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IMPLEMENTATION OF TONGKONAN TORAJA HOUSE CARVINGS ON TRANSFORMATION GEOMETRY MATERIAL IN CLASS XI SMA NEGERI 2 NORTH TORAJA

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Abstract:
This research implements the carvings of the Toraja Tongkonan house on the transformation geometry material in class XI SMA Negeri 2 Toraja Utara. The purpose of this study was to determine the learning outcomes and student activities in implementing Tongkonan house carvings on the Transformation Geometry material. The research method used is quantitative. Data collection using observation, pre-test, and post-test sheets. An essay test with five question items was used in this study as an instrument. The research sample was a class XI science high school student. Sampling Technique with cluster random sample. This research was conducted at SMA Negeri Toraja in the even semester of 2021. Data analysis techniques are carried out with descriptive statistics in the form of percentage analysis for student activities and student learning outcomes. The results showed that (1) the average score of student activity in learning was 4.05 which can be categorized as active, and (2) student learning outcomes can be categorized as good as evidenced by the average score of student learning outcomes being 76.35.

Keywords: Implementation, Engravings, Geometry Transformation

IMPLEMENTASI UKIRAN-UKIRAN RUMAH TONGKONAN TORAJA PADA MATERI GEOMETRI TRANSFORMASI DI KELAS XI SMA NEGERI 2 TORAJA UTARA

Abstrak:
Penelitian ini mengimplementasikan ukiran-ukiran rumah Tongkonan Toraja pada materi geometri transformasi di kelas XI SMA Negeri 2 Toraja Utara. Tujuan penelitian ini adalah untuk mengetahui hasil belajar dan aktivitas siswa dalam mengimplementasikan ukiran-ukiran rumah Tongkonan pada materi Geometri Transformasi. Metode penelitian yang digunakan adalah metode penelitian kuantitatif. Pengumpulan data menggunakan lembar observasi, pre-test, dan post-test. Tes esai dengan lima item soal digunakan dalam penelitian ini sebagai instrumen. Sample penelitian adalah siswa Kelas XI IPA SMA. Teknik Pengambilan

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sampel dengan *cluster random sample*. Penelitian ini dilakukan di SMA Negeri Toraja semester genap tahun 2021. Teknik analisis data dilakukan dengan statistik deskriptif yakni berupa analisis persentasi untuk aktivitas siswa dan hasil belajar siswa. Hasil penelitian menunjukkan (1) skor rata-rata aktivitas siswa dalam pembelajaran adalah 4,05 yang dapat dikategorikan aktif, dan (2) hasil belajar siswa dapat dikategorikan baik dibuktikan dengan nilai rata-rata hasil belajar siswa adalah 76,35.

Kata Kunci: Implementasi, Ukiran-ukiran, Geometri Tranformasi

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INTRODUCTION

Mathematics seeks to understand the patterns that are intertwined, both in the surrounding environment that is the real world, and in the realm of our minds. According to Schoenfeld (Borba, 1992). Although the language of mathematics is based on strict axioms, mathematics is also a social and cultural activity. This change led to changes to the curriculum content and learning strategies focused on: (1) finding solutions, not just memorizing procedures (2) exploring patterns, not just memorizing formulas, (3) formulating guesses, and not just doing exercises.

The objectives of Mathematics Learning according to the Ministry of Education and Culture (2013) namely: (1) improving intellectual abilities, especially students' high-level abilities, (2) shaping students' abilities in solving a problem systematically, (3) obtaining high learning outcomes, (4) training students in communicating ideas, especially in writing scientific papers, and (5) developing student character. However, achieving the objectives of learning mathematics is not an easy thing and there is still a high level of criticism and condemnation of mathematics learning today such as the problem of students finding it difficult to apply mathematics to real life. Another problem is partial and monolithic learning, namely learning that only interprets what is written in the curriculum, the study and development of the substance/subject matter are still mono-disciplinary, and the knowledge used is sterile from the reality of children's lives and their environment, and is cognitively low (Angkowo, Djahiri, & Safitri, 2007; Arisetyawan, 2015). The

teacher only conveys what is written in the curriculum, without having the competence to relate to contextual problems that are often encountered by students in everyday life. The results are predictable, most students who learn mathematics are only able to get to the stage of memorization rather than interpreting in real context and application. So many students only understand certain materials but do not understand their application to the real world.

Associating mathematics with human activities, culture and customs are very important. For this reason, it is necessary to have models, approaches, or techniques that can be used in mathematics learning that can relate mathematics to the student culture. Associating mathematics with culture is one of the solutions that can be used to bring mathematics to the daily life of students and can be a solution to familiarize mathematics with students. Ethnomathematics is a science that studies the relationship between mathematics and culture. It refers to an extensive collection of ideas ranging from different numerical and mathematical systems to multicultural mathematics education. The purpose of ethnomathematics is to contribute both to the understanding of culture and the understanding of mathematics, but mainly to appreciate the relationship between the two.

