KEMAMPUAN BERPIKIR KREATIF MELALUI MODEL PROBLEM BASED LEARNING BERBASIS ETNOMATEMATIKA DALAM PEMECAHAN MASALAH SISWA SMP

Saiful Bahri[1], Samsul Bahri[2], Alkausar Saragih[3], Bambang Hermanto[4]
[1]Pendidikan Matematika, Universitas Muslim Nusantara Al Washliyah
Email:saifulbahri@umnaw.ac.id

Abstrak

Tujuan penelitian ini adalah mengetahui Model Problem Berbasis Learning etnomatematika untuk melihat kemampuan Berpikir Kreatif dan Pemecahan Masalah siswa SMP Negeri 23 Medan pada materi bangun datar. Jumlah sampel pada penelitian ini 25 siswa kelas IX SMP Negeri 23 Medan, Kelurahan Binjai Kec. Medan Denai, Kota Medan, Propinsi Sumatera Utara . Penelitian ini adalah penelitian eksperimen desain The Group Pretest-postest. Subjek dalam penelitian ini adalah siswa kelas IX SMP Negeri 23 Medan Kelurahan Binjai Kec. Medan Dena, Kota Medan, Propinsi Sumatera Utara. Pengumpulan data yang digunakan tes kemampuan berpikir kreatif etnomatematika dalam meningkatkan Kemampuan pemecahan masalah. Teknik analisis data yang digunakan dalam penelitian ini adalah uji paired t-test. Hasil penelitian ini adalah 1) hasil uji paired sample t-test menunjukkan nilai thitung < ttabel atau 7,575 < 2,19302 maka H0 ditolak yang berarti kemampuan berpikir kreatif siswa melalui model Problem Berbasis Learning etnomatematika dalam meningkatkan kemampuan Pemecahan Masalah dan Kemampuan berpikir kreatif pada materi bangun datar, 2) hasil uji peningkatan rata-rata (N-gain) menunjukkan bahwa siswa kelas IX SMP Negeri 23 yaitu 56,25 termasuk dalam kategori sedang. Rata-rata pretest siswa sebesar 83,42 dan rata-rata posttest sebesar 89,05. Sehingga dapat disimpulkan bahwa adanya peningkatan kemampuan berfikir kreatif melalui model pembelajaran problem based learning etnomatematika dalam meningkatkan Kemampuan Pemecahan Masalah pada materi bangun datar di SMP Negeri 23 Medan, Kelurahan Binjai Kec. Medan Denai, Kota Medan, Propinsi Sumatera Utara.

Kata kunci: Problem Basis learning, Etnomatematika, Kemampuan Berpikir Kreatif

Abstract

The purpose of this study is to determine the ethnomathematics-based learning problem model to see the creative thinking and problem-solving abilities of students of SMP Negeri 23 Medan on the material of flat shapes. The number of samples in this study were 25 students of grade IX of SMP Negeri 23 Medan, Binjai Village, Medan Denai District, Medan City, North Sumatra Province. This study is an experimental study with the Group Pretest-postest design. The subjects in this study were students of grade IX of SMP Negeri 23 Medan, Binjai Village, Medan Denai District, Medan City, North Sumatra Province. Data collection used ethnomathematics creative thinking ability tests in improving problem-solving abilities. The data analysis technique used in this study was the paired t-test. The results of this study are 1) the results of the paired sample t-test show the value of t count < t table or 7.575 < 2.19302 then H0 is rejected which means that students' creative thinking abilities through the ethnomathematics Problem Based Learning model in improving Problem Solving and Creative Thinking Ability on flat shape material, 2) the results of the average increase test (N-gain) show that grade IX students of SMP Negeri 23, namely 56.25, are included in the medium category. The average pretest of students is 83.42 and the average posttest is 89.05. So it can be concluded that there is an increase in creative thinking abilities through the ethnomathematics problem based learning model in improving Problem Solving Ability on flat shape material at SMP Negeri 23 Medan, Binjai Village, Medan Denai District, Medan City, North Sumatra Provinc

Keywords: Problem Based Learning, Ethnomathematics, Creative Thinking Skills

1. INTRODUCTION

Providing quality education, both now and in the future, will continue to be a priority for the government. The realization of good education is not solely the responsibility of the government, but involves the active participation of various parties, including the private sector, educators from various educational institutions, and society as a whole (Ariyani and Nugraheni, 2024). The Sustainable Development Goals (SDGs), agreed upon by the United Nations in 2015, provide comprehensive guidance in addressing various global challenges, including poverty, inequality, climate change, and inequity.

