



Assessment of Middle School Mathematics Educators' Grasp, Comprehension, and Utilization of Ethnomathematics in Conducting Math Instructional Sessions

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Abstract: *This research evaluates the understanding and application of ethnomathematics by junior high school level mathematics educators in carrying out mathematics learning sessions. The focus of this research is to identify the extent to which these teachers understand ethnomathematics concepts and how effective they are in integrating them into mathematics learning activities. Through this analysis, we can evaluate the impact of teachers' ethnomathematics understanding on students' mathematics learning experiences at the junior high school level.*

Keywords: *Mathematics Educator, Etromathematics, Comprehension*

INTRODUCTION

Mathematics is a logical science that studies the form of quantities and related concepts. Mathematics is one of the subjects that we often study at school when we enter elementary school, middle school, high school and even university. Therefore, mathematics is a very important subject in life, helping students' reasoning so they can think critically when facing problems. But according to (Gazali, 2016; Nisrina et al., 2021) Most students stated that the material in mathematics was difficult. Apart from being difficult, students also have the perception that mathematics is a boring subject (Indriyani et al., 2020; Nawi, 2012).

According to (Mahmudah, U., & Fikroh, F. H, 2021) the learning process requires serious attention from all parties such as teachers, the school environment, students' guardians, and the playing environment at home, because mathematics learning is a process where students are active. constructing mathematical knowledge. Thus, when studying mathematics, students definitely need a teacher to guide students in applying mathematics in the classroom. Teachers play a very important role in creating a quality generation of the nation. Therefore, teachers must have high-quality potential to be able to apply their knowledge to students. Teachers must also have extensive knowledge in their understanding of the material explained to students. Therefore, it equips students with logical, analytical, systematic, critical, innovative and creative thinking competencies, as well as the ability to collaborate (Rachmantika & Wardono, 2019).

With many teachers not knowing and understanding ethnomathematics, there are very few opportunities for applying ethnomathematics in junior high schools. This is also because ethnomathematics learning was only established in 2019, so many teachers or schools do not know or are just learning about ethnomathematics. With ethnomathematics-based learning, students are less likely to participate in learning mathematics through culture.

The mathematics learning method that is often used in class is explanation of the material or what is called the monotonous lecture method. The impact of teachers who do not master and understand the ethnomathematics approach is that they are unable to apply ethnomathematics methods to students which also aims to introduce the culture that exists in Indonesia. With the ethnomathematics method, the mathematics learning taught is no longer monotonous. Most teachers in junior high schools do not know what ethnomathematics is and only a few understand what ethnomathematics is. In fact, not many junior high school teachers in the Pekayon area understand and apply ethnomathematics. Minimal application of ethnomathematics in schools.

With these problems, an analysis of mathematics teachers' knowledge and understanding in the learning process needs to be carried out. This aims to find out what difficulties mathematics teachers face in ethnomathematics. It is hoped that the data resulting from this analysis can provide evaluation material for schools to improve the quality of mathematics learning in the classroom by implementing an ethnomathematics approach. Ethnomathematics is the study of mathematics linked to culture. According to Fitriza, R (2018), Ethnomathematics is a mathematical study in the form of the study of forms of culture (ideas, activities or cultural objects) that have become the characteristics of a particular social group. And the study was carried out by someone who has knowledge/expertise in the field of mathematics. Because ethnomathematics is a study, it makes the ideas/concepts and activities of a cultural group the object of study. Therefore, it is possible to explore mathematical concepts in various Indonesian cultural treasures. One way that can bridge between culture and education and mathematics is ethnomathematics.

The aim of this research is to provide the application of ethnomathematics learning to teachers who do not yet understand ethnomathematics. This research also provides education to teachers that ethnomathematics methods can be used in mathematics material and in classroom learning. So that the next generation of the nation will also be more familiar with the culture in Indonesia, because Indonesian culture is now rarely known to the younger generation who have been mixed with foreign cultures.

The benefits of implementing ethnomathematics learning for teachers are that teachers have alternative innovative learning methods, teachers can make students familiar with their regional culture, and teachers can make students have more mathematical reasoning so that students think critically in solving problems.

So the researcher chose to use a qualitative descriptive type and approach in this research because it is in accordance with the research objective, namely to describe knowledge, understanding and application of junior high school level ethnomathematics to mathematics learning practices so that the author can describe various data sources from teachers' knowledge and understanding of ethnomathematics.

METHODE

This research is a descriptive type with a qualitative approach. The research design used is a preliminary study. The purpose of using a qualitative approach in this research is to determine the knowledge, understanding and application of mathematics teachers at junior high school level regarding ethnomathematics in the practice of mathematics learning activities.

