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The Impact of Ethnomathematics on Contextual Mathematics Learning in Elementary School

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Etnomatematika;
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Abstrak: Penelitian ini bertujuan untuk mengetahui peran etnomatematika dalam penerapan pembelajaran matematika kontekstual di sekolah dasar. Metode penelitian yang digunakan ialah studi kepustakaan dengan tahapan *Organize*, *Synthesize*, dan *Identify*. Hasil penelitian menunjukkan bahwa etnomatematika dalam penerapan pembelajaran matematika merupakan salah satu solusi yang digunakan untuk meningkatkan minat belajar siswa. Selain itu etnomatemika juga dapat menghadirkan komponen-komponen pembelajaran antara lain konstruktivisme, bertanya, menemukan, masyarakat belajar, permodelan, refleksi dan penilaian otentik. Sehingga etnomatematika memudahkan siswa untuk belajar, karena konteks yang digunakan berupa budaya yang lazim siswa lihat, dengar dan lakukan sebagai anggota keluarga dan masyarakat. Pembelajaran kontekstual berbasis etnomatematika tentunya tidak hanya memberikan pengetahuan tentang konsep geometri saja, tetapi juga memberikan pengetahuan tentang budaya kehidupan masyarakat dimana siswa berada

Keywords:
Ethnomathematics;
Contextual Mathematics;
Elementary School

Abstract*: This study aims to determine the role of ethnomathematics in the application of contextual mathematics learning in elementary schools. The research method used is literature study with organizing, synthesizing, and identifying stages. The results showed that ethnomathematics in the application of mathematics learning is one of the solutions used to increase students' interest in learning. In addition, ethnomathematics can also present learning components, including constructivism, asking questions, discovering, learning communities, modeling, reflection, and authentic assessment. So that ethnomathematics makes it easier for students to learn, because the context used is in the form of a culture that students commonly see, hear, and do as family and community members. Ethnomathematics-based contextual learning, of course not only provides knowledge about geometric concepts, but also provides knowledge about the culture of community life where students are located.*

INTRODUCTION

Mathematics is a science that has made a major contribution to the advancement of modern technology in the 21st century (Mulbar, 2012). In addition, mathematics learning is also an important part of education that plays a role in developing students' thinking processes in dealing with mathematical problems and training the preparation of thinking for students' future (Dewi Murniati et al., 2013). The 2013 curriculum emphasizes learning mathematics based on scientific methods (Scientific Methode) by observing scientific mathematical problems that aim to increase student activity (Richardo, 2017). However, learning mathematics now is still done in a monotonous way, so students find it difficult to convey their thoughts. This is because learning is focused on the role of the

teacher (Denning, 2016; Irawan & Kencanawaty, 2017). The difficulty is due to students' assumption that learning mathematics has no connection with everyday life and the presentation of mathematical concepts does not attract students' interest in learning (Makonye, 2014; Misdalina et al., 2013).

Learning mathematics should be associated with the reality of everyday life because mathematics has become entrenched in the lives of students in society (I Gusti Putu Suharta, 2017). In addition, learning in which social and cultural interactions occur is a reflection of good mathematics learning (Sudirman et al., 2017). D'Ambrosio stated that it is good for the mathematics learning process to use a culture-based context, commonly called ethnomathematics (D'Ambrosio, 1985), (Asnawati et al., 2015).

Ethnomathematics is defined as a mathematical activity carried out by certain cultural groups (Zahroh, 1985). In addition, ethnomathematics is referred to as a science that provides understanding through culture as a starting point for building and connecting students' understanding of informal mathematics to formal mathematics (Richardo, 2017). Ethnomathematics is referred to as a science that can provide insight to students that mathematics is one of the learning adapted from culture and can indirectly enrich students' knowledge of culture itself (Richardo, 2017). Ethnomathematics was born through traditional community habits, whether in the form of games, buying and selling, traditional music, building forms, or others that have been preserved until now. This is done as a way to love culture (Asnawati et al., 2015; D'Ambrosio, 1985).

