MaPan : Jurnal Matematika dan Pembelajaran
p-ISSN: 2354-6883; e-ISSN: 2581-172X
Volume 12, No 1, June 2024 (36-46)
DOI: https://doi.org/10.24252/mapan.2024v12n1a3

THE IMPLEMENTATION OF THE PROBLEM-BASED LEARNING MODEL BASED ON TORAJA CULTURE IN MATHEMATICS LEARNING

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Received November 27, 2023; Revised April 15, 2024; Accepted May 13, 2024

Abstract:
This research aims to implement Toraja cultural-based mathematics teaching tools to enhance the learning outcomes of students at SMPN 1 Makale Selatan. The objectives include assessing students' learning outcomes, their activities, and the teacher's capability in applying Toraja cultural-based mathematics teaching tools. The research method employed is quantitative research. Based on the findings, students' learning outcomes through problem-based learning (PBL) models infused with Toraja cultural elements are categorized as very high, with an average score of 86.17. This success is attributed to the cultural relevance and emotional connection fostered by the PBL approach integrated with Toraja traditions. The inclusive learning environment created through the recognition of cultural diversity further contributes to positive outcomes, confirming the effectiveness of the Toraja culture-based PBL model in promoting active student involvement in the learning experience. The integration of Toraja cultural elements into the PBL model significantly contributes to the remarkable success in achieving a high average score of 86.17 in students' learning outcomes. This achievement is found due to the contextual relevance of Toraja cultural values, increased emotional engagement, and the development of critical thinking skills within a broader cultural context. The use of Toraja culture not only enhances memory retention but also empowers students to actively participate in a learning environment that celebrates cultural diversity. The exceptional learning outcomes affirm the efficacy of integrating PBL with Toraja cultural elements, providing students with a profound and meaningful educational experience.

Keywords: Problem-Based Learning, Toraja, Mathematics

PENERAPAN MODEL PROBLEM-BASED LEARNING BERBASIS BUDAYA TORAJA DALAM PEMBELAJARAN MATEMATIKA

Abstrak:
Pembelajaran matematika seringkali dianggap abstrak dan sulit dipahami oleh siswa karena kurangnya relevansi dengan kehidupan sehari-hari mereka. Mengaitkan konsep matematika dengan budaya Toraja dapat membantu memperbaiki masalah ini dengan membuat pembelajaran lebih relevan dan bermakna bagi siswa. Penelitian

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ini menerapkan perangkat pembelajaran metematika berbasis budaya Toraja untuk meningkatkan hasil belajar siswa SMPN 1 Makale Selatan. Tujuan penelitian ini adalah untuk mengetahui hasil belajar dan aktivitas siswa dalam menerapkan perangkat pembelajaran matematika berbasis budaya Toraja. Metode penelitian yang digunakan adalah metode penelitian kuantitatif. Instrumen yang digunakan adalah tes hasil belajar dan lembar observasi aktivitas siswa. Berdasarkan hasil penelitian ditemukan bahwa hasil belajar siswa melalui pembelajaran menggunakan model pembelajaran Problem-based learning berbasis budaya Toraja dapat dikategorikan sangat tinggi dengan skor rata-rata 86,17. Keberhasilan ini disebabkan pada relevansi budaya, koneksi emosional, yang ditanamkan oleh pendekatan PBL yang diselipkan dengan tradisi Toraja. Lingkungan pembelajaran inklusif yang diciptakan melalui pengakuan terhadap keanekaragaman budaya lebih lanjut berkontribusi pada hasil positif, mengkonfirmasi efektivitas model PBL berbasis budaya Toraja dalam mendorong keterlibatan aktif siswa dalam pengalaman belajar berdasarkan hasil penelitian diperoleh aktivitas belajar siswa diperoleh rata-rata dari pertemuan pertama hingga keempat adalah 67%. Penggunaan budaya Toraja tidak hanya meningkatkan retensi ingatan tetapi juga memberdayakan siswa untuk berpartisipasi aktif dalam lingkungan pembelajaran yang merayakan keberagaman budaya. Hasil pembelajaran yang luar biasa tersebut menegaskan efikasi integrasi PBL dengan elemen budaya Toraja, memberikan pengalaman pendidikan yang mendalam dan bermakna bagi siswa.