Mathematics and culture are interrelated with each other. Mathematics is used as a tool in solving life problems or in developing other disciplines. Students as learners must be empowered through the integration of mathematical and cultural content that corresponds to their life experiences to lead to successful mathematics learning. (Puspadewi & Putra, 2014; Wulandari & Puspadewi, 2016).

Ethnomathematics is a form of mathematics that is influenced or based on culture, nowadays the field of ethnomathematics, namely mathematics that grows and develops in society and accordance with the local culture, can be used as a center for learning processes and teaching methods, although it is still relatively new in the world of education, ethnomathematics includes mathematical ideas, thoughts, and practices developed by various cultural groups (Wahyuni, Tias, & Sani, 2013; Marsigit, Condromukti, Setiana, & Hardianti, 2014; Lembang, Baan, Dewi, & Palipangan, 2022).

Based on the results of the study, there is a concept of transformed geometry contained in the carvings of the Toraja tongkonan house, namely translation, dilatation, rotation, and reflection (Lembang, Baan, Dewi, & Palipangan, 2022). Based on the results of this study, the carvings on the tongkonan Toraja house accommodate culture-based learning. The results of

the study will be a reference in this study. This research will see how the learning outcomes and activities of students in implementing the carving of the Toraja tongkonan house on the transformation geometry material for and to obtain teaching materials that can accommodate tongkonan traditional house-based learning.

METHODS

The research method used is quantitative. This research will be conducted at SMA in North Toraja. The research design was designed using samples being treated by applying tongkonan house carvings to the Transformation geometry material.

1. Research Design

The design used is a pretest and post-test only as follows.

Table 1. Research Design

Pre-test	***treatment***	**Post-test**
O_1	T	O_2

Source: (Silalahi, 2018)

2. Population and Sample

The population of this study was all students of SMA IN North Toraja. The sample in the study was students of class XI IPA 1 which was determined by a random sample test.

3. Research Instruments

The instruments used in this study were learning outcome tests and student activity observation sheets. This test aims to determine students' level of ability after being given treatment. Student activity observation sheets are used to see how the activities of students of SMA in North Toraja in implementing the carvings of the Toraja tongkonan house on the Transformation Geometry material.

4. Data Collection Techniques

The data collection technique is carried out with du events, namely by providing learning outcomes test sheets to see student learning outcomes before and after being given treatment and student activity observation sheets to see student activities. Student activities will be assessed by filling out observation sheets carried out by observers in the classroom.

5. Teknik Analisis Data

a. Student Activities

Student activities in learning using Toraja carving teaching materials about transformed geometry can be measured by the percentage of each activity carried out during the learning. The formula used is:

$$N = \frac{R}{SM} X100 \quad (1)$$

b. Learning Outcomes

The learning outcomes test data is analyzed using the formula:

$$N = \frac{T}{Ti} \times 100 \quad (2)$$

RESULTS AND DISCUSSION

1. Student Activities

Student activities in learning activities are obtained from the results of observations using student activity observation sheets. The results of the observations are presented in table 2.

Table 2. Student Activity Observation Results

Meeting	Percentage (%)	Categories
I	67%	Active
II	75%	Active
III	78%	Active
IV	82%	Active
Average	75%	Active

Based on table 2 above, shows that overall student activities during learning in four meetings can be categorized as active according to the time order used with an average percentage of each activity carried out during the learning process. At the meeting I the percentage of activity is 67%, at meeting II the percentage is 75%. At the third meeting, It was 78% And at the fourth meeting, it was 82%. The observed student activity is relatively active with an average percentage of overall meetings being 75%.

Based on the results of the research above the carvings of the tongkonan Toraja house on the material of transformation geometry from meeting 1 to IV, students are relatively active in learning. Enthusiastic students can be seen from the way students do assignments and their activeness in asking and discussing. School mathematics learning is carried out by placing student reality and experience as a starting point for learning to provide enthusiasm

for students in learning (Kalinec-Craig, Prasad, & Luna, 2019; Rohaeti, Bernard, & Primandhika, 2019; Rosa & Orey, 2016). In addition, there is a two-way interaction between teachers and students, students with peers, not only gain mathematics knowledge, but students can feel the culture and learn mathematics everywhere (Palhares, 2012; Unlu, Ertekin, & Dilmac, 2017). Thus, the implementation of Toraja carvings in mathematics learning in the classroom brings students to reality and learning experiences because they have known Toraja carvings, making it easier for them to understand and understand geometric transformation. They are more active in answering questions and discussing.

2. Student learning outcomes

Data on student learning outcomes can be collected through the provision of written tests, namely pre-test (initial test) and post-test (final test). The learning outcomes test is used to find out the student's learning outcomes before and after being taught by implementing Toraja carvings in learning transformed geometry material. Written tests are used to find out student learning outcomes. Student learning outcomes are said to be complete if they reach a score of ≥ 65. The final test results of students can be seen in the diagram below.