Based on the literature review conducted by researchers, one solution to the problem of learning mathematics is ethnomathematical-based contextual learning (Hariastuti, 2014; Irawan & Kencanawaty, 2017; Sudirman et al., 2017). Ethnomathematical-based contextual learning is mathematics learning that uses a contextual approach with a cultural context. In addition, this learning can also increase knowledge and build a sense of student love for the local culture (Richardo, 2017). Based on the exposure to mathematics learning problems experienced by students, it makes researchers interested in conducting research with a focus on problem formulation: what is the role of ethnomathematics in the application of contextual mathematics learning, especially on geometry material in elementary schools?

METHOD

The research method used is library research, where researchers will examine in depth the knowledge and findings in the relevant literature to obtain theoretical and scientific information about the role of ethnomathematics in the application of mathematics learning, especially geometry learning materials at the elementary school level. Research activities begin by collecting secondary data from

research results, which are then analyzed. The information is gathered from scientific research journals, scientific reading books, reports from various studies, scientific websites accessed via the internet, and other relevant sources. The data analysis techniques used in library research include three stages, including organize, synthesize, and identify.

RESULTS AND DISCUSSION

Ethnomathematics in Contextual Mathematics Learning Geometry Materials

A well-known mathematician from Brazil named D'Ambrosio stated that ethnomathematics is a cultural mathematical activity that is practiced in society (D'Ambrosio, 1985). Ethnomathematics is also a learning approach using culture as a starting point to build and bridge students' understanding from informal mathematics to formal mathematics (Zahroh, 1985). In addition, ethnomathematics is referred to as a science that can provide insight to students that mathematics is one area of learning that is adapted from culture and can indirectly enrich students' knowledge of culture itself (Richardo, 2017).

Ethnomathematics was born through traditional community habits, whether in the form of games, buying and selling, traditional music, building forms, or others that have been preserved until now. This is done as a way to love culture (Asnawati et al., 2015; D'Ambrosio, 1985). The development of ethnomathematics through culture makes people unaware of the existence of ethnomathematics because it is considered simple when compared to formal mathematics in schools (Putri, 2017).

Current scientific advances provide space for the application of ethnomathematics to be applied in schools to overcome complex problems in the practice of learning mathematics (Putri, 2017). So the application of ethnomathematics began to grow rapidly in Indonesian education (Putri, 2017). Therefore, ethnomathematics can be an alternative for teachers to innovate in contextual learning with the introduction of culture as the context of the problem (Richardo, 2017).

Based on the literature review, it is known that research related to ethnomathematics in contextual mathematics learning has been carried out, with the aim of developing cultural learning that can increase students' interest in learning mathematics. Some of the literature will be presented as follows:

1. Research conducted by Ulum et al. in 2018 related to the exploration of geometry in batik motifs

   The results showed that the Pasedahan Suropati batik cloth motif has its own uniqueness, namely that all types of batik use a leaf-shaped motif. This can be seen in the following figure.

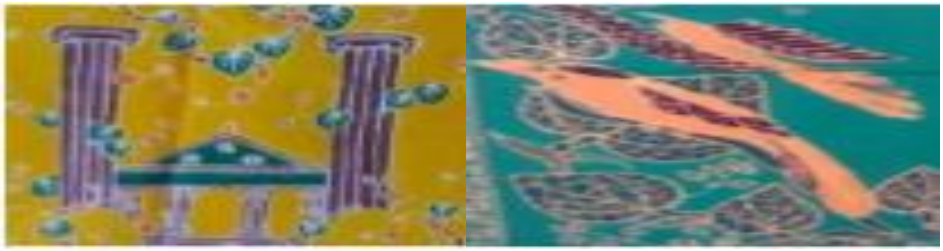

Figure 1. The Leaf Motif on The Pasedahan Suropati Batik

Ethnomathematical exploration of Pasedahan Suropati batik shows that the commonly used batik motifs can be a source for applying geometry learning, more specifically on the subject of the discussion of the concepts of points, straight lines, curved lines, parallel lines, angles, triangles, rectangles, and folding symmetry (Ulum et al., 2018).

