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DEVELOPMENT OF E-LKPD BASED ON ETHNOMATHEMATICS FOR GEOMETRY MATERIALS OF ELEMENTARY SCHOOL

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ABSTRACT

The material on geometry is one of the things that is difficult to understand for grade VI students of Bintang Mandiri Elementary School. Various research results show that the use of E-LKPD can improve students' understanding in learning mathematics. The purpose of this study was to produce ethnomathematics-based E-LKPD for geometry material for grade VI in an effort to improve students' conceptual understanding. This type of research is Design Research, which consists of 3 phases, namely: 1) Preliminary Research, 2) Prototyping, and 3) Assessment. In this case, the research conducted is limited to the preliminary research phase to see the validity of E-LKPD with the subjects of the study being students or teachers of grade

VI of Bintang Mandiri Elementary School. Data were collected using documentation, observation, and validation sheets. Furthermore, the data were analyzed descriptively. The results of the study showed that ethnomathematics-based E-LKPD for geometry material for grade VI of elementary school was of valid quality with the following characteristics: (1) containing instructions for using E-LKPD, (2) learning achievements, (3) learning objectives, (4) ethnomathematics, (5) interaction, and (6) concept construction. The E-LKPD can be used in mathematics learning in an effort to improve students' conceptual understanding.

Keywords: E-LKPD, ethnomathematics, geometry, design research

1. INTRODUCTION

One of the mathematics lessons that is considered difficult to understand by grade VI students of Bintang Mandiri Elementary School is geometry material. Based on the results of an interview conducted with one of the grade VI mathematics teachers of Bintang Mandiri Elementary School, in mathematics learning there are many obstacles faced by students in understanding geometry material related to everyday life. The difficulty explained is that many students still feel confused about which formula or concept to use when presented with new questions related to geometry material.

From the results of the assessment test, 10 out of 32 students understood the concept of geometry. Students tend to memorize formulas but cannot determine the right solution when given different

problems. Teachers also find it difficult to provide students with an understanding of how to apply the concept of geometry. According to Nursyamsiah (2020), the results in the field related to the value of the material on geometry are still lacking and must be improved. In addition, Damayanti (2020) in her research found that the lack of understanding of mathematical concepts also occurred in the material on geometry. Students can understand the material on flat figures, but when implemented into geometry, students experience difficulties. This difficulty is closely related to a lack of understanding of the basic concepts of the material.

Understanding the concept can be instilled in students through various representations, these various representations can be poured into the form of teaching materials, in this case the closer the representation given to students will make it easier for students to remember and understand the concept of the material being studied. Innovations made by teachers can start from developing learning media such as Student Worksheets (LKPD). Student Worksheets are one type of teaching material that has an important role in learning activities. The use of teaching materials for students can provide students with an interesting learning experience, so that it can foster motivation and reduce students' dependence on the same source (Magnalena, et al., 2020).

In LKPD there is a series of exercises and important information such as basic competencies, material summaries and instructions that are arranged to help students find concepts about a material to find creative ideas that learning steps can be done systematically. Ethnomathematics as a context in mathematics learning can be packaged in the form of problems that are used to bridge students in finding mathematical concepts (Maryanti and Suhartini, 2018). Ethnomathematics aims to draw on cultural experiences and the use of mathematics so that it not only makes mathematics learning more meaningful, but also to provide students with insight that mathematical knowledge is embedded or inherent in the social and cultural environment, and students appreciate the use of mathematics more in everyday life (Balamurugan, 2015; Rosa & Orey, 2016). Research related to ethnomathematics continues to develop (Turmuzi, Suharta, Suparta, 2023).

The research includes: 1) The results of research by Suharta, Puja Astawa, Pasek Budarsini (2020), the use of ethnomathematics of traditional Balinese building carvings, and Suharta, Puja Astawa, Widhy Adnyana (2020) the use of Nusantara batik culture can improve understanding of the concept of geometric transformation. Archaeological objects in Pugung Raharjo can be associated with the concepts of mathematical education (Kusuma, 2019). There are also those listed in traditional house buildings, which are perceived as local units for Lampung residents (Amalia, et al., 2019; Hartinah, et al., 2019). The concept of mathematics is seen in batik activities, namely flat plane geometry and geometric transformation (Maidiyah, et al., 2021) while Banten culture has various Pythagorean theories (Rakhmawati, 2016). 2) Puspadewi (2028) explores the ethnomathematics of Balinese sewing in the concept of flat shapes; 3) Darmayasa (2020) who explored the ethnomathematics of using Balinese klatkat in the concept of geometry. Based on these studies, it can be said that culture can be used as a context in the process of learning mathematics. Local culture cannot yet be placed in the mathematics education curriculum but is used more to increase a sense of love for culture (Manik, E, 2020). Therefore, the problem of this research is how the characteristics of E-LKPD based on ethnomathematics for geometry material in an effort to improve students' understanding of concepts.