The subjects of this research were educators at Yasmin Islamic Middle School, Karya Dharma Islamic Middle School educators, SMPN 91 Jakarta educators, and SMPN 184 Jakarta educators. Participants in this research are mathematics educators. With a total of 1 Mathematics Educator at Yasmin Islamic Middle School, 1 Mathematics Educator at Karya Dharma Islamic Middle School, 1 Mathematics Educator at SMPN 91 Jakarta, and 1 Mathematics Educator at SMPN 184 Jakarta . Winarni (2021) believes that sample determination in qualitative research is carried out when the researcher begins to enter the field and during the research process. This method involves the researcher selecting certain people who are considered capable of providing the necessary data .

The data collection technique used in this preliminary study was interviews. Winarni (2021) believes that interviews are a data collection method that requires direct communication between the interviewer and the subject or respondent. In interviews, one-sided questions and answers often occur, carried out systematically and based on research objectives.

The instrument used in this preliminary study was an interview sheet . This interview sheet will be used to obtain information related to the knowledge, understanding and application of mathematics teachers at junior high school level regarding ethnomathematics in the practice of mathematics learning activities .

RESULTS AND DISCUSSION

Something you don't like will have a negative impact on something. Likewise, students who don't like mathematics will have an indifferent attitude and may even not want to study mathematics at all. Most likely the main cause is that students lack confidence and are not motivated to learn mathematics because they feel they do not have the ability to understand mathematics. Apart from the subject being considered difficult, the problems raised by the teacher are also very foreign to the students.

According to (Sarwoedi, S., Marinka, DODkk 2018:172) Children who experience a lack of ability to understand a mathematical problem will have low learning achievement. To overcome this, teachers are expected to be able to innovate and apply appropriate strategies in the classroom. In the process of learning mathematics, students who get grades due to poor comprehension skills are considered normal, this is because students seem to have received suggestions from the beginning of their education which say that mathematics is difficult because it is abstract.

By applying ethnomathematics in the mathematics learning process, students' reading comprehension abilities can be improved and improved compared to before applying ethnomathematics in the learning process.

Ethnographic mathematics can be used by teachers as an alternative method to help students understand mathematics more easily. With ethnomathematics, students are expected to be able to further explore metacognitive, critical thinking and problem solving abilities.

Ethnomathematics is a form of mathematics which in practice is influenced or based on culture (Kou & Deda, 2020). The application of ethnomathematics in the world of education, especially in teaching mathematics at the secondary school level, is expected to help students better understand the various mathematical concepts taught in school, apart from that it can equip children with knowledge that allows them to get to know various Indonesian cultures, which are already underdeveloped and foreign to them. ethnic generation.

In terms of student problems in learning mathematics, teachers must have knowledge and understanding of ethnomathematics, so that they can better master innovative and creative learning. Before implementing mathematics learning, the first thing to do is start with the teacher, because the teacher is the student's facilitator in learning. As said, the role of the teacher is as an organizer of the learning environment and at the same time as a learning facilitator which includes, the teacher as a model, the teacher as a planner, the teacher as a

forecaster, the teacher as a leader, and the teacher as a guide or guide towards learning centers. (Zein, M. 2016).

YASMIN ISLAMIC SMP INTERVIEW

In the interview results, the mathematics teacher at SMP Islam Yasmin stated that the respondents knew what ethnomathematics learning was.

Researcher : *Do you know what ethnomathematics learning is?*

Respondent : *So far, I already know about enomathematics learning.*

In the interview results, the mathematics teacher at SMP Islam Yasmin stated that the respondent had knowledge in ethnomathematics learning where the teacher could understand it as mathematics learning related to the culture in Indonesia. Ethnomathematics learning can also be applied to mathematics material.

Researcher: Do you understand ethnomathematics learning in depth?

Respondent : *So, as far as I know, ethnomathematics learning is mathematics learning that connects culture in Indonesia, for example in traditional house buildings in the application of mathematical concepts, namely squares, rectangles, cubes and prisms, in mathematics learning that is applied to the culture most taught by students is Padang traditional house*

Researcher : *According to you, what is the role of ethnomathematics in mathematics?*

Respondent : *the role is to be more familiar with the culture in Indonesia and in culture it turns out there are also mathematical concepts.*

In the interview results, the mathematics teacher at Yasmin Islamic Middle School stated that at Yasmin Islamic Middle School, ethnomathematics learning had not yet been implemented, but would apply it to students. Because ethnomathematics learning can be applied in mathematics material to make students have variations in understanding mathematical formulas directly with real learning models and by learning ethnomathematics, they can create innovative learning methods with the learning models provided.

Researcher : *Will you apply ethnomathematics to your students?*

Response : *yes, I apply it to students*

Researcher: Do you think ethnomathematics needs to be applied in mathematics learning?

