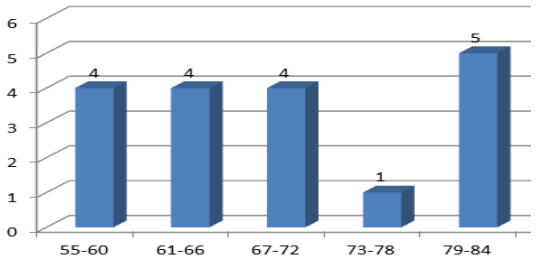

Figure 2. Posttest Frequency Distribution of Experimental Class Mathematical Representation Ability

Mathematical Representation Ability Control Class

Table 4. Description of Control Class Mathematical Representation Ability Statistics

Statistics	**Control Class**	
	Pretest	*Posttest*
Maximum Value	50.00	85.00
Minimum Value	10.00	40.00
Average	31.04	59.79
Variant	115.17	166.26
Standard Deviation	10.73	12.89

(Source: Research Data Analysis)

From the table above, it can be seen that the lowest value of Pretest is 10.00 with the highest value is 50.00. For the average value of 31.04 with a standard deviation of 10.73. As for the Posttest value, the lowest value is 40.00 and the highest value is 85.00. For the average value of 59.79 with a standard deviation of 12.89.

Then the Pretest and Posttest data are classified based on the interval class to find the frequency. From the results of the calculation of the control class pretest data, it was found that the class interval K = 1 + 3.3 log n = 1 + 3.3 log 24 = 5.56 = 6. The data range is r = 50 – 10 = 40. For class width obtained$\frac{40}{5,56}$ = 7.2 = 7 The following table presents the distribution of the Pretest after knowing the number of classes, ranges and class widths.

Table 5. Ability Pretest Frequency Distribution Mathematical Representation

No	**interval**	**Mathematical Representation Ability**	
		Frequency (Pretest)	**% (Pretest)**
1	10-16	3	12.50
2	17-23	2	8.33
3	24-30	8	33.33
4	31-37	5	20.83
5	38-44	2	8.33
TOTAL		24	100

From the table above, it is known that the highest frequency in the Pretest is found in a score of 24 – 30, namely as many as 8 students or 33.33%. For the lowest frequency, there are scores of 17-23 and 38-44, namely as many as 2 students or 8.33%. Pretest data on the ability of mathematical representation in the control class in the frequency distribution table above, when presented in the form of a histogram diagram, is as shown below.

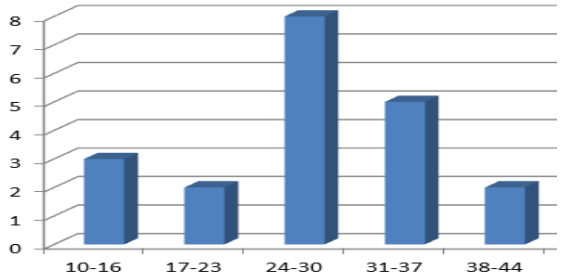

Figure 3. Pretest Frequency Distribution of Control Class Mathematical Representation Ability

Meanwhile, from the results of the posttest data calculation for the control class, it was found that the class interval K = 1 + 3.3 log n = 1 + 3.3 log 24 = 5.56 = 6. The data range was r = 85.00 – 40 = 45. For the class width we

get $\frac{45}{5,56}$ = 8.1=8. The following table presents the distribution of the posttest after knowing the number of classes, ranges and class widths.

Table 6. Posttest Frequency Distribution Mathematical Representation Ability

No	interval	Mathematical Representation Ability	
		Frequency (Posttest)	% (Posttest)
1	40-47	4	16.67
2	48-55	5	20.83
3	56-63	4	16.67
4	64-71	7	29.17
5	72-79	2	8.33
TOTAL		24	100

From the table above, it is known that the highest frequency in the Posttest is found in a score of 64 - 71, namely as many as 7 students or 29.17%. For the lowest frequency, there is a score of 72 - 79 as many as 2 students or 8.33%.Posttest data on mathematical representation ability in the control class in the frequency distribution table above, when presented in the form of a histogram diagram, is as shown below.

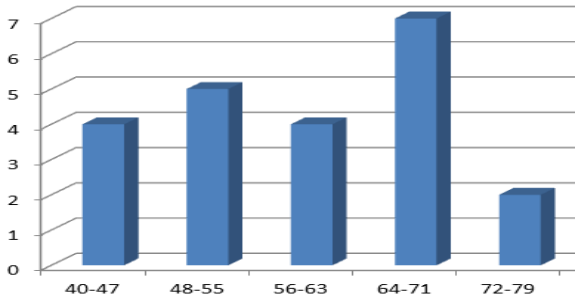

Figure 4. Posttest Frequency Distribution of Control Class Mathematical Representation Ability

Animation Video Validity Test Results

The practicality test is carried out after the animation video validity test, after which it is done by obtaining valid or very valid criteria. At the practicality test stage, it is carried out using the practicality sheet instrument that is given to students to provide an assessment of each animated video. Practicality test was conducted to find out whether the parts in the animated video were practical and easy to use by students as users. In this study, the practicality test was carried out twice, namely the Practicality Test 1 was carried out in class VIII C of SMP Negeri 2 Bengkulu City and the Practicality Test 2 was carried out in class VIII D of SMP Negeri 2 Bengkulu City.

