



Improving the Mathematical Understanding of Elementary School Students Through Problem-Based Learning and an Ethnomathematical Perspective

Yeni Dwi Kurino^(✉) and Tatang Herman

Faculty of Education, University Education Indonesia, Bandung, Indonesia
tatangherman@upi.edu

Abstract. The ability to understand mathematics is quite crucial in the process of learning mathematics in elementary schools. Ethnomatematics Problem-Based Learning is a strategy for learning mathematics that helps improve the ability to understand mathematics. The type of this research is Quasy Experiment with pretest-posttest control group design. The population of this study was all of class V at Nanggewer Elementary School which consisted of two classes, namely class Va as the experimental class and class Vb as the control class. Data collection uses multiple choice questions and essays, questionnaires, and performance appraisal. Data analysis used is the t test, data reliability test, data normality test, homogeneity test, and hypothesis testing. The results of the data analysis showed that the average N-gain ability of students' mathematical understanding who received problem-based learning based on ethnomathematics was significantly higher than students who received conventional learning.

Keywords: Elementary School · Problem Based Learning · Ethnomathematical

1 Introduction

Mathematics has a very important role in everyday life and in helping other fields of science. Given the importance of the role of mathematics, there is hope that students' understanding of concepts in mathematics can be improved. But in reality, the understanding of students' concepts is still relatively very low. This is because there are still many students' assumptions that are less positive about mathematics [1]. The rational importance of mathematical comprehension ability is stated in the mathematics learning objectives of the High School Mathematics Curriculum [2] which states that the purpose of teaching mathematics is so that the mathematics knowledge conveyed can be understood by students. In his research, [3] states that students who do not have the ability to understand a mathematical concept, then the usefulness of ideas, knowledge and other mathematical skills will be very limited, it can event.

Mathematical understanding can be interpreted as the ability of students to apply and apply mathematical concepts related to each other into various kinds and calculation models and be able to interpret them in other forms [4]. Tatang Herman [5] posits

“cognitive development as a process by which the child actively builds a system of meaning and understanding of reality through their experiences and interactions”.

Mathematical understanding plays an important role in mathematics and should play an important role in mathematics education [6]. Mathematical understanding and problem solving are central to school mathematics [7, 8]. Mathematical comprehension in mathematics learning is easier to comprehend when the KBM represents a concrete object in the school environment. This also includes tangible media in the form of media or culture in the school environment.

Education and culture are closely related because education is a process of interaction between teachers and students in a sphere of society [9]. A culture is a group of people’s outlooks on life in the form of behaviors, beliefs, values, and symbols that they unconsciously receive and transmit from generation to generation through the process of communication [10]. Based on the above opinions, we can conclude that culture cannot be separated from education, because her one aspect of culture is science. Mathematics is one of the subjects at the elementary school [SD] education level. Mathematics is used to solve problems in everyday life. For example, to calculate, interpret data, measure weight, process data, etc. [11]. This means that humans in their lives cannot be separated from mathematics.

Ethnomathematics aligns with the scientific approach. Ethnomathematics is a study that examines the relationship between mathematics and culture. Mathematics as a basic science also developed throughout the country. Each country has a different culture so that the development of mathematics is different because it is influenced by the existing culture. Ethnomathematics study is a study It examines how groups of people belonging to a particular culture understand, express, and use their cultural concepts and practices, which researchers describe as mathematical.. Societies are often unaware of the existence of ethno-mathematics as ethno-mathematics grows and evolves from culture. Ethnomathematics uses mathematical concepts that are broadly related to mathematical activity [12]. His six dimensions of ethnomathematics, namely:

- cognitive,
- conceptual,
- educational,
- epistemological,
- historical, and
- political.

The dimensions are interrelated and aimed at analyzing the sociocultural roots of mathematical knowledge. Through application, ethno-mathematics grows and develops from culture, so that society often remains unaware of its existence. Ethnomathematics uses mathematical concepts that are broadly related to mathematical activity [12]. The six dimensions of ethno-mathematics, namely:

The dimensions are interrelated and aimed at analyzing the sociocultural roots of mathematical knowledge. The application of ethno-mathematics makes it easier for students to understand the material, because it relates to the student culture in which they are learning, and because the material directly relates to the student culture, the activities of everyday life that ethno-mathematics represents. increase. was first introduced by Brazilian mathematician D’ Ambrosio in 1977 [13]. Ethnomathematics consists of the

word “ethno” prefix and is interpreted as a very wide range of languages, jargon, codes of conduct, myths, symbols, etc. related to socio-cultural contexts. The root word “mathematics” usually means describing, knowing, understanding, and performing activities such as coding, measuring, classifying, reasoning, and modeling. The suffix “tics” comes from *techne* and means as much as engineering. Ethnomathematics is defined as mathematics practiced by specific cultural groups such as national tribal societies, indigenous homes, and working-class groups, children of year.

