

---



---

## THE NEED ANALYSIS OF MATHEMATICS TEACHING MATERIALS BASED-ON ETHNOMATHEMATICS IN TERMS OF ELEMENTARY STUDENT

**Mukti Sintawati**

*PGSD FKIP UAD*

*mukti.sintawati@pgsd.uad.ac.id*

### Abstract

Mathematics are subjects that has an abstract material concepts. To explain the abstract concept, students need teaching materials that can explain the concept. Students better understand the concept of mathematics through the culture around them. The approach in learning mathematics that associate the concept of mathematics with the culture around them is ethnomatematics. The purpose of this study was to determine: 1) the need of students in elementary school to the teaching materials based-on ethnomatematics, 2) difficulties material in learning mathematics, and, 3) the interest of students in elementary school to the culture in yogyakarta. The data in this study were collected using questionnaire and interview then analyzed descriptively. The results showed that students in elementary school need teaching materials based-on ethnomatematics.

**Keywords:** teaching materials, ethnomatematics, elementary student

### INTRODUCTION

Mathematics is one of the compulsory subjects in elementary school. In the 2013 curriculum of the 2016 revision, the subjects of mathematics in high classes are separated in an integrated thematic book. This is because the discussion of mathematics in that book is very superficial, while the object of mathematical study is abstract and the method for conducting a study of mathematical objects is deductive so that students do not get a deep understanding of the concept of mathematics (kemendikbud, 2016: 1-2). Therefore, to explain the study of abstract material objects, it takes mathematical teaching materials that relate mathematical concepts to real-world contexts.

Teaching materials are needed in elementary school mathematics learning. One type of teaching materials used in learning mathematics is textbooks. The study conducted by Supriadi (2000: 35) show that the textbook is a significant determinant of the learning outcomes of elementary students. Textbooks are structured on the basis of certain considerations and its very dominant as learning resource. Among the textbooks prepared and adapted to the subject matter and consideration aspects of the ability or cognitive development of students.

In preparing the teaching materials, students' cognitive development must also be considered. Piaget's theory explains that elementary school children (7-11 years) are at a concrete operational stage where the child is only able to solve real problems (Baharuddin, 2010: 117). So the teaching materials that exist in elementary school must use real-world context. Mathematics learning in the real

world context of students can improve the meaning of learning mathematics elementary students (kemendikbud, 2016: 1-2).

Culture around students is one of the real-world contexts that can be used in learning mathematics. Mathematical learning that is associated with the culture around students is called ethnomatematics. Ethnomatics is an approach that can be used to explain the reality of the relationship between environmental culture and mathematics while teaching (Rusliah, 2016: 716). In the learning mathematics teachers in the context of the school, culture and society (Orey & Rosa, 2010: 139).

The objectives of developing mathematics competencies are directed to improving life skill, especially in building creativity, critical thinking skills, collaborating or collaborating and communication skills that demand 21st century skills. This is in line with ethnomatematics-based mathematics learning. In ethnomatematika, teachers help students to develop skills in critical thinking and analysis that can be applied to all areas of live, and to facilitate a effective environment for developing skills to solve real problems (Rosa & Orrey, 2011: 48).

The aim of ethnomatematical studies is to help the teacher establish cultural models of beliefs, thought and behavior, in the sense of contemplating not only the potential of the pedagogic work that takes into account the "knowledge" of the students, but also a learning inside the school, more meaningful and empowering (domite, 2010: 20). Ethnomatematics also builds on and values the cultural experiences and knowledge of students regardless of whether

they are represented by dominant or non-dominant cultural systems and empowers them intellectually, socially, emotionally, and politically by using cultural referents to impart their knowledge, skills, and attitudes in the pedagogical work in schools (Rosa & Orey, 2011: 47).

To develop the teaching materials needs to be analyzed needs so that the resulting in accordance with the needs of users in the field. Based on the description above this study aims to analyze the needs of students on mathematics-based mathematics materials. Etnomatematika to be developed adapted to the existing culture in Yogyakarta. The form of culture that developed in Yogyakarta is physical and non physical. Culture in the form of physical example is the palace and prambanan temple. While the non-physical culture that is customs, Javanese calendar, traditional game.

