The 2nd International Conference on Mathematics Education and Technology (ICOMET) 2023
ISSN 2986-8513 | pp. 18-23 (2023)
Publisher: University of Islam Malang

APPLICATION OF ETHNOMATHEMATICS-BASED RME (REALISTIC MATHEMATIC EDUCATION) LEARNING TO IMPROVE STUDENTS' MATHEMATICAL COMMUNICATION SKILLS AND CONFIDENCE

Anita Fitri Agustia[1], Hamidah[2], Amat Hidayat[3]
[1,2,3]Mathematics Study Program, Faculty of Teacher Training and Education, Universitas Bina Bangsa, Serang, Indonesia

Email: anitafitri2001@gmail.com

ABSTRACT

This study aims to find out: 1) Is the increase in mathematical communication skills of students who are given learning using the Ethnomathematics-based RME (Realistic Mathematical Education) approach better than those given conventional learning; 2) Is the increased self-confidence of students who are given Ethno-mathematics based RME (Realistic Mathematics Education) learning better than those given conventional learning. This research is a quantitative research that is experimental in nature. The data collection technique used a test of students' mathematical communication skills which totaled 4 items of description in accordance with the indicators of students' mathematical communication abilities and filled in the student's self-confidence questionnaire which totaled 14 statements which consisted of 7 positive statements and 7 negative statements. And the data analysis technique used was the normality test, the Mann Whitney u test and the N-Gain test. In which the researchers took random samples, namely class VII C as the experimental class and class VII B as the control class at SMP Negeri 3 Kragilan. The results of the study showed that the increase in mathematical communication skills and students' self-confidence given the Ethnomathematics-based Realistic Mathematical Learning approach was better than the class given conventional learning. Keywords; students' mathematical communication skills, student self-confidence, RME (Realistic Mathematical Education) approach, Ethnomatematics

INTRODUCTION

Today all countries make education a point of attention. Education is considered a step towards a useful and productive life in the future. This is in accordance with the opinion according to Sulastri, (2014), saying that; "Education has a major role in personal and social development, affecting individual and social change, peace, freedom and justice."

According to Yuliani, *et.al., (2020)* suggests that mathematics is the source of other sciences, such as physics and chemistry. Mathematics is also a way or method of thinking and reasoning, a symbol that can be understood. Therefore, we understand and learn mathematics, because mathematics has many benefits for human life in living daily life.

According to Hendriana &; Kadarisma, (2019), the objectives of learning mathematics are 1) understand mathematical concepts, explain the relationship between concepts and apply concepts or algorithms flexibly, accurately, efficiently and precisely in problem solving; 2) use reasoning on patterns and properties, perform mathematical manipilations in making generalizations, constructing proofs or explaining mathematical statements and statements; 3) solve problems; 4) Publish

ideas with symbols, tables, diagrams, or other media to clarify the situation or problem.

Based on the above mathematical objectives, one of the goals is to be able to communicate students' mathematical communication skills. This is in line with NCTM's opinion (*National Countil of Teacher of Mathematic*) that there are 5 process standards in mathematics learning, namely: problem solving, understanding and evidence, communication, relationships and presentation (*NCTM, D, 2014*).

The importance of mathematical communication standards according to NCTM emphasizes the importance of students being able to speak, write, describe and explain mathematical concepts. NCTM also states that without good communication, development will be hampered, because students' mathematical communication skills are students' essential basic mathematical competencies from mathematics and mathematics education. (Yuliani, *et.al,*. 2020)

According to Jasisa,*etal.,* (2018) Improvement of students' mathematical communication skills that obtain learning of the RME approach is better than students who obtain ordinary approaches. Also supported by research results Yuliani et al., (2020)regarding the effect of the application of [the RME approach on the mathematical communication skills of students in SMP 18 pekan baru. That there are differences in the mathematical communication ability of students who learn using the RME approach with other approaches.

Another factor that is felt to have a relationship with mathematical communication is student confidence, this is in line with the statement of Fardani and Surya (2018) which states that one factor that affects student success in learning is self-confidence. Of course, each student will have a different level of trustworthiness which will later be felt to have a relationship with the level of mathematical communication skills possessed by students.