The fourth of the 17 SDGs emphasizes the importance of ensuring access for every individual to inclusive, equitable, and high-quality education, as well as opportunities for lifelong learning (Ariyani and Nugraheni, 2024). The standard of education in a society plays a crucial role in determining its ability to address complex issues that support sustainable development. A high level of education significantly influences the achievement of the Sustainable Development Goals (SDGs) (Zulyanto, 2022).

Mathematics developed in response to the various challenges faced by humanity across cultures. Each culture has a unique approach to developing mathematical concepts. Thus, mathematics can be considered a construct of human thought integrated into daily life activities and has become an integral part of society. Mathematics learning encompasses two interrelated, non-formal activities: the teaching and learning process, which function synergistically as students interact with educators, fellow students, and their surroundings.

Culture encompasses the customs and knowledge of humans as social beings, which play a role in our understanding of the environment and experiences, as well as in guiding behavior, including norms, beliefs, morals, laws, and art. (Iraratu, 2021). Ethnomathematics is an approach to mathematics influenced by cultural context. By applying ethnomathematics in education, it is hoped that students can deepen their understanding of mathematical concepts while simultaneously understanding their own culture. This implementation also makes it easier for educators to instill cultural values in students, so that the national character embodied in these values can be internalized from an early age (Soebagyo et al., 2021).

Based on research conducted by Karimah and Dewi (2022), the results showed that mathematical activities are involved in the Syawalan Gunungan Megono tradition. These activities include designing and making gunungan molds, measuring bamboo weaving for the gunungan frame, and preparing ingredients for cooking. Furthermore, there are calculation activities carried out to determine the weight and area of the gunungan mold. Through this implementation, 25 out of 30 students successfully completed the task, with a percentage of 80.25% and an average class score of 77.29.

Problem-Based Learning (PBL) is a learning model that emphasizes the problems students face during the learning process. These problems are addressed from the beginning of the learning process. In the context of mathematics learning, students are challenged with everyday problems, enabling them to connect mathematical concepts to real-world situations. Through these problems, students are expected to draw conclusions from what they have learned, thus facilitating their understanding and application of mathematical concepts in everyday life (Isrok'atun, 2018).

The advantages of PBL include: 1) Challenging students' abilities and

providing the satisfaction of discovering new knowledge. 2) Increasing student motivation and learning activities. 3) Helping students transfer their knowledge to understand real-world problems. 4) Helping students develop their new knowledge and take responsibility for their learning. 5) Developing students' critical thinking skills and adapting to new knowledge. 6) Providing opportunities for students to apply their knowledge in the real world. 7) Developing students' interest in continuous learning even after formal education has ended. 8) Makes it easier for students to master the concepts they learn to solve real-world problems. (Sanjaya, 2007).

The concept of thinking is often associated with the process of doing and generating new ideas. While creativity is often associated with the process of doing and generating creativity (Suripah & Sthephani, 2017). Creativity comes from the word creative, which means a person's ability to give birth to something new, such as ideas, real works, new forms of work, and combinations with things that already exist or have never existed. Creativity is a skill that everyone must have today, especially in the field of education.

In this case, it can be interpreted that creative thinking is one of the higher-order thinking skills, namely the process of thinking that goes beyond memorizing and re-presenting known information. McGroger (2007) defines creative thinking as thinking that leads to ways of gaining new insights, new approaches, new perspectives, or new ways of understanding something. This is in line with the opinion of Anwar (2012) who stated that creative thinking is a way of generating ideas obtained from several applied methods. Creative thinking usually involves problem solving, utilizing certain aspects of intelligence, such as language, mathematics, and interpersonal.

