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The Influence Of The Ethnomathematicss-Based Multy Representation Discourse Learning Model On Mathematical Communication Skills And Self-Confidence Of Junior High School Students

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Abstrak. Ethnomathematicss-based multy representation discourse is a learning model that emphasizes the use of multi-representation in a classroom setting using cultural relationships in the context of life that can improve students' mathematical communication skills and self-confidence. The purpose of the study was to find out how the influence of the Ethnomathematics based diskursus multy Representation model on students' mathematical communication skills and self-confidence. This study used a type of pretest-posttest control group design experiment. This research was carried out in the even semester of 2022 with samples of class VII B as the experimental class and VII A as the control class. Data collection techniques use tests and questionnaires. Data analysis techniques use t-test analysis, Effect Size, and questionnaire percentage. Based on the results of the study, it is known that the influence of the Ethnomathematics based diskursus multy Representation learning model on students' mathematical communication skills is very high and student self-confidence after being given the Ethnomathematics based diskursus multy Representation learning model is relatively high.

Key words: Ethnomathematics; Multi Representation Discourse (DMR); Communication Skills; Self Confidence

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INTRODUCTION

National Council of Teachers of Mathematics (2000) mentioned that one of the basic mathematical skills that students must have in learning mathematics is mathematical communication skills. National Council of Teachers of Mathematics (2000) and Baiduri et al. (2020) wrote's that mathematical communication skills are a way for students to express mathematical ideas either orally, in writing, drawings, diagrams, using objects, presenting in algebraic form, or using mathematical symbols. Baroody & Coslick (1993) also mentioned that there are at least two reasons why mathematical communication is so important, namely: (1) mathematics as language, meaning that mathematics is not just a thinking aid but mathematics helps to find patterns, solve problems, and communicate various ideas appropriately and concisely; (2) mathematics is learning as social activity, meaning that mathematics is a social activity in mathematics learning, as well as interaction between students and teacher-student communication.

Teacher-to-student communication is an important part of mathematics learning in an effort to guide students to understand concepts or find solutions to a problem. It is also through communication that students can exchange and explain their ideas or understandings to their peers (Hendriana et al., 2013). A similar statement was expressed by Clark et al. (2005) who explained how important it is to have the ability to communicate mathematically because mathematical communication is a way and understanding to build meaning and explain one's ideas. Mathematical communication is one of the standard processes in learning Mathematics (Cumhur & Tezer, 2020), (Sumaji et al., 2019), and (Viseu & Oliveira, 2012).

Mathematical communication is one of the competencies that students need in real life and in learning Mathematics. In the classroom students always communicate with the teacher and other students in order to solve problems in mathematics, as well as to present mathematical

solutions or ideas to others. However, there are many difficulties with many reasons when they exchange information or communicate with others using mathematical language in class. Therefore, the ability to communicate Mathematics is one of the competencies needed by students. However, judging from the results of The Trends in International Mathematics and Science Study (TIMSS) 2015, it ranks Indonesian students 45th out of 50 countries in mathematical communication, and Program for International Student Assessment (PISA) 2018 which ranks Indonesian students 74th out of 79 countries in mathematical communication (OECD, 2019). The results of the Programme for International Student Assessment (PISA) Indonesia study have always been low in each year of the number of participating Countries. From 2000 to 2018 the achievement of Indonesia's PISA index did not experience a better increase (Saputri, 2021).

Furthermore, based on the results of previous studies, it is known that students' mathematical communication skills are still low. Österholm (2006) pointed out that students' mathematical communication skills are still considered low, especially the skills and accuracy of drama to observe or recognize a mathematical problem. Österholm (2006) results stated that respondents seemed to have difficulty articulating reasons for understanding a reading. Low mathematical communication skills are also shown in the study Zulkarnain (2013) i.e. students have not been able to communicate ideas properly. Phuong & Tuyet (2018) wrote in the results of his research that siswa is more interested in solving multiple-choice questions than questions that ask them to give an opinion, so that students only give short answers such as yes or no.

When a student is unable to describe their ideas logically, this is because the student cannot communicate his thoughts in words so that problems will arise because the student cannot describe his mathematical ideas coherently (Baxter et al., 2005). This problem certainly requires attention so that a solution can be found to improve students' communication skills in mathematics. Improving students' mathematical communication skills must join hands with the learning process. We can optimize communication skills by applying learning models that provide opportunities for students to discuss and interact with each other so that their mathematical communication skills improve (Tinungki, 2015). Pugalee (2001) further stated that in order for students to be trained in their mathematical communication skills, in learning students need to be accustomed to providing arguments for each answer and providing responses to answers given by others, so that what is being learned becomes more meaningful to them.

The results of interviews with mathematics teachers are known that in general, many mathematics teachers think that mathematics is a difficult lesson. Furthermore, it is known that not a few students do not have confidence (self-confidence) in their ability to solve the given questions and choose to cheat on friends' answers. Self-confidence or self-confidence is the most valuable attribute in a person in social life, because with self-confidence, a person is able to actualize all the potential that exists in himself (Andayani & Amir, 2019).