According to Yuliani *et.al,*. (2020) the emphasis of RME is an approach that uses a real-world context that is applied through real events that are close to students, one of which is the use of culture (ethno) around the student environment both in the form of objects and culture, which can help students understand and communicate mathematics in the learning process.

Ethnomathematics has to transform mathematics to make mathematics a science that does not exploit and expose and improve humans.transforming here has the meaning of improving in a better direction, correcting shortcomings, especially in the educational system. This is evidenced by making ethnomathematics a medium or tool in the process of learning mathematics (Muslim &; Prabawati, 2020)

RESEARCH METHODS

This type of research is a quantitative method that is experimental, where the purpose of this study is to increase mathematical communication skills and student confidence given learning by using the RME approach (*Realistic Mathematic Education)* Ethnomathematics-based is better than students who are given conventional learning.

PopuThe lasi in this study is all grade VII students of SMPN 3 Kragilan Odd semester academic year 2023/2024 consisting of approximately 7 classes. In this study, the class used as sampe; The research is kela VII B and VII C where class VII B as the control class and class VII C as the experimental class.

The instruments used are tests and non-tests, tests in the form of essay questions and non-tests in the form of questionnaires about student confidence statements. Data

collection techniques in this study are in the form of

1. Student Mathematical Communication Skills Test
   The test questions are 4 questions covering indicators of students' mathematical communication skills. Taken from the results of the improvement before and after working on the test questions or often said to be *pretsest-postest.* Which aims to find out the extent of student improvement before and after being given learning.
2. Student Confidence Questionnaire
   The filling out of the student confidence questionnaire amounted to 14 statements consisting of 7 positive statements and 7 negative statements. Each is given at the time of *pretest* and *postest.* Which aims to find out how to increase students' confidence before and after being given learning.

Data analysis techniques in this study are: (1) test the average difference to find out that the application of the RME learning approach is better than conventional learning. (2) N-Gain test to determine the improvement before and after RME learning.

RESULTS AND DISCUSSION

After going through the research process, researchers have obtained research results after analyzing the data. What was analyzed in this study was the results of tests of students' mathematical communication skills and self-confidence. Test results are obtained from the results *pretest-postest* experimental class and control class. Before conducting a hypothesis test, the data obtained is calculated first, the N-Gain value will be processed in this study. The first step is to do a prerequisite test first.

Table 1. *Results of N-Gain mathematical communication skills*

Kelompok	X_{max}	X_{min}	Ukuran Tendensi Sentral		Ukuran Variansi Kelompok	
			$\bar{x}$	M_e	R	Sd
Eksperimen	0,82	0,06	0,675	0,53	0,75	0,193
Kontrol	0,69	0,01	0,468	0,50	0,68	0,176

Based on the table above, it can be seen that the *N-Gain value of* the experimental class is better than that of the control class. Judging from the average value.

After that, prerequisite tests, normality tests and homogeneity tests were carried out.

Table 2. *N-Gain value normality test result*

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	kelas	Statistic	df	Sig.	Statistic	df	Sig.
N_Gain	Eksperimen	.136	33	.128	.952	33	.150
	kontrol	.182	34	.005	.884	34	.002
a. Lilliefors Significance Correction							

MAs seen from the results above, the probability value of the experimental class is 0.128. With a confidence level of 95% with n = 65 which is 1.997. Therefore , it is normally distributed. While the probability value of the control class is 0.005, with hence abnormally distributed.$L_{Tabel} L_{Tabel} < L_{Hitung} L_{Tabel} > L_{Hitung}$,

Because the sample has abnormally distributed data, to test the hypothesis, a non-parametric statistical test is carried out using the Mann Whitney test

Table 3. *Test Hypothesis N=Gain Students' mathematical communication skills*

Test Statistics[a]	
	N_Gain
Mann-Whitney U	514.500
Wilcoxon W	1109.500
Z	-.585
Asymp. Sig. (2-tailed)	.089