2. Research exploring ethnomathematics in tambourine art by Putri in 2017

This research indicates that mathematics learning is not always sourced from reading books but can also be sourced from local culture, one of which is an Islamic musical instrument in the form of a tambourine. This is because the tambourine has a physical form that helps students understand mathematics. Here are pictures of four types of tambourines:

Figure 2. Tambourine

The results show that there are mathematical concepts in the traditional musical instrument, the tambourine which are expected to be used to apply geometry learning, especially on tubes, circles, and cones in elementary schools (Putri, 2017).

3. Vitantri conducted research on the implementation of ethnomathematics based on local culture in elementary schools

The results showed that Sanggar Rahayu's filter cloth woven motifs have geometric shapes inspired by the natural surroundings, including squares, crosses and flowers. These artistic forms can be a focus for students to learn culture-based mathematics, especially on the subject of flat

shapes. Teachers are required to innovate in learning by making culture a source of learning (Vitantri, 2017).

4. Hariastuti's research in 2014 with the title Study of Geometric Concepts in a Traditional House Using Banyuwangi as a Basis for developing contextual learning

   The ornaments contained in traditional houses indirectly contain geometric concepts, as shown in the figure 3.

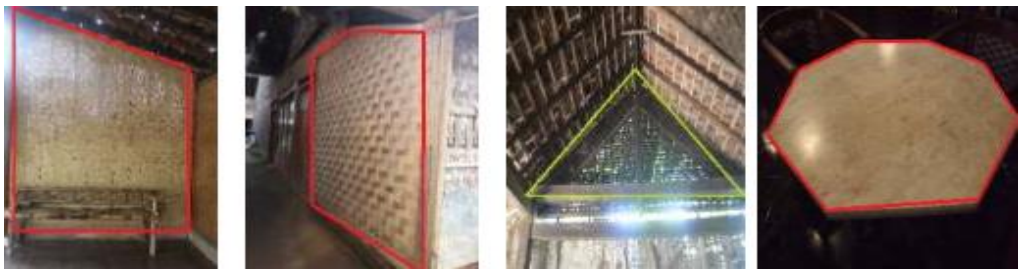

Figure 3. Using Traditional House

Some of the geometric shapes found in the traditional house include elements of circumference and area (flat shape), as well as surface area and volume (building space). These geometric shapes can be implemented in contextual learning in elementary schools (Hariastuti, 2014).

5. Research by Sudirman et al. in 2017 on the use of Indramayu batik artwork as a context for learning transformation geometry

   The results showed that ethnomathematics on batik motifs such as dots, lines, and flat planes in the form of ellipses, circles and so on can be a reference for learning mathematics. One of the artistic forms in Indramayu batik will be shown in the figure 4.

Figure 4. Indramayu Batik

The researcher suggests that the pattern contained in batik is a form of applying mathematical concepts in the form of translation and reflection. Therefore, Indramayu batik can be used as an alternative to implement mathematics learning, especially in geometry material (Sudirman et al., 2017).

Ethnomathematics' Role in Contextual Mathematics Learning on Geometry Materials

In general, contextual mathematics learning based on ethnomathematics uses the context of problems in the form of various cultures, such as games, building forms, batik motifs, traditional objects, musical instruments, and others (Putri, 2017). Learning begins with the teacher asking students to observe events or events in the form of mathematical problems. The components that can be presented through ethnomathematical-based contextual learning include constructivism, asking questions, discovering, learning communities, modeling, reflection, and authentic assessment (Richardo, 2017).