Kata Kunci: Problem-Based Learning, Toraja, Matematika

How to Cite: Lembang, S. T., Arsyad, N., & Bernard. (2024). The Implementation of The Problem-Based Learning Model Based on Toraja Culture in Mathematics Learning. *MaPan : Jurnal Matematika dan Pembelajaran*, *12*(1), 1-13. https://doi.org/10.24252/mapan.2024v12n1a3.

INTRODUCTION

Mathematics is still considered a subject that is far from students' daily activities and has no connection to customs or culture. Teachers are supposed to be the bridge between the school and the community. One of the teacher's responsibilities is to pass on culture to the students in the form of skills and experiences (Djamarah, Bahri & Zaini, 2000; Rahmawati, 2015). For example, when a teacher teaches plane geometry, based on initial observations, teachers tend to provide examples by directly drawing geometric shapes on the chalkboard. Some teachers explain by giving real-life examples from their surroundings. However, few teachers connect these geometric examples to culture. As a result, students often think that mathematics has no connection to their culture or customs.

This is emphasized by Rusliah (2016), who states that mathematics and daily life are perceived as disconnected, making mathematics difficult for students to understand. This narrow perception limits the ability to perceive and present mathematics as a human activity. Naresh (2015) mentions that mathematics has always been a part of our ancestors' heritage, but both teachers and students still believe that mathematics can only be obtained in the classroom. Mathematics seeks to understand patterns, both in the immediate environment of the real world and in our minds. Mathematical language is based on strict axioms, but mathematics is also a social and cultural activity.

Connecting mathematics to culture is one of the solutions that can be used to bring mathematics into students' daily lives and make it more relatable to them. Some research results show that students taught with culture-based learning can integrate their background with their environment (Sarwoedi, Marinka, Febriani, & Wirne, 2018). Mathematics learning with a cultural approach also has a positive impact on student performance compared to conventional methods. Mathematics can explain activities such as counting, measuring, explaining, comparing, classifying, and playing within a specific cultural environment. Optimal mathematics learning outcomes can be achieved through culture-based learning (Ozofor & Onos, 2018; Pannen, 2005; Wijayanto & Retnaningsih, 2019).

The problem-based learning model with a Toraja cultural basis will be implemented. The steps used in learning will follow problem-based learning but with a Toraja cultural basis. Problem-based learning with a Toraja cultural basis will be evident in the learning materials used. Learning materials can help and facilitate teachers in conducting the learning process and provide students with a variety of learning experiences to achieve the established learning objectives. Trianto (2010) states that learning materials are the tools needed and used to manage the teaching and learning process.

METHODS

The research method employed is quantitative research. This research will be conducted at SMPN 1 Makale Selatan. The research design is designed by providing a sample with treatment through the application of Toraja culture-based learning.

The research design employed in this study follows a pretest and posttest model.

Table 1. Research Design

Pre-test	Treatment	Post-test
O_1	T	O_2

(Source: Silalahi, 2018)

The population under investigation consisted of all students enrolled in SMPN 1 Makale Selatan, with the sample drawn from Class IX via a randomized selection process. Research instruments included a learning outcome test, an observation sheet for student activities, and another for assessing teacher capabilities. The learning outcome test aimed at gauging students' proficiency levels following the treatment, while the observation sheets were utilized to monitor student engagement in problem-based learning rooted in Toraja culture, as well as to evaluate teachers' adeptness in employing this approach. Data analysis techniques involved assessing student activities, measured as percentages based on the frequency of each activity during the learning process, using the formula.

$$N = \frac{R}{SM} X\ 100 \quad (1)$$

Similarly, learning outcomes were analyzed using the formula:

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

Where T represents the number of students achieving mastery after the treatment, and Ti denotes the total number of students. Through these methodologies, the study sought to evaluate the effectiveness of problem-based learning infused with Toraja cultural elements on students' academic performance and engagement levels.

