

Designing Cultural-Based Worksheets (LKPD) in Osing Village Culture for Elementary School Geometry Learning

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Article history: received July 12, 2024; revised August 09, 2024; accepted November 29, 2024

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Abstract. The aim of this research is to be able to use it as a learning resource for elementary school mathematics using the Osing traditional house, and also to introduce the Osing traditional house to the community. This research is qualitative research that uses an ethnographic approach, and also collects data by surveying students while building rooms in Osing traditional houses and also interviews with teachers. The school sample was selected based on student ability, namely students with high, medium and low ability. A sample of 8 grade 5 students were involved in this research. After the data was collected, the survey data was analyzed descriptively, and the interview data was analyzed by data collection and drawing conclusions. Based on the results of student perceptions, with the largest percentage, almost all students were able to work on the LKPD questions given by the author

Keywords: Learning Resources, Traditional Houses, Geometry

I. INTRODUCTION

Osing Kemiren is a traditional tourist village located in the Glagah district, Bayuwangi Regency. This village covers an area of 1177.052 hectares with a population of approximately 2,500 people. Kemiren Village is a traditional village of the Osing community that still preserves its customs and traditions to this day. According to Sutarto [1], in the Osing language, the word "Osing" (pronounced as "Using") itself means 'no', and the term Osing represents the existence of Osing people in Banyuwangi. An artifact is an archaeological object or historical relic, which includes all objects made or modified by humans that can be moved [2]. Examples of artifacts found in Indonesia include stone axes, deity statues. Examples of artifacts are stone, metal and bone tools, pottery, inscribed tablets and paper, metal weapons (arrows, arrowheads, etc.), terracotta, and animal horns [3]. These historical artifacts are important to be placed in museums so that everyone can see and study them.

According to a source who is a prominent figure in the Osing village, the Osing community continues to preserve their traditions, one of which is in the form of artifacts. Artifacts are physical cultural manifestations that result from the activities, actions, and creations of all people within the community, in the form of objects or things that can be touched, seen, and documented. The study of artifacts that can be found in the Osing village includes Gandrung, whose presence is deeply rooted as the mascot of tourism and a welcoming dance from Banyuwangi. Additionally, there is Barong Kemiren, a sacred art form for which a specific ritual is performed before its performance. Furthermore, the traditional houses of the Osing village are characterized by their basic shape and the sequential arrangement from front to back, with the roof structure being a primary indicator distinguishing Osing house forms. Apart from these three, there are also agricultural rituals, Odeg-odeg dance, Sedekahan (charity rituals), Ngarak pengantin (bridal procession), and Lontar yusuf (a cultural practice involving traditional manuscripts).

The existence of traditions or customs within the educational context, equipped with cultural artifacts from the Osing village as cultural heritage, can be utilized as learning resources from elementary to high school education levels, both in Banyuwangi itself and throughout Indonesia [4]. Several artifacts from the Osing village mentioned above can be used as learning resources in elementary schools, such as in Mathematics education. Mathematics and culture are two closely related aspects that are often overlooked. According to Hardiarti [5], mathematics and culture are inseparable in daily life because culture is a comprehensive and integral unit that applies to the life of a community, while mathematics is knowledge used by humans to solve daily problems. However, mathematics is often perceived as disconnected from everyday life.

Bishop asserts that mathematics is a form of culture [5]. Mathematics as a form of culture is inherently integrated into every aspect of community life. Unique knowledge refers to the application of mathematical ideas in socio-cultural contexts [6]. This proves that mathematics is always present in culture, and they are an integral unity. Bishop [7] states that mathematics is a form of culture and is indeed integrated into all aspects of community life wherever they are. Essentially, mathematics is a symbolic technology that grows out of culturally oriented environmental skills or activities. Culture influences individual behavior and significantly contributes to the development of individual understanding,

including mathematical learning. In mathematics education, it is beneficial to start with the culture surrounding the students' living environment, known as their culture. According to Sirate [5], if mathematics education is linked to culture, the learning process will feel easier because students will find it easier to understand each topic they study, which turns out to be relevant to their everyday cultural lives.