From the explanations above regarding creative thinking, the author concludes that creative thinking is a high-level thinking ability that leads to the way we broaden new insights, and broaden new perspectives and approaches in understanding a problem so that the thinking process can produce ideas from the ways we use in understanding and solving problems. Noer (2013) in his description stated that to measure creative thinking ability, a measuring tool is needed that covers 4 aspects of creative thinking, namely, (1) Fluency, (2) Flexibility, (3) Elaboration, and (4) Originality

2. METHOD

This research is an experimental research with a one group pre-test and post-test design (Ratminingsih, 2010). The research procedure consists of several steps. 1) Determining the focus of the research related to the application of ethnomathematics nuanced problem based learning (PBL) model on creative thinking skills. 2) Conducting a preliminary survey to determine students' abilities. 3) Formulating problems based on the knowledge gained. 4) Developing a theoretical framework. 5) Developing a research system. 6) Formulating hypotheses. 7) Selecting research methods; and 8) Relevant Determining variables and indicators. 9) Preparing research instruments. 10) Collecting data. 11) Analyzing data. 12) Drawing conclusions.

3. RESULTS AND DISCUSSION

The ethnomathematics-based Problem-Based Learning model in problem-solving skills was applied to improve creative thinking skills in the material of plane figures. This research was conducted using the ethnomathematics-based Problem-Based Learning model. Problem-based learning based on ethnomathematics.
Phase
Phase 1: Problem orientation

Phase 2 : Organizing students to conduct research
Phase 3: Helping students conduct investigations independently and in groups
Phase 4: Developing and presenting work results
Phase 5: Analyze and evaluate

Learning Activities

a. Discussing learning objectives
b. Describe what will be done in Helping students define and organize learning tasks related to ethnomathematics-based problems
c. Encourage students to obtain accurate information about environmental problems based on ethnomathematics, conduct experiments, and seek explanations and solutions.
d. Encourage students to obtain accurate information about environmental problems based on ethnomathematics, conduct experiments, and seek explanations and solutions
e. Helping students reflect on and evaluate their work (Amalia, 2021).

Before the lesson began, a pretest was administered, and after the lesson, a posttest was administered. Both were used to collect data on thinking skills. Data analysis was performed using a paired t-test. Prior to this, a normality test was performed to ensure the class distribution was normal, using SPSS 27 with the Shapiro-Wilk formula. The results of the normality test analysis are as follows. Based on the table above, the normality test analysis conducted with the Shapiro-Wilk formula using SPSS 27 shows the following results: the Shapiro-Wilk significance value for the class before being taught with the ethnomathematics-based Problem Based Learning model is 0.095, which is greater than 0.05, so H0 is accepted.

This means that the data before learning is normally distributed. Meanwhile, the significance value for the class after being taught with the ethnomathematics-based Problem Based Learning model is 0.304, which also makes H0 accepted, indicating that the data after learning is also normally distributed. Since the prerequisite test has met the requirements, the next step is to conduct a paired sample t-test. The following are the results of the data analysis. The hypotheses used in this study are as follows:

H0: $\mu 1 \leq \mu 2$ (Creative thinking skills after the introduction of the ethnomathematics-based Problem Based Learning model are the same as the creative thinking skills before the introduction of the ethnomathematics-based Problem Based Learning model). Ha: $\mu 1 > \mu 2$ (Creative thinking skills after implementing the ethnomathematics-based Problem Based Learning model are not the same as the creative thinking skills before implementing the ethnomathematics-based Problem Based Learning model).

The paired sample t-test was used to determine the difference in mean scores between the pre-test and post-test. This test was conducted using SPSS 27. Based on the table above, the results of the test for differences in average pretest and posttest scores using the program are <0.05. This indicates a significant difference between creative thinking skills before and after using ethnomathematics-based PBL. The N-Gain test was used to determine the effect of the ethnomathematics-based PBL model on improving creative thinking skills before and after use.