A search for research articles on the research database https://eric.ed.gov/?q=E-LKPD+based+on+ethnomathematics (accessed June 15, 2024) with the keyword "E-LKPD based on ethnomathematics" found 455 articles in 2024, there were 1746 articles since 2023, there were 5369 articles in the last 5 years, If examined in detail, no research was found that examined E-

LKPD based on ethnomathematics. With the keyword "ethnomatematics" 2 articles were found in 2024, there were 9 articles since 2023, there were 37 articles in the last

5 years, and there were 47 articles in the last 10 years. In general, the integration of ethnomathematics has a positive impact on students' mathematics learning outcomes (Mohammed Waziri Yusuf, 2010; Rosa, M & Orey, 2011; Unodiaku, Stanislus Sochima, 2013; Hartinah et al, 2019; Patrick Obere Abiam, et al, 2016; Patrick Kyeremeh, et al, 2023; Rachmaniah Mirza Hariastuti, et al, 2022; Deah Uji Wulandari, 2024). Teachers have a positive perception of the use of ethnomathematics in mathematics learning (Mania and Alam Samsu; 2021). With the keyword "E-LKPD" only 1 article was found in the last 20 years, with the title "Development of interactive E-LKPD based on creative thinking skills on the concept of environmental change" in the field of biology. The results of this study are that the use of interactive E-LKPD can develop creative thinking skills (Ricky Ardiansah, Z. Zulfiani, 2023). The development of ethnomathematics-based E-LKPD to improve understanding of mathematical concepts is a novelty in this study.

2. RESEARCH METHOD

Types and implementation of research

This type of research is Design Research, which consists of 3 phases, namely: 1) Preliminary Research, 2) Prototyping, and 3) Assessment (Plom, 2013; Suharta, 2022). The product produced in this study is E-LKPD to be able to improve students' understanding of mathematical concepts. In this case, the research conducted is limited to the preliminary research phase to see the validity of E-LKPD. However, it will be developed in a cycle so that the quality of E-EKPD becomes better, namely meeting valid, practical, and effective qualities. This research was conducted at SD Bintang Mandiri Jimbaran in the odd semester of the 2024/2025 academic year.

Subject of research

The subjects of this study were teachers and students of grade VI of Bintang Mandiri Elementary School who were selected purposively, namely teachers who teach in grade VI of Elementary School and are willing to volunteer as research subjects.

Instruments of research

The instruments used in this study were documentation, observation, and validation sheets. Documentation is used to obtain data on learning outcomes, learning objectives for geometry material, student characteristics, and the initial design of ethnomathematics-based E- LKPD. Observations were conducted to obtain information about how the teacher's learning was carried out, problems experienced by students and teachers, learning resources used, while the validation sheet was used to see the validity of the E-LKPD produced. Validated aspects relate to rational aspects, objectives, existence of learning materials, E-LKPD display, language, special characteristics. Each sub-aspect will be scored 1-4.

- Score 1 means very unclear/very inappropriate
- Score 2 means unclear/less appropriate
- Score 3 means clear/appropriate
- Score 4 means very clear/very appropriate

Data Analysis

Data analysis was conducted descriptively to determine the validity of the E-LKPD. In this study, data validity testing was conducted by triangulation through different subjects to examine and compare existing data.

3. RESEARCH RESULTS AND DISCUSSION

Based on the research method as described previously, E-LKPD based on Ethnomathematics was obtained for the material of geometry in an effort to improve the mathematical problem-solving abilities of grade VI elementary school students. Learning outcomes are: Students can calculate the area of a circle, surface area and volume of various forms of geometry (cubes and cuboids) and their combinations; students are able to identify the characteristics of various forms of geometry (sides, edges, and angles) of pyramids, cones, and spheres and their combined geometry.

The learning objectives are to calculate the area of a circle, surface area and volume of various forms of geometry (cubes and cuboids) and their combinations; identify the characteristics of various forms of geometry (sides, edges, and angles) of pyramids, cones, and spheres and their combined spatial figures. The structure of E-LKPD based on ethnomathematics is as follows.

a. Instructions for using E-LKPD
b. Learning outcomes
c. Learning objectives
d. Cube material. This section contains: let's watch the video, let's practice, and student worksheets.
e. Block material: This section contains: let's watch the video, let's practice, and student worksheets.

The following is an example of ethnomathematics used in relation to tipat and canang sari which are types of Balinese sewing.

Figure 1a. *Tipat*

Figure 1b. *Canang Sari*

The E-LKPD, from the aspect of validity, has met the validity of content and construct. Content validity means that the learning material is in accordance with the demands of the current curriculum, while construct validity means that the arrangement or terms used in the E-LKPD are consistent with each other. The characteristics of the E-LKPD based on ethnomathematics for geometry material in an effort to improve students' conceptual understanding are: (1) contains instructions for using E-LKPD, (2) learning outcomes, (3) learning objectives, (4) ethnomathematics, (5) interaction, and (6) concept construction

a. Instructions for using E-LKPD, contain operational matters, instructions on how the material is understood, what and how students do, and things to do if there are problems.
b. Learning outcomes, are learning competencies that must be achieved by students at the end of each phase.
c. Learning objectives, are the direction or targets to be achieved by the learning process. Learning objectives are formulated by referring to learning outcomes.
d. Ethnomathematics, etymologically comes from the word "ethno" which means something that refers to the socio-cultural context, including language, jargon, codes of behavior, myths, and symbols. While "mathema" means explaining, knowing, understanding, and carrying out activities such as coding, measuring, classifying, concluding, and modeling. The suffix "tics" comes from the word techne which means techniquee.
e. Interaction, students are given the opportunity to interact with E-LKPD, as well as with teachers and other students so that student activities are optimal
f. Concept construction, students are given the opportunity to construct new mathematical knowledge, both in the form of principles and concepts based on previous student experiences.

4. CONCLUSION

Based on the results and discussions above, it can be concluded that E-LKPD based on ethnomathematics for geometry material in an effort to improve students' conceptual understanding produced valid quality. The characteristics of the E-LKPD are: (1) contains instructions for using E-LKPD, (2) learning achievements, (3) learning objectives, (4) ethnomathematics, (5) interaction, and (6) concept construction.

It is further recommended that the E-LKPD be developed further through a trial cycle process so that an E-LKPD is obtained that is valid, practical and effective in the sense that it can improve problem-solving skills for grade VI students.

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