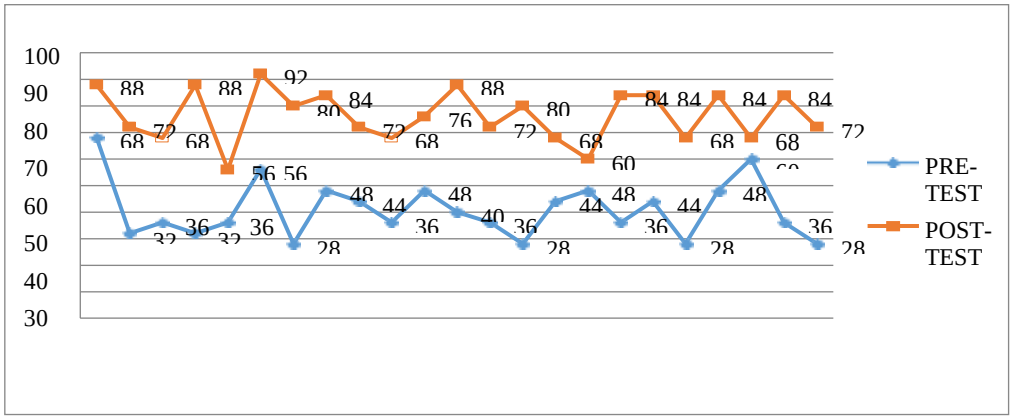

Figure 1. Diagram of Pre-test and post-test Learning Outcomes

Diagrams of students' pre-test and post-test results on the material of transformed geometry. From the line diagram above, it shows that student learning outcomes, can be seen from the scores of pre-test and post-test results obtained by students, can be seen that the scores obtained by students on post-test scores are higher than the pre-test scores with the

average score obtained by students in the pre-test which is 43 and the average score obtained by students on the post-test is 76.35.

Table 3. Descriptive Analysis Results of Pre-Test and Post-Test Values

Statistic	Pre-test	Post-test
Sample	23	23
Mean	43	76,35
Maximum Skor	68	92
Minimum Skor	28	56
Range	40	36
Standard deviation	10,72	9,72

Based on table 3 above, it is known that the average score on the pre-test value of 43 with a maximum score of 68 a minimum score of 28, and a standard deviation of 10.72. While the average score on the post-test score is 76.35 with a maximum score of 92, a minimum score of 56, and a standard deviation of 9.72. If the pre-test and post-test scores are divided into five categories, the frequency of scores and percentages are obtained as follows.

Table 4. Categorization of Students' Math Scores on Pre-Test and Post-Test

Score	Category	Pre-test		Post-test	
		Frequency	Percentage	Frequency	Percentage
80-100	Very well	0	0%	11	48%
66-79	Good	1	4%	10	43%
56-65	Enough	1	4%	2	9%
40-55	less	9	39%	0	0%
30-39	Very lacking	8	35%	0	0%
0-29	fail	4	17%	0	0%
		23	100%	23	100%

Based on table 4 in the pre-test who obtained scores in the fail category there were 4 students (17%) with scores ranging from 0-29, in the very less category, there were 8 students (35%) with scores ranging from 30-39. In the less category, there were 9 students (39%) with scores ranging from 40-45. In the sufficient category, there are 1 student (4%) students with a score ranging from 56-65. In the good category, there were 1 student (4%) students with a score ranging from 66-79. Meanwhile, in the post-test,

it was seen that student learning outcomes have increased, where there are 2 students (9%) whose scores are in the sufficient category, and 10 students (43%) whose learning outcomes are in the sufficient category. And there are 11 students (48%) whose learning outcomes are in the very good category. None of the students scored in the failed category, severely lacking and lacking.

Based on the data above, it can be seen that culture-based learning can improve student learning outcomes. Data learning outcomes by implementing Toraja carvings in learning transformation geometry, students show that all students are in the good and excellent categories. Learning by implementing Toraja carvings is able to provide convenience in learning mathematics, to be able to provide students getting to know the mathematics of geometric transformation. With the help of carvings Toraja, students can relate to culture in learning and produce good learning outcomes. This is affirmed by Achor, Imoko, and Uloku (2009) the application of ethnomathematics learning also arouses students' interest in learning, and with direct involvement in learning, producing curious students, keep in mind interest is an internal factor of every student, every teacher must be able to give the same sense when learning, by using the right way in every activity. So it can be described that ethnomathematics being able to provide excellent interest in learning followed by this satisfactory cognitive aspect is seen to be able to student learning outcomes (Borba, 1992; Warin, 2019; Fouze & Amit, 2018; Zulkardi, 2002). From this explanation, it is emphasized that providing mathematics learning by integrating with the surrounding culture, because it provides convenience for every student in learning mathematics, by looking at it from a different point of view and improving mathematics learning outcomes.

CONCLUSION

Based on the results of the study, it can be concluded as follows: (1) Learning with the implementation of Toraja carving in learning shows that the percentage of overall student activities is 75% so students are categorized as active during the learning process. (2) Students' mathematics learning outcomes are better, especially for the Geometry of Transformation material. This can be seen from the average score of 76.35 included in the Good category.

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