So that in this study, an appropriate learning model will be chosen to influence students' mathematical communication skills and self-confidence. One of them is the Multy Representation Discourse (DMR) model. The DMR model is a learning model that emphasizes class arrangements and group work for students so that when learning takes place students can discuss between groups to solve problems (Suendang, 2017). The stages in this DMR model greatly influence students' ability to communicate, because students are organized in a group to exchange opinions. This is also expected to provide opportunities for students to increase their confidence in sharing forums to solve problems.

Based on the results of research conducted by Amani (2021)obtained the learning model of the Multy Representation Discourse can improve the ability to understand mathematical concepts and self-efficacy of students. Furthermore, the results of Rahmawati (2019) research are known that the Multy Representation Discourse learning model can improve students' representation and communication skills. This reinforces that the Multy Representation Discourse learning model can be used to address research problems.

On the other hand, Ethnomathematicss is interpreted as the study of mathematics (mathematical ideas) and its relationship with culture in the context of social life in society (Gerdes, 2010). This is in line with Rosa & Orey (2011) and Albanese & Perales Palacios (2015)opinion that Ethnomathematicss is a study that examines mathematical ideas or practices in various cultures that show a reciprocal

relationship between the two. To bring out students' love for culture as well as hone students' ability to communicate on cultural topics, the DMR learning model will be collaborated with Ethnomathematicss. The collaboration between the DMR learning model and Ethnomathematicss is on the given problem, which is culture-based.

The purpose of this study is to find out how the influence of the Ethnomathematicss-based multy representation discourse learning model on students' mathematical communication skills and self-confidence. The formulation of the problem is:

Are the mathematical communication skills of students given Ethnomathematicss-based multy representation discourse learning model better than conventional models?

How does the Ethnomathematicss-based multy representation discourse learning model affect students' mathematical communication skills?

How is the student's self-confidence after being given the Ethnomathematicss-based multy representation discourse learning model?

METHODS

The proximity of this study is quantitative. Cresweel stated that the quantitative approach is the measurement of objective quantitative and statistical data through scientific calculations derived from a sample of people or residents who are asked to answer a number of questions about the survey to determine the frequency and percentage of their responses (Creswell, 2015). This type of research uses experimental research and uses pretest posttest control group design. This p enelitian population is class VII students at SMP Negeri 01 Tanara for the 2021/2022 school year and the ampelis the entire population, namely class VIIA and VIIB students who are taken by saturated sampling.

Data obtained from mathematical communication skills tests and self-confidence questionnaires. The test is made based on indicators of mathematical communication skills in the form of 4 essay questions. The indicators of communication skills are 1) writing, which is explaining the idea or situation of an image or graph in its own words in written form; 2) drawing, that is, stating a situation with a drawing or graph; 3) mathematical expression, that is, expressing a situation into the form of a mathematical model and solving it. The self-confidence questionnaire is made based on self-confidence indicators, namely believing in one's own abilities, having a sense of responsibility, wanting to achieve high achievements, not giving up easily, having the courage to act, as many as 26 statements.

The self-confidence questionnaire will be calculated by the following formula:

$$X = \frac{total\ score}{number\ of\ students} \times 100$$

The criteria for assessing self-confidence according to Arwadi (2021) is:

Table 1. Self Confidence Criteria

Interval	Category
25 - 39	Very Low
40 - 54	Low
55 - 69	Keep
70 - 84	High
85 - 100	Very High

Then the mathematical communication skills test data is processed using the help of Microsoft Excell and SPSS 19 software with the following steps:

Calculates flatteningand standard deviation.

Test the normality and homogeneity of sample data.

Average Difference Test.

Test effect size

Test effect size (Umam & Jiddiyyah, 2021) is:

$$d = \frac{M_2 - M_1}{S_{pooled}}$$

Information:

d : Cohen's effect size

M_1 : average pretest value

M_2 : average posttest value

S_{pooled} : combined of standard deviation values

The combined formula of the standard deviation value is:

$$S_{pooled} = \sqrt{\frac{(SD_1)^2 + (SD_2)^2}{2}}$$

Information:

$(SD_1)^2$: Pretest score variance

$(SD_1)^2$: Postest score variance

Table 2. Interpretation of Values Cohen's d

Cohen's d	Criterion
$d \geq 2.1$	Very High
$0.8 \leq d \leq 2.0$	High
$0.5 \leq d \leq 0.79$	Keep

$0.2 \leq d \leq 0.49$	Low
$0.0 \leq d \leq 0.19$	Very Low

RESULTS AND DISCUSSION

Based on descriptive analysis using spss version 16, the following data were obtained:

Table 3. Descriptive Statistics of Pretest and Postest Data

	Pretest				Posttest			
	n	$\overline{X}$	Max	Min	n	$\overline{X}$	Max	Min
Experiment	20	50	65	35	20	78	90	60
Control	20	49.5	65	30	20	69.5	80	60

The results of table 3 show that in general the experimental class is higher than the control class descriptively. To find out the differences significantly will be presented a table of statistical test results.