## RESEARCH METHOD

The focus of this research is the analysis of the need of teaching materials of elementary school mathematics based on ethnomathematics. Subject of this study were students of SD Muhammadiyah Gondanglegi, SD Muhammadiyah Domban 1, and SD Muhammadiyah Gendol. The object of this research is the subject matter of mathematics subject of SD 2013 curriculum which can be taught with ethnomatematics.

The data obtained by observation and questionnaire. Data analysis technique used is descriptive qualitative. With this descriptive technique the researchers will describe the data that has been collected.

## RESULT AND DISCUSSION

The need analysis of mathematics based on ethnomatematika showed that students' need on mathematics material is 73%. The result of the questionnaire is also known that the concept presented in the student book is too short and the relationship with the real world, especially the local culture is still lacking.

Students feel the most difficulty in the scope of mathematics material numbers as much as 33%, geometry and measurement as much as 41%, and statistics as much as 26%. The data are presented in Figure 1

In the scope of the number matter, students find it most difficult on fractional number. In the scope of geometry and measurement materials, students find it most difficult to understand the material distance, debit and volume of solids. In the scope of statistics, students feel the most difficult on the mcentral tendency.

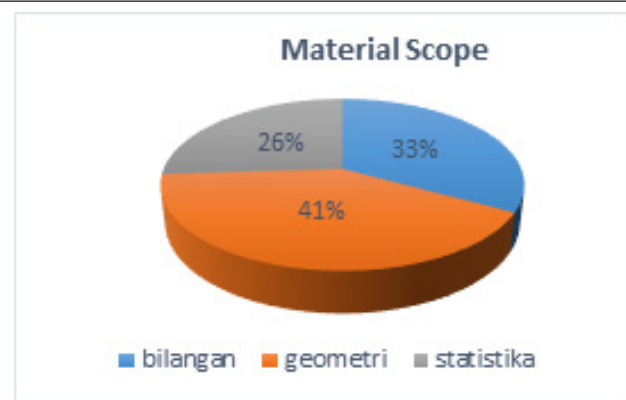


Figure 1. Mathematics material scope

On the cultural aspects in Yogyakarta, students are interested in non-physical aspects such as traditional games and manners by 41%, while physical aspects such as temples, and palace by 59%. The cultural aspect is presented in figure 2.



Figure 2. Students interest in cultural aspects

Cultural aspects in Yogyakarta can be used as a source of learning in the making of mathematics-based mathematics materials. In this research, the students are interested in culture in the form of physical aspect such as Prambanan temple. In Prambanan temple there are temple buildings that can be utilized for the manufacture of teaching materials based on ethnomatematics on geometry material.

Figure 3 is the stones that make up the wall of prambanan temple. Figure 4 is the stones that make up the floor of prambanan temple. The stones that make up the prambanan temple can be used to learn the concept of tessellation, namely:

1st Grade: KD 3.7 Identify a plane that can be arranged to form a pattern of subtraction.

2nd Grade: KD 3.11 Describes the pattern of plane and solid lines using concrete models.



Figure 3. The wall stones prambanan temple



Figure 4. The floor stones prambanan temple

Figure 5 is one of the prambanan temple that have door and window. Figure 6 is a sketch of doors and windows on the temple building. The shape of the temple doors and windows can be used to study the concept of a triangular and rectangular.

1<sup>st</sup> Grade : KD 3.6 recognizes solid and plane by using various concrete objects.

2<sup>nd</sup> Grade: KD 3.10 Analyze the perimeter of plane. KD 3.12 Analyze the various plane based on the properties they possess.

3<sup>th</sup> Grade : KD 3.9 Describes and determines the circumference and area of the square, rectangular, and triangular.