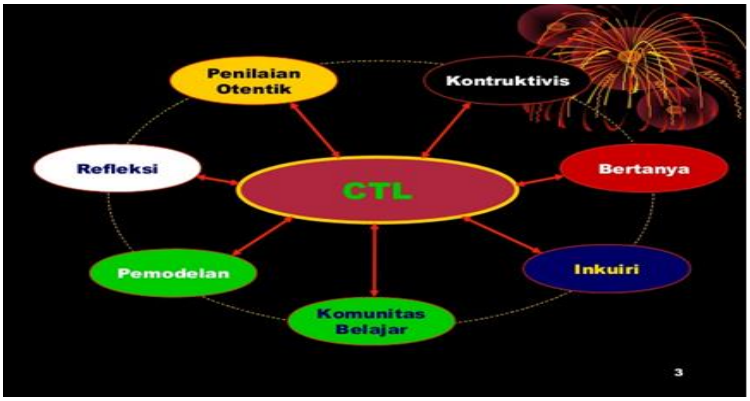

Figure 5. Sketch of Components in Contextual Learning

Constructivism

The constructivism view of ethnomathematical-based contextual learning emphasizes that the teacher's role is only as a facilitator. Constructivism also views each student as an individual who already has the ability to construct his own knowledge (Putri, 2017). Through this ability, students can find problems to solve from contextual mathematical problems given. The teacher's task is not only limited to transferring knowledge but also maximizing the role of building knowledge in him. For example, the teacher presents relevant teaching methods to attract students' interest in learning geometry (Amir & Risnawati, 2015).

Active asking

Students are given the opportunity to ask questions that are not understood, and the teacher does not have to answer all these questions, but directs students to find solutions from the development of mathematical models. It is intended to develop students' curiosity using conversational activities in the form of questions and answers with teachers and other students to get involved in the learning community (Ilma & Putri, 2012). Questioning activities in ethnomathematical-based contextual learning make the learning process more lively and interesting. In addition, asking questions is a factor

in the breadth and depth of the learning context that students understand. Students are trained to think critically by not accepting opinions or ideas as "raw" and encouraging students' curiosity to understand deeply the concepts of geometry (Kadir, 2013).

Find concept

Students are directed to find mathematical models through ethnomathematical-based contextual mathematical problems. The discovery of mathematical concepts by students is inseparable from the teacher's role as a facilitator to guide and direct students to become independent so that learning becomes meaningful (Kadir, 2013).

Learning society

Ethnomathematical-based contextual learning emphasizes social learning (Irawan & Kencanawaty, 2017). Kadir (2013) argued that ethnomathematical-based contextual learning cannot be separated from group learning activities. Students can also share experiences and ideas with their group friends to get conclusions from math problems given by the teacher.

Modeling

Mathematical modeling is found in ethnomathematical-based contextual learning through students' mathematical activities and teacher activities when giving modeling examples in the form of working on mathematical problems (Hasibuan, 2014). In addition, the teacher becomes an initial example that can be captured by students' visuals and can then be imitated to motivate students that they can also do the same (Kadir, 2013).

Reflection

The teacher provides opportunities for reflection through direct statements about students' understanding of the learning material. It can also be through important student notes and student impressions related to ethnomathematical-based contextual learning, especially on geometry material (Hasibuan, 2014).

Genuine evaluation

According to Kadir (2013), there are three activities carried out by teachers in authentic assessment, namely: 1) measuring knowledge through questions and measuring students' skills through working directly in front of the class. 2) Assessment of students' products or performance in solving mathematical problems is given. 3) The teacher provides relevant tasks according to the material applied that can trigger student activity in the classroom, and the problems given must also be contextual in accordance with the students' daily life experiences.

Based on the learning components that have been described, it can be seen that the role of ethnomathematics in general in ethnomathematics-based contextual mathematics learning is:

- Make it easier for students to learn because the context used is a real problem in the form of local culture.
- Teach students how to solve math problems on their own and in groups.
- Presenting learning that gets students used to working together
- Make learning relevant.
- Prepare students to be highly social people.
- Creating a pleasant classroom environment
- Learning can stimulate students to be active and creative.
- Develop students' ability to develop mathematical models.
- Increase students' curiosity and ability to find and ask questions.

CONCLUSION

Through the results and discussion described in the previous chapter, the role of ethnomathematics in the application of contextual mathematics learning in elementary schools is that ethnomathematics makes it easier for students to learn geometry because the context used is in the form of culture that students commonly see, hear, and do as family and community members. Ethnomathematics-based contextual learning, of course, not only provides knowledge about geometric concepts, but also provides knowledge about the culture of community life where students are located. In addition, ethnomathematics is able to present learning that can stimulate students to be active and creative, transfer knowledge about culture and nationalism, and build students' love for local traditions and culture.

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