Mathematics has been part of human culture for centuries. Starting from prehistoric times, ancient Egypt, ancient Greece, India, China, Rome, to present-day Europe. Human creative products are culture manifested in the form of ideas, activities, and artifacts. The values embedded in human cultural behaviors demonstrate aesthetic sensibility and human creativity. According to [6], the integration of mathematics and culture signifies contextual and creative mathematics. Mathematics becomes part of culture, applied and used for innovative analysis. In connection with this, the paradigm of mathematics as thinking skills and tools for developing superior culture emerges. Mathematics tends to use linear thinking related to theorems, but when integrated with something soft like culture, that thinking becomes flexible [6]. For example, considering the forms of architectural beauty. The structure of buildings is thought through mathematics, but their ornaments use aesthetics. This flexibility arises when thinking about the structure of buildings not only from the aspect of form (three-dimensional geometry) but also considering the aesthetic beauty of those forms.

Mathematics learning is the process of teaching and learning activities aimed at instilling and creating conditions so that students have mathematical skills. Furthermore, Mathematics is a form of human activity "(mathematics as a human activity)". Mathematics as one of the subjects in schools is considered to play a crucial role in being rational, critical, precise, effective, and efficient. Therefore, mathematical knowledge must be mastered as early as possible by students. This condition can be developed if the sources of learning mathematics are adequate. There are various learning sources that can be used in mathematics learning. This research aims to serve as a source of elementary school mathematics learning using Osing traditional houses, and also to introduce Osing traditional houses to the community. The relationship between Osing village customs and geometry learning lies in the form of their traditional houses. Osing traditional houses have a geometric concept such as their rectangular-shaped roofs, which can be used as a source for learning mathematics. Ethnomathematical research using traditional houses as a learning source has been conducted by Yeni Dwi Kurino and Rahman in their article titled "Exploring ethnomathematics of traditional panjalin houses in basic geometry concepts in elementary schools".

Learning resources are crucial in classroom teaching activities to achieve expected learning objectives. Learning resources are designed and developed to provide learning facilities to students, and can be utilized to enhance student activities within the classroom. Typically, learning resources nowadays are limited to teachers and textbooks, whereas there are many other learning resources both inside and outside the classroom, such as using concrete objects, posters, and natural and social environments that can be used to optimize the learning process and outcomes. This signifies that everything experienced is considered a learning resource, as long as it brings experiences that lead to learning. According to Seels and Richey, learning resources are all supportive sources for learning activities, including support systems, materials, and learning environments [8].

Mathematics has been a part of human culture for centuries. It started from prehistoric times, the era of ancient Egypt, ancient Greece, India, China, Rome, and continues in present-day Europe. Human creative products are culture manifested in the form of ideas, activities, and artifacts. The values embedded in human cultural behaviors show aesthetic sensibility and human creativity. The integration of mathematics and culture means contextual and realistic mathematics [9]. Mathematics becomes a part of culture, applied and used for innovative analysis [10]. In relation to this, the paradigm of mathematics as thinking skills and tools for developing superior culture emerges. The nature of mathematics tends to be linear and rigid, but when integrated with something soft like culture, that thinking becomes flexible [11]. For example, considering forms of architectural beauty. The structure of buildings is considered with mathematics, but their ornaments use aesthetics. This flexibility arises when considering the structure of buildings not just from the aspect of form (three-dimensional geometry), but also must consider the aesthetic beauty of those forms.

Ethnomathematics is defined as the cultural anthropology of mathematics and mathematics education [12]. In ethnomathematics-based learning, the learning environment will change into a pleasant environment for teachers and students, which allows teachers and students to participate actively based on the culture they are familiar with, so that optimal learning results can be obtained [13]. So the culture in Osing village, namely the trapezoid-shaped roofs of the houses, is a special attraction for teachers and becomes an innovation in learning, so that learning becomes fun and not monotonous. In principle, all cultures can be used as learning resources with different themes according to the discussion.