Respondent : important, because students have varying explanations for mathematical material, if given formulas and material students are still confused so they need models or real objects that can be found in everyday life.

Interview at SMPN 184 Jakarta

The results of interviews with mathematics teachers at SMPN 184 Jakarta stated that the teachers were aware of ethnomathematics learning.

Student : Previously, did you know what ethnomathematics was?

Respondent : Yes, I know ethnomathematics

The results of interviews with mathematics teachers at SMPN 184 Jakarta stated that teachers did not understand mathematics learning in depth and only knew the general outline, namely ethnomathematics learning is mathematics learning based on a local cultural approach.

Student : Do you understand what ethnomathematics is?

Respondent : Not yet in detail

Student : According to you, what is meant by ethnomathematics?

Respondent : So ethnomathematics is mathematics learning based on an approach to local culture. Like traditional games.

In the interview results, the mathematics teacher at SMPN 184 Jakarta stated that applying ethnomathematics to mathematics learning would be very difficult because mathematics learning tends to be more exact and ethnomathematics is more applied to the social. The application of ethnomathematics also does not all discuss mathematical material and can only be used in material on equations of two variables.

Student : How do you think ethnomathematics is applied in a mathematical context?

Respondent : In my opinion... mathematics is actually still quite difficult, because in terms of learning mathematics tends to be more exact. And whereas ethno is more social. So maybe there is, but not all mathematical material can be used with an ethno approach. Usually, ethno is when the material is an equation of two variables.

In the interview results, the mathematics teacher at SMPN 184 Jakarta stated that the application of ethnomathematics would be applied if the respondent was able to master or understand ethnomathematics because mathematics cannot be done in one way but there are many ways to do it. The difficulty in understanding and applying ethnomathematics is that the social environment around the school is lacking in culture and most of the material applied is independent curriculum and differentiated learning so that ethnomathematics is not touched and not materialized.

Student : Will you later apply ethnomathematics to your students?

Respondent : If I feel that I have mastered and understood ethnomathematics, I will try, because mathematics cannot be done in one way.

Student : What are the difficulties or obstacles in understanding and applying this ethnomathematics concept?

Respondent : Socialization, social ethnomathematics is still lacking here. Most of the training materials are about the independent curriculum, learning differentiation. For ethnomathematics, it is untouchable and unmaterialized.

Student : In your opinion, does ethnomathematics need to be applied in mathematics learning?

Respondent : In my opinion, yes .

Interview with SMPN 91 Jakarta

In the interview results, the mathematics teacher at SMPN 91 Jakarta stated that he already knew about ethnomathematics learning

Student : Previously, did you know what ethnomathematics was?

Respondent : I know, but only a little

In the results of the interview, the mathematics teacher at SMPN 91 Jakarta stated that the teacher knew what ethnomathematics was in general but did not understand it in depth and had not applied it.

Student : Do you understand what ethnomathematics is?

Respondent : I only understand theoretically because I have never practiced it

Student : Have you ever applied ethnomathematics in mathematics learning?

Respondent : I myself rarely apply it, but in questions I like to have something to do with ethnomathematics

In the interview results, the mathematics teacher at SMPN 91 Jakarta stated that in learning they rarely use ethnomathematics because the respondents only understand the theory and have never put it into practice.

Student : According to you, sir. Do ethnomathematics learning methods need to be applied in mathematics learning?

Respondent : In my opinion, it is very necessary, as an alternative choice for teachers and students in developing strategies for solving mathematics problems

Student : According to you, does the application of ethnomathematics have an influence in solving students' problems in understanding mathematical concepts?

Respondent : In my opinion, every method of solving material in mathematics has advantages and disadvantages, so I cannot say that ethnomathematics can solve students' problems in understanding mathematical concepts. However, in some materials it may be possible to solve students' problems in understanding mathematical concepts. come back again because each method has its own advantages and disadvantages

In the interview results, the mathematics teacher at SMPN 91 Jakarta stated that he would apply the ethnomathematics method if the respondent really understood what ethnomathematics was. According to respondents, ethnomathematics can only be a solution in a few materials because there is also a lot of material that is not related to ethnomathematics.

Karya Dharma Islamic Middle School Interview

The results of interviews with mathematics teachers at Karya Dharma Islamic Middle School stated that the teachers knew about ethnomathematics learning.

Student : Previously, did you know what ethnomathematics was?

Respondent : Yes , I know but not much.

In the results of the interview with the mathematics teacher at Karya Dharma Islamic Middle School, it was stated that the teacher did not understand mathematics learning in depth and only knew it in general,

Student : Do you understand what ethnomathematics is?