RESULT AND DISCUSSION

The research began with the development of research instruments. The instruments prepared include a learning outcome test, student activity observation instrument, and teacher capability observation instrument. Additionally, in this research, instructional materials were developed, including a lesson plan for problem-based learning based on Toraja culture and worksheets based on Toraja culture. After preparing the research instruments, the research was conducted, starting with the administration of a

pretest, followed by the implementation of problem-based learning based on Toraja culture. The research data was analyzed using descriptive statistics, which are elaborated as follows.

1. Student Activities

The students' activities in mathematics learning were obtained from observations using a student activity sheet. The observation results are presented in table 2.

Table 2. Analysis of Student Activities in Mathematics Learning

No	Aspect observed	Percentage				Average(%)
		P1	P2	P3	P4	
1	Forming study groups	10	12	11	19	13
2	Listening/note-taking during teacher explanations	26	26	23	22	24
3	Expressing ideas/answering questions	22	23	27	21	23
4	Participating in group discussions	22	29	29	27	27
5	Summarizing material	14	6	7	6	8
6	Irrelevant behavior	7	5	5	5	5
	Amount	100	100	100	100	100

Based on the data in table 2 above, it is evident that students are actively involved in learning using the Problem-Based Learning model based on Toraja culture. This can be observed from the average student activities over four meetings, including forming small groups at 13%, listening/note-taking during teacher explanations at 24%, expressing ideas/answering questions at 23%, participating in group discussions at 27%, summarizing lesson material at 8%, and irrelevant behavior at 5%. Thus, the overall average percentage of student activities from Meeting 1 to Meeting 4 is 67%, categorized as active. Based on these results, it can be concluded that learning using the Problem-Based Learning model based on Toraja culture can actively engage students in the learning process, indicating overall effective learning activities.

The observed student activity is forming study groups with an average score of 13%. This can be seen in figure 1.



Figure 1. Forming Study Groups

Meanwhile, student activity in listening/note-taking during teacher explanations, with an average score of 24%, can be observed in figure 2.



Figure 2. Listening/Note-taking during Teacher Explanations

Next, students actively engage in group discussions with an average score of 27%, as depicted in figure 3.



Figure 3. Teacher Guiding Students in Discussion

Therefore, the problem-based learning model based on Toraja culture can be applied in learning, particularly in the topic of transformations, as evident in the student activities obtained during Meetings I-IV totaling 67%. Consequently, the student's activities are categorized as Active.

Based on research findings, students' engagement in learning using a problem-based learning (PBL) model infused with Toraja cultural elements is categorized as active, with an average score reaching 67%. The increased student activity in this context can be explained by several interrelated factors. Firstly, the integration of Toraja culture in learning provides relevance and contextualization to the material, making students more interested and motivated to actively participate. Emotional engagement is also crucial, as students' identification with their own culture creates a strong emotional connection to the learning process, encouraging active participation. The PBL model, emphasizing real-world problem-solving, presents challenges that stimulate student engagement in seeking solutions and understanding the problems they face. Additionally, student empowerment within the PBL model, reinforced by Toraja cultural elements, creates an environment where students feel empowered to contribute, share knowledge, and seek solutions collaboratively. Lastly, the recognition of cultural diversity through the integration of Toraja culture creates a more inclusive space where students feel valued and motivated to actively participate in learning. Therefore, the average score of 67% in student activity can be interpreted as a positive indication of the success of the Toraja culture-based PBL model in stimulating student participation and engagement in the learning process (Abdulrahim & Orosco, 2020; Ardianti, Sujarwanto, & Surahman, 2022; Karkkainen & Rasanen, 2019; Wulandari, 2017).