Several studies connecting culture and mathematics have been carried out, such as that conducted by Rachmaniah M. Hariastuti who discussed the study of geometric concepts in the Osing Banyuwangi traditional house [14]. Apart from research from Rachmaniah M. Hariastuti, there is also research from Jainudin, et al which discusses ethno-mathematical exploration of geometric patterns in traditional tongkonan houses in Toraja [15]. However, there has been no research that implements the Osing traditional house in mathematics learning. Therefore, the aim of this research is to be able to contribute ideas to teachers who teach mathematics in elementary schools, that even the smallest things, including geometrically shaped house roofs, can be used as learning resources. Also including customs, culture and building forms can be innovations in learning so that learning is more effective and enjoyable for students, because learning methods are more important than the material itself, if the method is fun, then the material will be conveyed well.

Some of the problems in learning that the author encountered include that learning mathematics is not really liked by students because it uses monotonous methods. So the author considers it necessary to design student work sheets

based on the culture of Osing village. The author believes that the use of innovative methods can be liked by students, because elementary school age students quickly grasp material related to daily life, especially in Osing village. using a trapezoidal roof, this will speed up students' understanding of the material.

Researchers are interested in conducting research in Osing village, firstly, because the author wants to know how local wisdom can be a filter for globalization, so that people have concern about preserving culture in Indonesia, one of which is by preserving Osing village as a cultural village, as well as introducing houses. Osing village customs are introduced into the community. The two roofs of the traditional houses of Osing village are trapezoidal in shape, this can be used as a mathematics learning resource in elementary schools, and is expected to become a learning innovation in elementary schools.

II. METHODS

This research uses qualitative research with an ethnographic approach. Qualitative research is research that relies on humans as a research tool, is descriptive, the process is prioritized over results, the study is limited to focusing on the research object, the research design is temporary and the research results are agreed upon by the researcher and research subjects. Meanwhile, research with an ethnographic approach is research that describes culture. Ethnography is known as a science that focuses on efforts to describe human ways of life and refers to social descriptions of humans and the cultural foundations of humanity [16]

This research uses observation, interviews and documentation. The research object is something that is to be investigated and researched in a study. The object of this research is to name objects which are forms of cultural artifacts in Osing Village, Banyuwangi Regency, East Java. And explain the form of cultural artifacts in Osing Village, Banyuwangi Regency, East Java, which can be used as a source for elementary school mathematics learning. Meanwhile, the research subjects were students at Kemiren 2 State Elementary School using the traditional house form of Osing Kemiren village as media. Subjects in research are informants who can provide information about the selected research object. Spradley [5] believes that the selection of informants in ethnographic research must meet the following requirements: (1) full enculturation, (2) direct involvement, (3) unfamiliar cultural atmosphere, (4) sufficient time sufficient, and (5) non-analytical. The three subjects selected fulfilled the five requirements for selecting informants.

This research data collection method uses an ethnographic research design, so that the main instrument is the researcher himself (human instrument) and cannot be replaced by anyone else. Data collection in ethnographic research includes participant observation and interviews (Fraenkel, Wallen, & Hyun) [17]. Observation is a data collection technique that involves direct observation of participants and the context involved in the research phenomenon [18]. Observation aims to see and make direct observations on a research object so that researchers can record and collect the necessary data, in this case exploring information about mathematics contained in the cultural artifacts of Osing Village.

The researchers are 5 (five) students and lecturers of the Primary School Teacher Education Study Program (PGSD) Swadaya Gunung Jati University, Cirebon. Interviews were conducted by researchers with a resource person named Suhaemi as the traditional leader of Osing village. Using semi-structured interview techniques to obtain various data related to research problems. This type of interview is classified into the in-dept interview category, meaning that its implementation tends to be freer compared to structured interviews. In an effort to assist the main instrument in data collection, supporting instruments are needed in this research, namely non-test instruments in the form of observation sheets and open-ended interview guides.