According to the table, the results of the average increase test (N-gain) that the ninth grade students of SMP Negeri 23 Medan Denai have a score of 47.49, which is included in the moderate category. Then, a gain test was conducted to measure how much the ability to think creatively in depth increased. The average pre-test score of students was 77.28, while the average post-test score was 88.6. From here, it can be concluded that there is an increase in creative thinking ability

through the problem based learning model with an ethnomathematics approach on the cone material at SMP Islam Salakbrojo. This is reinforced by the research of Sofri Rizka Amalia et al. in their journal entitled the application of ethnomathematics-based problem based learning to mathematical creative thinking. The study shows that the t-value < t-table or 7.575 < 2.19302, so H0 is rejected, which means the application of the ethnomathematics-based Problem Based Learning model can improve creative thinking ability.

The results of the n-gain test showed that most students experienced improvement, with 7 students in the high and medium categories, while 6 students were in the low category. This indicates that students' creative thinking skills improved during the learning process. Research by Mustika Tia Anggita et al. (2024) supports this finding, showing that N-gain scores with high criteria showed an average increase.

The results of this test are consistent with the actual survey results. The ethnomathematics-based Problem Based Learning model is implemented in several steps: problem orientation, organizing student learning, guiding individual and group student experiences, presenting student work results, and evaluating the learning process. The assignments given during this orientation period are related to Gunawan traditions. In addition, students are given the opportunity to identify and solve their own problems in their own environment. Through this approach, students become familiar with the problems presented and are able to solve them more easily in various ways. In this way, students are able to directly identify and solve problems in their environment, thereby developing creative thinking skills.

The Learning Objective Achievement Criteria (KKTP) used in data analysis is 72, which is the KKTP for Mathematics subjects in class IX of SMP Negeri 23 Medan, Binjai Village, Medan Denai District, Medan City, North Sumatra Province. The average class value obtained was 89.05, with 78% of students successfully achieving completeness, which is included in the good category with a value of 80%. The interview results showed that many students did not know the Gunawan tradition, Medan Denai. But they were able to understand and answer questions well in the completion process. Students felt that exam questions based on ethnomathematics theory were more interesting because they could learn about the building of traditional Malay cultural houses related to flat shapes that were around the building.

This research aligns with other studies that show a significant influence between the two learning approaches. The results showed that students who implemented the ethnomathematics-based Problem-Based Learning approach, which integrates problem-solving skills, had better creative thinking skills compared to students who used the conventional Problem-Based Learning approach. Prior to implementation, the ethnomathematics-based approach had shown higher average scores.

In this context, ethnomathematics acts as a differentiator between the two approaches, providing a new dimension to mathematics learning. Ethnomathematics teaches how to view mathematics from a broader perspective through culturally relevant practices and methods, and relates them to the overall context (Lestari and Murtiyasa, 2023).

A problem-based learning model that integrates ethnomathematics has a positive impact on student learning outcomes. This approach aligns with scientific methods that connect subject matter with local culture, thereby increasing student interest and creating a more effective learning environment. It is hoped that this approach will increase student enthusiasm in achieving optimal learning objectives (Safitri et al., 2020).

Problem-based learning that integrates ethnomathematics has a significant impact on students' creative thinking skills. This approach combines mathematical concepts with local cultural contexts, enabling students to understand mathematics through experiences relevant to their daily lives. During the learning process, teachers introduce problems drawn from cultural contexts, specifically the Gunawan tradition in Medan Denai.

Students are then grouped to collaborate on solving the problems by seeking information and data from available learning resources and exploring examples of ethnomathematics around them. Next, they are invited to present the results of their problem-solving and reflect (Qomariyah and Subekti, 2021). Through these steps, ethnomathematics-based problem-solving learning can optimize the development of students' creative thinking skills, as they learn to view mathematics as an integral part of their lives.

4. CONCLUSION AND SUGGESTION

4.1 Conclusion

So it can be concluded that there is an increase in creative thinking skills through the ethnomathematics problem-based learning model in improving problem-solving skills in flat shape material at SMP Negeri 23 Medan, Binjai Village, Medan Denai District, Medan City, North Sumatra Province.

4.2 Suggestion

The contribution or team role provided by an author in creating written works and additional materials such as textbooks and accredited journal outputs (Sinta 4). Beneficial for SMP 23 Medan Denai.

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