2. Student Learning Outcomes

To assess students' learning outcomes, two tests were conducted: a pre-test to determine students' initial abilities before implementing the Problem-Based Learning model based on Toraja culture, and a post-test to assess students' abilities after the learning intervention. The study involved 27 students in the class. Based on the data processing results from the study using the Problem-Based Learning model based on Toraja culture, it was found that in the initial test, none of the 27 students achieved a passing score, with an average score of 24,69.



Figure 4. Students participating in the pre-test

In the final test, the 27 students achieved an average score of 86,17. This indicates that the implementation of the problem-based learning model based on Toraja culture falls into the very high category, as it has the potential to enhance students' thinking processes.



Figure 5. Students participating in the post-test

According to the test results, no student passed the pre-test among the 27 students. However, in the post-test, it was found that all 27 students who participated achieved passing scores according to the KKM set by SMPN 1 Makale Selatan. This is evident from the scores obtained by students ranging from 80 to 86,66.

The above research results indicate that the problem-based learning model based on Toraja culture has been successful. The teacher was able to manage the teaching and learning process, resulting in a positive impact on

students' learning abilities. Initially, none of the 27 students passed the pre-test, but in the post-test, all students in class IXA SMPN 1 Makale Selatan achieved passing grades. The implementation of the Problem-Based Learning model based on Toraja culture in the transformation material, starting from understanding transformations and their types to discussing examples of transformation problems related to Toraja culture, specifically Toraja carvings found in Tongkonan Bamba in the Sanda Bilik village, South Makale District, can be categorized as very high. This is evident in the increase in the average student score from 24,6914 to 86,1728. Therefore, because the average score in the post-test is 86,1728, it indicates that the average score is higher than the KKM set by SMPN 1 Makale Selatan, which is 78.

The implementation of a problem-based learning (PBL) model with a touch of Toraja culture has proven that students' learning outcomes can reach a very high level, as reflected in the average score of 86,17. This success can be explained by several factors. Firstly, the integration of Toraja cultural values and traditions provides contextual relevance to the learning process, making the material more closely aligned with students' everyday lives. Secondly, emotional engagement with the course material increases as students can feel their cultural identity reflected in the learning experience. Furthermore, the PBL model emphasizes real-world problem-solving, and by incorporating elements of Toraja culture, students can develop their critical thinking skills in a broader cultural context. The use of Toraja culture also enhances students' memory retention as the learning material becomes more meaningful and relevant. Additionally, PBL based on Toraja culture empowers students to take an active role in the learning process, creating an inclusive environment that recognizes and appreciates cultural diversity. Thus, the very high learning outcomes can be attributed to the effective integration of PBL and Toraja cultural elements in teaching, creating a deep and meaningful learning experience for students

CONCLUSION

Based on the results of the study, it can be concluded as follows: The integration of Toraja cultural elements in the problem-based learning (PBL) model significantly enhances students' engagement, as evidenced by active participation with an average score of 67%. This success is attributed to the cultural relevance, emotional connection, and empowerment fostered by the PBL approach infused with Toraja traditions. The inclusive learning

environment created through cultural diversity recognition further contributes to the positive outcomes, affirming the effectiveness of the Toraja culture-based PBL model in promoting active student involvement in the learning experience. The integration of Toraja cultural elements into the problem-based learning (PBL) model significantly contributes to the remarkable success of achieving a high average score of 86,17 in students' learning outcomes. This achievement is attributed to the contextual relevance of Toraja cultural values, increased emotional engagement, and the development of critical thinking skills within a broader cultural context. The use of Toraja culture not only enhances memory retention but also empowers students to actively participate in a learning environment that celebrates cultural diversity. The exceptional learning outcomes underscore the efficacy of integrating PBL with Toraja cultural elements, providing students with a profound and meaningful educational experience.

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