This indicates the need to select appropriate learning models in the course of teaching and learning activities. One learning model that can be applied to math problem solving is the Problem Based Learning [PBL] model. The problem-based learning [PBL] learning model is one of the student-centered learning models, exposing students to a variety of problems encountered in life [14]. A problem-based learning model encourages students to understand mathematical concepts in order to solve the problems they face, which is his one in the culture of the Panjalin family. Some studies related to this study [15].

A study conducted by revealed findings that PBL was shown to be important in improving learners’ critical thinking skills [16]. A study by found that using a PBL learning model affects learning in SMA PGRI 1 Metro, especially in class X1 as the experimental class in this study. [17] A study conducted by [18] found that applying a PBL learning model can enhance students’ conceptual proficiency and critical thinking skills related to the concept of elasticity and Hooke’s law. I understand. Based on this related work, the novelty of this study is that no researcher has examined the impact of ethnomathematics-based problem-based learning (PBL) [19] models on geometry teaching materials on students’ understanding of mathematics. is. This study aims to improve the learning model of problem-based learning based on ethno-mathematics in order to improve the mathematical comprehension of SD Negeri Nanggawer Class IV students [20].

2 Methodology

This study is a quantitative study using experimental research methods. The study design used is a pre-experimental one with the nature of a one-group pre-test-post-test design. Two of his classes were used in this study: an experimental class and a conventional class. This research was conducted at Naggawer Elementary School. The time of this study was carried out in the even semester of the 2021/2022 academic year [20].

3 Result and Discussion

This research was conducted in an elementary school in one of the Majalengka districts, with all class V students consisting of Va and Vb classes. The results of the calculation of increasing the ability of mathematical understanding through the t test can be seen in the Table 1.

Test Results t Independent Sample Test Data N-Gain Mathematical Comprehension Ability t impartial t pattern check N-Gain Mathematical Comprehension Ability t impartial pattern check Sig (2-tailed] 0.1/2 Sig (2-tailed) Sig (1-tailed) 0.0075 Sig (1-tailed) Based at the desk above the importance price of 1-tailed t check impartial pattern check

Table 1. T-test Results Independent Sample Test Data N-Gain Mathematical Comprehension Ability

t independent sample test	N-Gain Mathematical Understanding Ability	t independent sample test
Sig [2-tailed]	0,015	Sig [2-tailed]
Sig [1-tailed]	0,0075	Sig [1-tailed]

records N-benefit of college students' mathematical comprehension capacity is 0.00075 smaller than. Taking under consideration the above check criteria, H_0 is rejected. In different words, substantially the common N-benefit of mathematical comprehension capacity This way that at a self belief stage of 95%, an boom in mathematical comprehension capacity of college students who get trouble primarily based totally gaining knowledge of primarily based totally on ethnomathematics gaining knowledge of is higher than college students who get traditional gaining knowledge of than [21].

PBL gaining knowledge of has traits as namely, first gaining knowledge of starts off evolved with a trouble, issues are given in step with the actual global of the pupil, 3 supply the pupil responsibility, 4 shape a small group; and 5 make college students to illustrate what has been found out withinside the shape of performance [22]. The benefits of the trouble-primarily based totally gaining knowledge of version are, firstly, college students actively take part in gaining knowledge of in order that the cloth is absorbed properly, secondly it is able to educate college students to paintings together, and thirdly college students get data from numerous reassets to remedy a trouble [23].

4 Conclusion

Improvement of mathematical comprehension ability of students who get ethnomathematics-based problem-based learning is higher than students who get conventional learning.