Practical Test Results 1

The practicality test phase 1 was carried out in class VIII A with a total of 24 students. Practicality 1 result data is seen from the practicality sheet given to students in each animated video. The results of the assessment on the practicality sheet for all animated videos can be seen in table 4.31 below.

Table 7. Practicality Average Score 1 Animated Video

Animated Videos	Practicality Average Score	Criteria
Animated Video Eps 1	4.07	Practical
Animated Video Eps 2	4.04	Practical
Eps 3 Animation Videos	4.07	Practical
Animated Video Eps 4	4.10	Practical
Average Total Practicality	4.07	**Practical**

Based on table 7 shows that the average practicality of the animation video for eps 1 is getting a score of 4.07 which is categorized as practical with revision. The part of the animated video eps 1 that still needs to be revised is related to the second criterion, namely the animated video has clear writing so it is easy to read and the third criterion is that the subject matter in the animated video is easy to understand and the fifth criterion is that the practice questions in the animated video can be understood.

The average practicality of the animated video eps 2 gets a score of 4.04 which is categorized as practical with revision. The part of the animated video eps 2 that still needs to be revised is related to the second criterion, namely the animated video has clear writing so it is easy to read, the third criterion is that the subject matter in the animated video is easy to understand and the fifth criterion is that the practice questions in the animated video can be understood.

The average practicality of the animated video eps 3 gets a score of 4.07 which is categorized as practical with revision. The part of the eps 3 animation video that still needs to be revised is related to the fifth criterion, namely the practice questions in the animated video can be understood.

The average practicality of the animated video eps 4 gets a score of 4.10 which is categorized as practical with revision. The animation video section 4 that still needs to be revised is related to the third criterion, namely the subject matter in the animated video is easy to understand and the fifth criterion is that the practice questions in the animated video can be understood. Thus the average total practicality of all animated videos gets a score of 4.07 which meets the "practical" criteria.

Practical Test Results 2

Practicality test 2 was carried out after revising the animated video based on the results of practicality test 1. Practicality test 2 was carried out in class VIII B with a total of 24 students. Practicality 2 data is seen from the practicality sheet given to students in each animated video. The results of the assessment on the practicality sheet for all animated videos can be seen in table 4.32 below.

Table 8 Practicality Average Score 2 Animated Videos

Animated Videos	**Practicality Average Score**	**Criteria**
Animated Video Eps 1	4.16	Practical
Animated Video Eps 2	4.19	Practical
Eps 3 Animation Videos	4.16	Practical
Animated Video Eps 4	4.17	Practical
Average Total Practicality	**4.17**	**Practical**

Based on table 8, it shows that the average practicality of the animation video for eps 1 is getting a score of 4.16 which is categorized as practical with small revisions. The part of the animated video eps 1 that still needs to be revised is related to the fourth criterion, namely the image in the animated video attracts students' attention to learn.

The average practicality of the animated video eps 3 gets a score of 4.16 which is categorized as practical with minor revisions. The part of the eps 3 animation video that still needs to be revised is related to the fourth criterion, namely the image in the animated video attracts students' attention to learn.

The average practicality of the animated video eps 4 gets a score of 4.17 which is categorized as practical with minor revisions. The part of the eps 4 animation video that still needs to be revised is related to the second criterion, namely the animated video has clear writing so it is easy to read.

In the second practical test for the animated video eps 2, nothing needs to be revised. Thus, the average total practicality of all 2 animated videos gets a score of 4.17 which meets the "practical" criteria.

Furthermore, the total average score of practicality is obtained by the following formula.

$$\bar{P} = \frac{\bar{P}_1 + \bar{P}_2}{2}$$

$$= (4.07 + 4.17)/2$$

$$= 4.12$$

Based on the results of the above calculation, the average practicality score of animated videos is 4.12 which is included in the "practical" category. This shows that animated videos are practical and easy to use by students in the learning process.

CONCLUSIONS AND SUGGESTIONS

CONCLUSION

Based on the analysis of the research data presented in the description of the research above, it can be concluded as follows.

1) There is the effect of the ethnomathematics-based realistic mathematics learning approach (PMR) assisted by animated videos on students' representational abilities.

2) Achievement of mathematical representation ability who was taught with realistic mathematics learning approach (PMR) based on ethnomathematics assisted by animated videos was better than the one he taught with conventional learning. This is shown from the significance value in the parameter estimate of each classas big as 0.000 and less than alpha (0.05)

3)

SUGGESTION

Based on the conclusions of this study, the researchers provide suggestions for mathematics teachers, researchers and the development of mathematics learning as follows.

Because there are differences in the ability of mathematical representation between students who are taught with realistic mathematics learning approach (PMR) based on animated video-assisted ethnomathematics and conventional after controlling for students' initial abilities, it is suggested that the ethnomathematics-based realistic mathematics learning approach (PMR) assisted by animated videos can replace the conventional learning approach. to improve mathematical representation skills.

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