Then for data analysis techniques, according to Sugiyono [19] Qualitative data analysis techniques are efforts made by working with data, organizing data, sorting it into manageable units, synthesizing it, looking for and finding patterns, finding what is important and what was learned and deciding what to tell others. The data obtained in this research is in the form of interviews and documentation. All data that has been collected will later be analyzed in an effort to retrieve information and present the results of the research findings. Activities carried out in data analysis are data collection, data reduction, data presentation and drawing conclusions.

The researcher obtained data from observations, interviews and documentation, the data was then analyzed. Based on all the analysis, the researcher carried out analysis in the form of descriptions, narratives and arguments. The research procedures carried out by the researcher were: carrying out component analysis of reference terms, finding a broader perspective, test all the data that has been analyzed, finally draw conclusions. The way to design a culture-based student worksheet (LKPD) is to go through the steps of preparing a title, preparing the material to be included in the LKPD, determining basic competencies, determining achievement indicators and goals, writing LKPD instructions, and preparing the necessary data. consulting with experts, validation, and the final step of creating the LKPD design and materials.

III. RESULTS AND DISCUSSION

Based on the results of data collection obtained from the Osing Kemiren traditional tourist village located in Glagah District, Banyuwangi Regency, East Java, the artifacts obtained were studied in two elements, including traditional houses. In this discussion, the relationship between cultural artifacts in the form of traditional houses in the Osing Traditional Tourism Village and mathematics learning in elementary schools is presented, such as material about flat shapes and mathematical concepts that explain these shapes. Which is described as follows:

A. **Flat rectangular shape on the roof of the Osing traditional house**

A traditional house is a building that has special characteristics, used as a residence by a particular ethnic group [20]. Likewise, the traditional house in Osing Village has a special characteristic in its roof which is a flat shape like a combination of a rectangle, trapezoid and triangle. Osing has a special characteristic in its roof which is a flat shape like a combination of a rectangle, trapezoid and triangle.

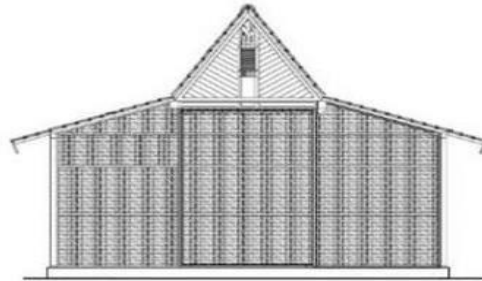


Figure 1. Roof of the Tikel Balung Traditional House.



Figure 2. The roof of the Tikel Balung Traditional House is rectangular in shape.

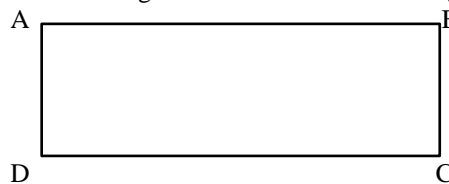


Figure 3. Geometry Modeling Like the Roof of a Traditional House.

The roof of the Tikel Balung traditional house is a complete form compared to Baresan and Crecogan. This house has a village-shaped roof, totaling 4 roofs or 4 rab (fields). The tikel house is able to cover the entire main room pattern in the Osing tribe's traditional house, namely the bale, jrumah, and pawon. The roof of the house in figure 1 is part of the composition of the Osing Tikel Balung traditional house by the Osing tribe and can be modeled geometrically as in the bottom of figure 3. From this figure, it can be seen that the modeling is in the form of a flat shape that has four sides. Based on this, the author then analyzes the concept of a flat, rectangular shape on the roof of a traditional house.

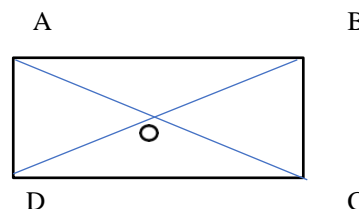


Figure 4. Rectangular Concept on Traditional House Roofs.