Looking at the statistical value of the Z test, calculate it is –585 and the probability is 0.089 because it uses 2 groups, the sig table is divided by 2 with a result of 0.045. thus rejected. This means that for the test of

increasing the average class given ethnomathematics-based RME learning is better than the class given conventional learning.H_0

Next, determine the results of the N-Gain test from the confidence questionnaire data

Table 4. *N-Gain Student Confidence Results*

elompok	X_{max}	X_{min}	Ukuran Tendensi Sentral		Ukuran Variansi Kelompok	
			$\bar{x}$	M_e	R	Sd
Eksperimen	34	-7	0,850	0,667	0,41	0,849
Kontrol	18	-53	0,256	0,243	0,71	1,343

Based on the table above, it can be seen that the *N-Gain value* of the experimental class students' confidence questionnaire has increased significantly compared to the control class. Furthermore, the data above will be carried out prerequisite tests.

Table 5. *N-Gain Normality Test Results*

Tests of Normality							
		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	kelas	Statistic	df	Sig.	Statistic	df	Sig.
N_GAIN	Eksperimen	.161	33	.030	.889	33	.003
	Kontrol	.160	34	.028	.819	34	.000
a. Lilliefors Significance Correction							

Source: Spss(25)

Looking at the results above, the probability value of the experimental class is 0.161. With a confidence level of 95% with n = 65 which is 1.997. Therefore , it is abnormally distributed. And the probability value of the control class is 0.028, with hence abnormally distributed.$L_{Tabel} L_{Tabel} < L_{Hitung} L_{Tabel} > L_{Hitung}$,

Because the sample has abnormally distributed data, to test the hypothesis, a non-parametric statistical test is carried out using the *Mann Whitney test*

Table 6. *Test the Hypothesis N=Gain*

Test Statistics[a]		
	N_GAIN	
Mann-Whitney U	421.000	
Wilcoxon W	1016.000	
Z	-1.756	
Asymp. Sig. (2-tailed)	.079	
a. Grouping Variable: kelas		

Source: Spss (25)

Looking at the statistical value of the Z test, calculate it is –1.756 and the probability is 0.079 because it uses 2 groups, the sig table is divided by 2 with a result of 0.0395. Thus H0 is rejected. This means that the average increase test between classes given ethnomathematics-based RME learning is better than classes given conventional learning.

DISCUSSION

Quantitative research methods can be interpreted as data collection using research instruments, quantitative data analysis with the aim of testing a hypothesis that has been determined (*Sugiyono, 2019*).

The results of research on students' mathematical communication skills are known that the increase in classes given Ethnomathematics-based RME learning is better than those given conventional learning. Judging by the average results, the students of the experimental class are higher than those of the control class.

The second result of the study was that the increase in confidence of experimental class students was better than the control class. This shows that Ethnomathematics-based RME learning can be used as an alternative to mathematics learning in addition to conventional learning

This is in line with the results of Chotimah's research, (2015), based on the results of research conducted showing that the RME approach provides better results so that there is an increase in mathematical communication skills in students. This proves the influence of the RME approach on students' communication skills. Therefore, through the RME approach, it is expected to

overcome students' difficulties in mathematical communication skills. Also supported by research Yunisha et al., (2016), based on the results of research and discussion, it was concluded that there was a difference in the average value of mathematical communication skills of students who learned with the RME approach higher than students who learned using conventional approaches. Therefore, it can be concluded that in general the RME approach has a positive influence on communication skills.

This is in line with the statement Fardani et al., (2021), which states that one of the factors that influence student success in learning is self-confidence. Of course, each student will have a different level of confidence which will later be felt to have a relationship with the level of mathematical communication skills possessed by students (fardani et.al 2021).

CONCLUSION

1. Improving students' mathematical communication skills given an ethnomathematics-based RME (*Realistic Mathematic Education)* learning approach is better than that given conventional learning. Judging from the average experimental class > from the control class.
2. Increasing student confidence given an ethnomathematics-based RME (*Realistic Mathematic Education)* learning approach is better than that given conventional learning. Judging from the average score of the experimental class > from the control class.