Figure 5. Prambanan Temple

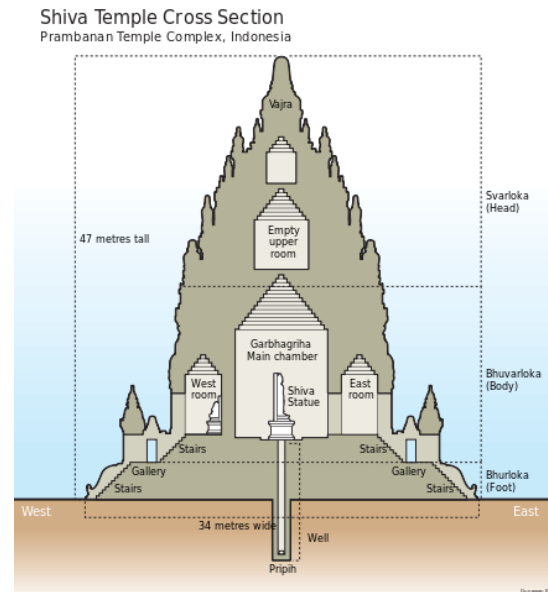


Figure 6. sketch of doors and windows on the prambanan temple

Figure 7 is stones that make up the prambanan temple. The shape of the stone is solid. The shape of the stone can be used to learn the concept of solid, namely:

2<sup>nd</sup> Grade: KD 3.12 Describes the plane and solid based on the properties they possess.

3<sup>th</sup> Grade: KD 3.8 Describes and determines the area and volum in non-standard units by using concrete objects.

5<sup>th</sup> Grade : KD 3.7 Describes and determines the volume of solid using units of volume (such as unit cubes)



Figure 7. Stones of prambanan temple

Figure 8 is the layout sketch of prambanan temple and Figure 9 is the layout of prambanan temple. The layout of the Prambanan temple can be used to study the concept of symmetry.

3<sup>th</sup> Grade: KD 3.9 Describe the symmetry of folding and rotary symmetry on the plane using concrete objects

### Tata Letak Candi

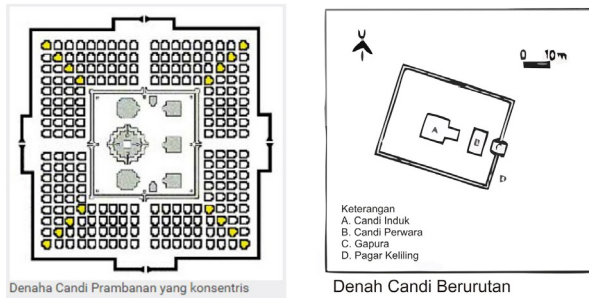


Figure 8. The sketch layout of prambanan temple



Figure 9. The layout of prambanan temple

The number of temples that make up the whole prambanan temple can be used to study the concept of numbers and number patterns.

### CONCLUSION AND SUGGESTION

Based on the results of research and discussion it can be concluded as follows:

1. Student's needs on teaching materials are still high, especially teaching materials that relate mathematics to the real world around students.
2. The most difficult material to be studied according to the students is geometry, especially volume of solid.
3. Student interest in cultural aspect in yogyakarta mostly on physical aspect such as Prambanan temple.

### REFERENCES

- Baharuddin. 2010. *Pendidikan & Psikologi Perkembangan*. Yogyakarta: Ar-Ruzz Media.
- Domite, Maria do Casmo Santos. 2010. Notes on teacher education: an ethnomathematical perspective. *Proceeding of the 10<sup>th</sup> International Congress of Mathematics Education Copenhagen*. Hal 17-28.
- Kemendikbud. 2016. *Panduan Pembelajaran Matematika dan Pendidikan Jasmani, Olahraga dan Kesehatan (PJOK)*. Jakarta:
- Rosa, Milton & Daniel Clark Orey. 2010. Ethnomatematics and the teaching and learning mathematics from a multicultural perspective.

*Proceeding of the 10<sup>th</sup> International Congress of Mathematics Education Copenhagen*. Hal 139-148.

Rosa, Milton & Daniel Clark Orey. 2011. "Ethnomatematics: the cultural aspects of mathematics". *Revista Latinoamericana de Etnomatematica*, no. 4, vol. 2, 32-54.

Rusliah, Nur. 2016. Pendekatan etnomatematika dalam permainan tradisional anak di wilayah kerapatan adat koto tengah kota sungai penuh propinsi jambi. *Proceedngs of the International Conference on University-Community Engagement*. Surabaya, Indonesia. Agustus 2016, Hal 715-726.

Supriadi, Dedi. 2000. "Problematik dan Opsi kebijakan tentang Buku Teks Sekolah Dasar" dalam *Mimbar Pendidikan* vol.2, no.19. hlm.35-46.