Based on the analysis in Figure 4, it can be concluded that there is a rectangular concept on the roof of the traditional house. The rectangular properties that can be found in modeling the roof of a traditional house according to Figure 4 are as follows:

$$AO = OC = BO = OD = AC = BD$$

It has 4 sides, where the 2 sides facing each other are the same length.

Has 4 corners of 90 degrees.

It has 2 axes of fold and rotation symmetry, so it can occupy the frame in 4 ways

Has 2 diagonals (transverse lines) of the same length.

Rectangles have the following formula

Area: Length x Width (L x W)
 Perimeter: 2 (Length + Width)

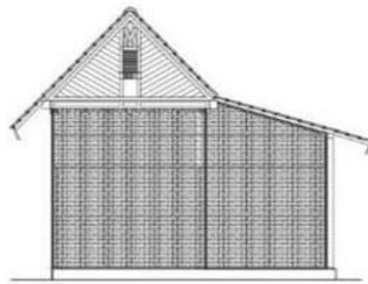


Figure 5. Baresan Traditional House Roof.



Figure 6. Trapezoidal Osing Traditional House.

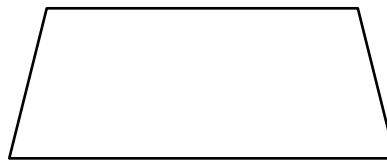


Figure 7. Geometry Modeling on Traditional House Roofs.

Apart from the rectangular concept on the roof of the traditional house, you can also find a flat trapezoidal concept on the roof of the Baresan traditional house. The roof of the Baresan traditional house is a house that has 3 roofs or 3 rab (fields). The roof arrangement of the traditional house in figures 5 and 6 can be modeled geometrically as in the bottom of figure 7 of the figure. It can be seen that the modeling is in the form of a flat shape that has four sides. Based on this, the authors then analyzed the concept of a flat trapezoidal structure on the roof of a traditional house.

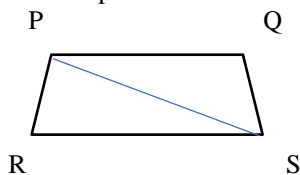


Figure 8. Trapezoid Concept in Traditional Houses.

Based on the analysis in Figure 8, it can be concluded that there is a trapezoidal concept on the roof of the traditional house. The characteristics of a trapezoid that can be found in modeling a traditional house roof according to Figure 8 are as follows:

- PQ // SR (pair of sides)
- There are 4 ribs and 4 elbow points.
- Has a pair of parallel sides.
- One of the legs is perpendicular (right trapezoid) to the parallel side.
- The sum of the adjacent angles is 180°
- Only has 1 rotational symmetry.
- The trapezoid has the following formula:

Wide : $\frac{1}{2} \times (a + b) \times c$
 $L = \frac{(a + b) \times t}{2}$

Around : $AB + BC + CD + DA$
 Tall : $2 \times L (a + b)$

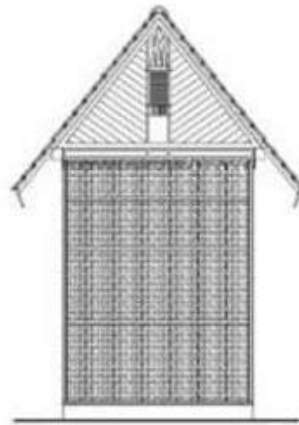


Figure 9. Crocogan Traditional House Roof.

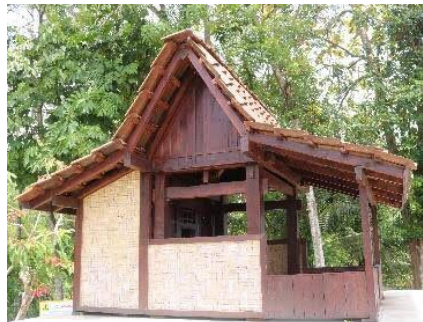


Figure 10. The roof of the Crocogan Traditional House is Triangular Shaped.