REFERENCES

Chotimah, S. (2015). Upaya Meningkatkan Kemampuan Komunikasi Matematik Siswa SMP di Kota Bandung dengan Pendekatan Realistic Mathematics Educations pada Siswa SMP Kota Bandung. Jurnal Ilmiah Stkip Siliwangi Bandung, 9(1).

Fardani, Surya, & Mulyono. (2021). Fardani, Z., Surya, E., & Mulyono, M. (2021). Analisis kepercayaan diri (self-confidence) siswa dalam pembelajaran matematika melalui model problem based learning. Paradikma: Jurnal Pendidikan Matematika, 14(1), 39-51.

Hamidah, H., Ayuningtyas, V., & Wahyuni, S. (2022). PENGARUH MODEL PEMBELAJARAN DISCOVERY TERHADAP KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA MTS KELAS VIII DI KABUPATEN SERANG. Jurnal Lebesgue: Jurnal Ilmiah Pendidikan Matematika, Matematika dan Statistika, 3(2), 438-445.

Hendriana, H., & Kadarisma, G. (2019). Self-Efficacy dan Kemampuan Komunikasi Matematis Siswa SMP. JNPM (Jurnal Nasional Pendidikan Matematika), 3(1), 153. https://doi.org/10.33603/jnpm.v3i1.2033

Kusuma, J. W., Zaenuri, Z., Rochmad, R., Pujiastuti, E., & Hamidah, H. (2022, October). The Influence Of The Ethnomathematicss-Based Multy Representation Discourse Learning Model On Mathematical Communication Skills And Self-Confidence Of Junior High School Students. In International Conference on Science, Education, and Technology (Vol. 8, pp. 740-746).

Muslim, & Prabawati. (2020). Muslim, S. R., & Prabawati, M. N. (2020). Studi Etnomatematika terhadap Para Pengrajin Payung Geulis Tasikmalaya Jawa Barat. Mosharafa: Jurnal Pendidikan Matematika, 9(1), 59-70.

NCTM, D (2014). “Penerapan Pembelajaran Reciprocal Teaching untuk Meningkatkan KemampuanKomunikasi Matematis dan

Kemandirian Belajar Matematika Siswa" Jurnal Pendidikan UNSIKA. 2,(2), 13-23. (2014).

Purwanto, J., Setyautami, C., Gunawan, G., Ulia, N., & Kusuma, J. W. (2022). DESCRIPTION OF STUDENT'S MATHEMATIC COMMUNICATION ABILITY REVIEWING FROM PERCEPTION OF MATHEMATICS. International Journal of Economy, Education and Entrepreneurship, 2(3), 806-813.

Sugiyono. (2019). Metode Penelitian Kuantitatif, Kualitatif, dan R&D (Sutopo (ed.); 2nd ed.). CV Alfabeta. (2019).

Sulastri. (2014). Sulastri, M. (2014). Penerapan model pembelajaran realistic mathematic education (rme) untuk meningkatkan kemampuan komunikasi matematika siswa pada materi bilangan bulat di kelas vii smp swasta laksamana martadinta ta 2014/2015 (Doctoral dissertation, UNIMED).

Yuliani, D., Andriani, L., & Fitri, I. (2020). Pengaruh Penerapan Pendekatan RME (Realistic Mathematic Education) Terhadap Kemampuan Komunikasi Matematis Berdasarkan Self Efficacy Siswa SMPN 18 Pekanbaru. JURING (Journal for Research in Mathematics Learning), 3(2), 193. https://doi.org/10.24014/juring.v3i2.9386

Yunisha, Prahmana, & Sukmawati. (2016). Yunisha, R., Prahmana, R. C. I. & Sukmawati, K. I. (2016). Pengaruh Pendekatan Pendidikan Matematika Realistik terhadap Kemampuan Komunikasi Matematis Siswa Kelas VII SMP. Jurnal Elemen, 2(2).