Table 4. Data Postes Prerequisite Test Results

	Normality Test	Homogeneity Test
Experiment	0.216	0.714
Control	0.128	0.714
Sig (α)	0.05	0.05
Conclusion	Normality	Homogen

Table 5. Test t Results

	Postest
tcount	6.198
ttable	2.093
Sig (α)	0.000
Conclusion	H1 Accepted

From tabel 5 obtained significant values contained in the independent t test of 0.000 dan t_{count} 6.198. It can be seen that the sig value < 0.05 and value $t_{count} > t_{table}$ so H_0 rejected and H_1 accepted. So it can be concluded that the mathematical communication skills of students who are given learning the Multy Representation Discourse model based on Ethnomathematicss are better than in conventional classes.

Furthermore, the influence of the Ethnomathematicss-based Multy Representation Discourse learning model on students' mathematical communication skills is determined from the effect size (d) value written by (Umam & Jiddiyyah, 2021).

Table 6. Effect Size Test Results (d)

Average		Standard Deviation		$\mathbf{S_{pooled}}$	d
Pretest	Posttest	Pretest	Posttest		
50	78	8.11	6.96	8.01	3.49

Based on tabel 6 it is known that the value of cohen's d is as large as 3,49. This shows that 3,49 ≥ 2,1 which means it has a very high influence based on the table of interpretation criteria of cohen's values d. The conclusion is that the influence of Ethnomathematicss-based Multy Representation Discourse learning on students' mathematical communication skills is classified as very high .

To answer the formulation of the third problem, student self-efficacy questionnaire data will be processed.

Table 7. Self Confidence Results

Aspects	Indicators	%	Category
Self-belief	Believe in one's own abilities	88	Very High
Act independently in making decisions	Not dependent on others	78	High
	Responsible	84	High
	Want to achieve high achievers	81	High
Have a positive self-concept	Not easy to give up	79	High
Dare to express an opinion	Memiliki keberanian untuk bertindak	88	Very High
Average		83	High

It can be seen in Table 7, that self-confidence in the experimental class obtained a high percentage of self-confidence. There are 4 indicators that are categorized as high and 2 indicators that are categorized as very high. The average self confidence in the experimental class obtained a percentage of 83% where the figure was categorized as high self-confidence. In conclusion, there is a model of learningaran Discourse Multy Representation based on Ethnomathematicss high influence on student self-confidence.

It is significantly known that theEthnomathematicss-based Multy Representation discourse model affects students' mathematical communication skills and self-confidence. This is because at the stage of the Discourse model Multy Representation contributes greatly to students' communication skills, including:

Students have discussions with predetermined groups.

Each group discussed the material and problems provided and each member recorded the results of the discussion in the student worksheet (LKPD).

One did a presentation and each group of students questioned each other.

Teacher as a facilitator and straighten out the material and solve the problem if there are obstacles.

According to Sari (2019) by applying the learning model discourse Multy Representation students are actively involved in the learning process, students will feel that learning is fun, effective and fast. Students' abilities are more honed by getting students used to expressing their opinions. The forum that created the atmosphere of the discussion also forced students who were embarrassed to ask questions to participate in the discussion.

Furthermore, collaborating Ethnomathematicss in learning models contributes greatly to the student's ability to communicate his ideas. This is because the problems discussed are closely related to the culture and environment around the students, so that students are more familiar and able to provide meaningful arguments. As previous researchers said that Ethnomathematicss is basically Mathematics practiced among cultural groups that people around them are very familiar with (Rosa & Orey, 2011), (Albanese & Perales Palacios, 2015), and (Mosimege, 2012).

Furthermore, the relationship with student self-confidence, namely the learning process at the DMR stage indirectly contributes greatly to students' self-confidence. Because students are given problems that are familiar and easy to understand, so students begin to feel confident that they will be able to solve the problem correctly. This is in line with Herdiana et al (2021) research that the Multy Representation Discourse learning model is a student-centered learning by generating group discussions and requiring students to have the courage to expresstheir opinions. Most students at multy representation discourse learning have the courage to act, for example acting in expressing an opinion, asking a friend or teacher if there is a difficulty he is going through. Therefore, the indicators of having the courage to act are categorized very high.

CONCLUSION

The conclusion in this study is that the influence of the ethnomathematics-based multy representation discourse learning model on students' mathematical communication ability is classified as very high and student self-confidence after being given a learning model of the ethnomathematics-based multy representation discourse is relatively high. The suggestion for further research is to apply the ethnomathematicss-based multy representation discourse learning model accompanied by a more LKPD so that the problems given are more numerous and varied covering more cultures.

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