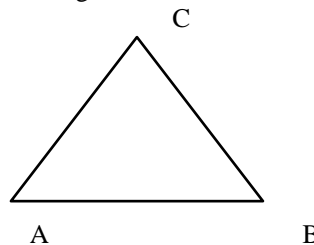


Figure 11. Geometry Modeling in Traditional Houses.

The roof of the Osing traditional house in figure 9 is the shape of a Crocogan house roof. The crocogan house is the simplest type of Osing tribe traditional house, which has 2 roofs or 2 rab (planes). It can be modeled geometrically as in the bottom of figure 11. From this figure it can be seen that the modeling is in the form of a flat triangular shape. Based on this, the authors then analyzed the concept of flat triangular shapes on traditional house roofs which have triangular characteristics that can be found in modeling the structure of traditional house roofs, namely as follows:

There are three sides viz: AB, BC, dan AC

There are three sides viz:

$\angle A$ or $\angle BAC$ or $\angle CAB$

$\angle B$ or $\angle ABC$ or $\angle CBA$

$\angle C$ or $\angle ACB$ or $\angle BCA$

It has 3 sides in the form of straight lines, these three straight lines must touch each other.

The three angles in a triangle have the same angle measure, namely 180°

The triangle has the following formula:

Wide : $\frac{1}{2} \times a \times t$

Around : $s + s + s$

B. LKPD Based on Osing Village Culture in Elementary School Geometry Learning

This research was conducted at one of the elementary schools in Osing Kemiren village, Glagah District, Banyuwangi Regency, East Java, specifically at SD Negeri 2 Kemiren grade 5. The research was carried out for 2 weeks, starting from Monday 20 May 2024 to Tuesday 4 June 2024. Data was obtained through interviews and observations

carried out during that time. Apart from research instruments, the author also prepared LKPD which is the main pillar in this research. This LKPD has had content and construct validity carried out by lecturers who are experts in their fields, what is meant by expert lecturers here are two supervisor lecturers. The following is the LKPD that has been prepared by the author: All title and author details must be in single-column format and must be centered.