Respondent : Understand, maybe not yet in depth because in terms of knowledge we haven't found out much about ethnomathematics, maybe in future learning there won't be much either.

Student : According to you , what is meant by ethnomathematics?

Respondent : In my opinion, ethnomathematics is like working together between culture and mathematics. So ethnomathematics is a mathematical culture that we know studies mathematics.

In the interview results, the mathematics teacher at Karya Dharma Islamic Middle School stated that ethnomathematics is more likely to be applied to mathematics learning and ethnomathematics is more applied to culture.

Student : How do you think ethnomathematics is applied in a mathematical context?

Respondent : In my opinion , it is applied in everyday life, for example, for learning or playing games, there is something called the engklek toy, actually it is a culture that is

usually used every day and in the engklek game there is mathematics, namely in the form of numbers. So, mathematics starts from numbers so it is very influential.

In the interview results, the mathematics teacher at Karya Dharma Islamic Middle School stated that the application of ethnomathematics has been applied in games or learning and to understand ethnomathematics because mathematics cannot be done in one way but there are many ways to do it.

Student : Will you later apply ethnomathematics to students?

Respondent : I want to apply it, I don't really know much about it and I haven't found out much about ethnomathematics in what material is taught, but we will realize that actually ethnomathematics in the material already exists and is implemented because we haven't studied it yet. So, maybe we realize that ethnomathematics is being used.

Student : What are the difficulties or obstacles in understanding and applying this ethnomathematics concept?

Respondent : Because at this school there are not high achieving students. So, for everyday application of ethnomathematics, the problem with any material is that it is difficult, so maybe after Covid, children's learning mentality is not there yet, so they don't want to apply it using any system or model. The problem is that students are just lazy. So, what we have been told many times is that after Covid, actually, children have no desire to study, especially now that there is no National Examination (UN) so their grades have no influence on going to the next level. The problem is that the students themselves feel lazy.

Student : According to you , does ethnomathematics need to be applied in mathematics learning?

Respondent : It is very necessary, perhaps with ethnomathematics learning while playing to introduce the culture we include because our numeracy literacy is very low. So, culture is actually the literacy of many students nowadays, culture is very minimal, how do we unite culture with mathematics is very important.

So from the results of interviews, mathematics teachers at junior high school level in Pekayon on average know what ethnomathematics is. Mathematics teachers know that ethnomathematics learning is mathematics learning that is related to the culture in the surrounding environment which is applied through culture to mathematical material.

Mathematics teachers' understanding of ethnomathematics is not deep in understanding it. Mathematics teachers only know that mathematics learning is related to culture and can be applied to mathematics material. However, mathematics teachers do not know what materials can be applied in ethnomathematics learning. Teachers only know some materials that can be connected through culture.

Meanwhile, in applying it to the practice of learning activities in the classroom, educators are still hesitant to apply it because educators do not understand more deeply how ethnomathematics can be applied in the classroom, educators also do not know what material can be applied to culture in the classroom, many students are not easy to understand. The concept of a new method is because any material is difficult for students to understand because post-Covid children's learning mentality is not there yet, they don't want to apply it using any system or model. The problem is that students are just lazy. Therefore, there are many educators who have not applied ethnomathematics, but educators will also apply ethnomathematics if they already understand the concept or knowledge about ethnomathematics in depth and will also apply ethnomathematics to different materials or not just one material that is applied.

CONCLUSION

Mathematics has long been seen as a neutral and culture-free scientific discipline that is free from social values. Mathematics has always been taught in schools as a subject that involves learning facts, concepts and content that are considered universally accepted. This means that Western mathematics or academic mathematics consists of a collection of knowledge of facts, algorithms, axioms and theorems. However, ethnomatics recognizes that there are different ways of doing mathematics, taking into account the academic mathematical knowledge developed by different sectors of society and taking into account the different modes in which different cultures negotiate their mathematical practices (ways of grouping, calculating, measuring, designing buildings or tools), play and others). There are several impacts from implementing Ethnomathematics-based learning, including: (1) Mathematics learning becomes fun and contextual learning; (2) Can reduce the impression that mathematics is difficult and abstract and replace it with the impression that mathematics is fun and real in every life activity; (3) Get to know your own culture and other cultures; (4) Awareness of respecting and loving one's own culture and other cultures; (5) Part of systematic cultural

preservation efforts through mathematics education in particular and education in general.

Ethnomathematics and academic mathematics have differences, but ethnomathematics can be used to help students in learning academic mathematics so that students can better understand and comprehend the lessons taught by the teacher. Ethnomathematics has also been proven to improve learning outcomes, which has been proven by the research studies mentioned above. Therefore, ethnomathematics can be used by teachers to carry out effective and enjoyable learning and can increase students' love of understanding their own culture.

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