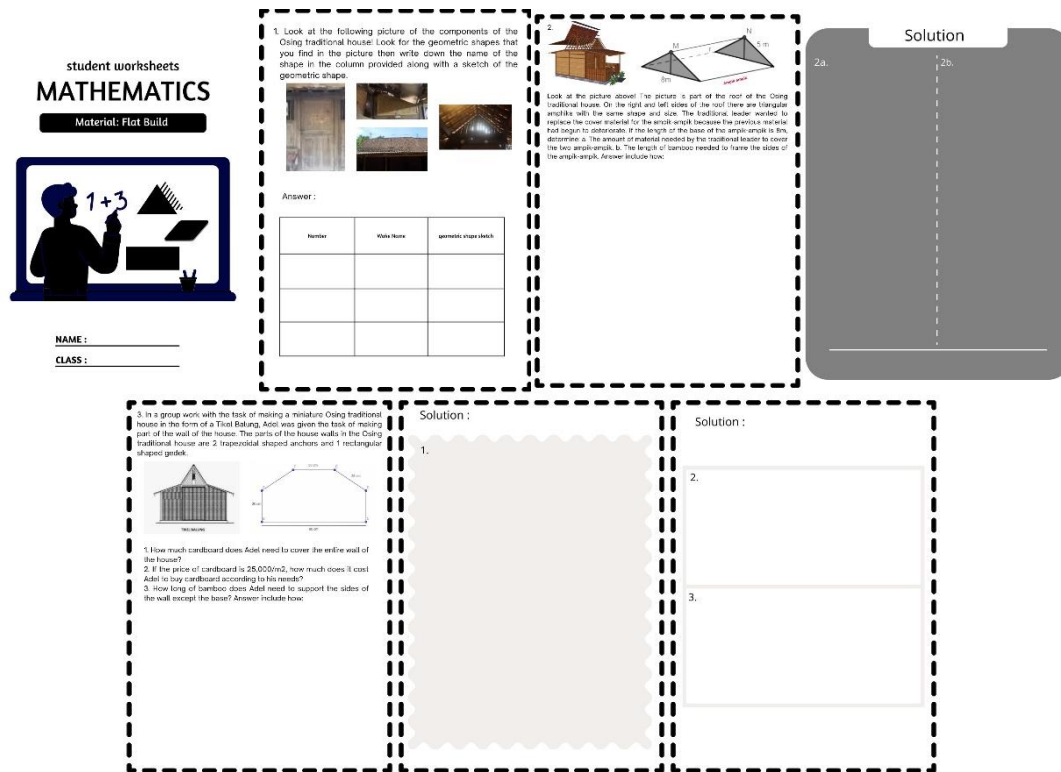


Fig. 12 LKPD

Students who work on LKPD are classified into 3 levels, namely high, medium and low levels. Students who enter the high level are smart students in their class. Middle level students are students who have the intelligence of the average student in their class. Meanwhile, students who are classified as low level are students who have intelligence below the average in their class. The student level data was obtained from interviews conducted with the homeroom teacher.

After implementing the LKPD for students, answers were obtained from students. The following is one of the answers from high, medium and low level students:

Advanced Students:

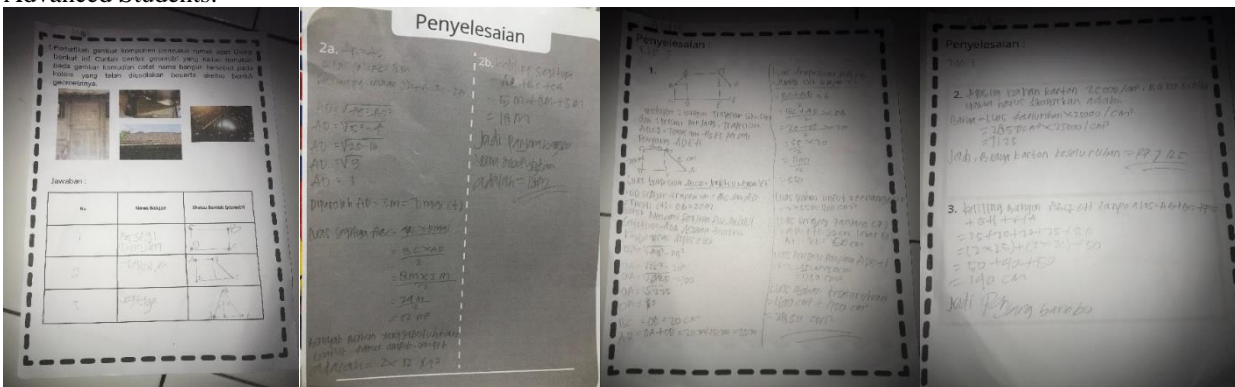


Figure 13. High Level Student Answers.

In this picture, it can be seen that in the answers of students at the high level, apart from the correct answer, the high level students also include how to work on the question so that it can be seen clearly where the answer to the question was obtained.

Intermediate Level Students:

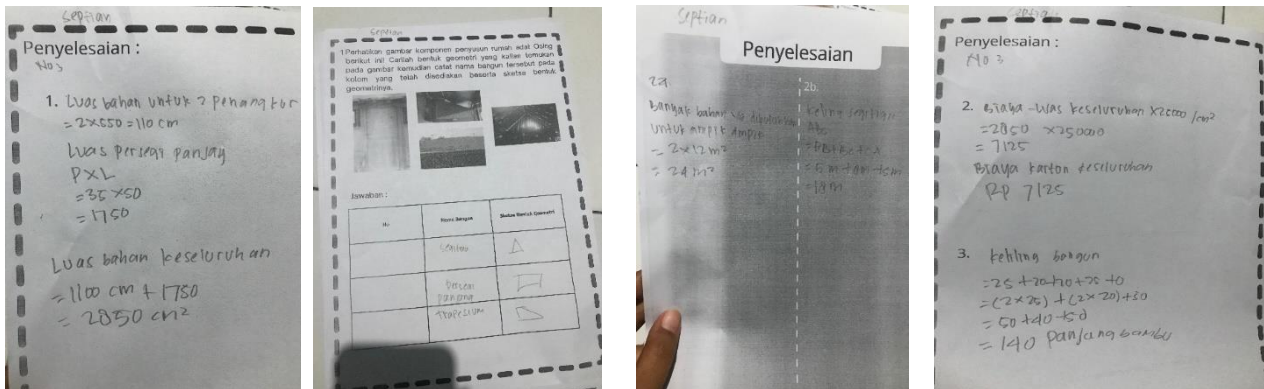


Figure 14. Medium Level Student Answers.

From this picture it can be seen that students at the medium level answered correctly, but the answer did not include a complete way to answer the question.
 Low Level Students

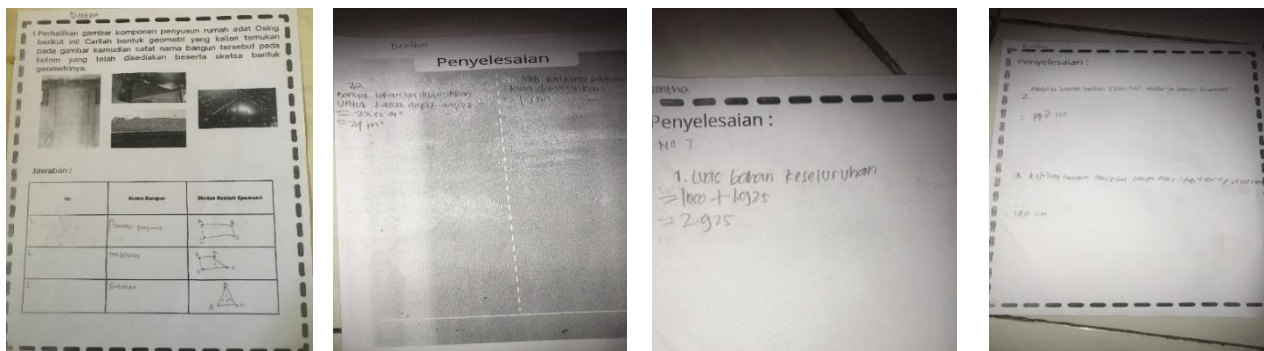


Figure 15. Low Level Student Answers.

Answers from low level students tend to answer directly without including how the student got the answer. Not only that, not all of the answers from low level students were correct, there was 1 question that had the wrong answer.

RESULT

Looking at the results of the students' answers, the majority answered correctly the questions in the LKPD given using the Osing Kemiren traditional house learning resource. It can be concluded that the Osing Kemiren traditional house can be used as a learning resource in geometry, properties, number of angles, formulas for area, height and width in flat shapes.

IV. CONCLUSIONS

Based on the results of the research and discussion explained in the previous section regarding the Study of Artifacts and their use as Learning Resources in Mathematics Learning in Elementary Schools, it can be concluded as follows, the artifacts found in the Osing Kemiren traditional village include traditional houses. In the Kemiren traditional village, the artifacts are in the form of traditional houses which can be used as learning resources in Mathematics learning in elementary schools, which have special characteristics in the roofs of the houses which have flat shapes such as a combination of rectangles, trapezoids and triangles which can be used as learning resources. mathematics in Geometry material, properties, number of angles, formulas for area, height, width in flat shapes.

ACKNOWLEDGEMENTS

First of all, the author would like to express his deepest gratitude to God Almighty, for His extraordinary mercy, for His countless blessings and love so that the author can finish this article. The author also expresses his deepest gratitude to the parties involved in completing this article.

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