References

1. Abdurrozak, R., & Jayadinata, A. K. (2016). Pengaruh Model Problem Based Learning Terhadap Kemampuan Berpikir Kreatif Siswa. *Jurnal Pena Ilmiah*, 1(1), 871–880.
2. Ali, R. (2010). "Pengaruh Menggunakan Pemecahan Masalah Metode Pengajaran Matematika Terhadap Prestasi Belajar Matematika Siswa". *Asian Social Science* Volume 6.No. 2
3. Ambrosio, U. D. (2006). The Program Ethnomathematics: A Theoretical Basis of the Dynamics of Intra – Cultural Encounters. *The Journal of Mathematics and Culture*, 1[1].
4. Caballero, A., Blanco, LJ, & Guerrero, E. (2011) "Pemecahan Masalah dan Pendidikan Emosional pada Pendidikan Awal Guru SD". *Jurnal Eurasia Pendidikan Matematika, Sains & Teknologi* Volume 7[4], 281-292
5. Herman, T., & Mega. (2019). Pengembangan Lembar Kerja Siswa Berbasis Masalah dengan Strategi Heuristic untuk Meningkatkan Kemampuan Literasi Matematis, 37–48. <https://doi.org/10.20527/bipf.v6i3.5436>

6. Indriani, A. (2015). Penerapan Pembelajaran Tematik Kurikulum 2013 oleh Guru SD/MI di Desa Klepek Kecamatan Sukosewu Kabupaten Bojonegoro Semester Gasal Tahun Ajaran 2014/2015. *Jurnal VARIDIKA*, 27[1], 43–49. <https://doi.org/10.23917/varidika.v27i1.738>
7. Jatmiko, J. (2015). Eksperimen Model Pembelajaran Think-Pair-Share Dengan Modul [Tps-M] Terhadap Prestasi Belajar Matematika Ditinjau Dari Minat Belajar. *JIPM [Jurnal Ilmiah Pendidikan Matematika]*, 3[2], 417–426. <https://doi.org/10.25273/jipm.v3i2.511>
8. Junaedi, I. & Asikin. (2012). “Pengembangan Pembelajaran Matematika Humanistik Untuk Foto Kemahiran Matematis”. *Jurnal Penelitian Pendidikan Matematika Unnes Jilid 1*[2], 114–120.
9. Karatas, I. & Baki, A. (2013). Pengaruh Pembelajaran Lingkungan Berdasarkan Pemecahan Masalah pada Prestasi Siswa Soal Torio, MZC (2015)
10. Kemdikbud. (2018). Hasil Ujian Nasional SMP. Jakarta.
11. Khofiatun, Akbar, S., & Ramli, M. [2016]. Peran Kompetensi Pedagogik Guru Dalam Pembelajaran Tematik Di Sekolah Dasar. *Jurnal Pendidikan*, 1[5], 984–988. <https://doi.org/10.17977/jp.v1i5.6336>
12. Kurino, YD. [2015]. Pengaruh Contextual Teaching and Learning dan Direct Instruction terhadap peningkatan pemahaman matematis siswa SD. *Jurnal Cakrawala Pendas*. <https://jurnal.unma.ac.id/index.php/CP/article/view/340>
13. Kurniasari, F. (2017). Implementasi Pendekatan Saintifik Pada Penugasan Aktivitas Di Buku Teks Bahasa Indonesia Kelas VII SMP Berdasarkan Kurikulum 2013. *Jurnal Pendidikan Edutama*, 4[1], 9–26. <https://doi.org/10.30734/jpe.v4i1.44>. Laily, A., Jalal, F., & Karnadi, K. (2019).
14. Mariani. (2017). Penerapan Model Pembelajaran Make A Match Untuk Meningkatkan Hasil Belajar Matematika Tentang Pembagian Pada Siswa Kelas II SD Muhammadiyah 4 Batu. *JINoP [Jurnal Inovasi Pembelajaran]*, 3[2], 599. <https://doi.org/10.22219/jinop.v3i2.5306>
15. Marleny, A. S., Somakim, Aisyah, N., Darmawijoyo, & Araiku, J. (2020). Ethnomathematics-based learning using oil palm cultivation context. *Journal of Physics: Conference Series*, 1480[1]. <https://doi.org/10.1088/1742-6596/1480/1/012011>
16. Meli, A., & Halimatusadiah, A. (2017). Pengaruh Pendekatan Kontekstual Berstrategi REACT terhadap Kemampuan Pemahaman Matematis dan Motivasi Belajar Siswa Sekolah Dasar, 4[3], 203–217. <https://doi.org/10.17509/mimbarsd.v4i3.7766>
17. NCTM. (2000). Prinsip Ringkasan Eksekutif dan Standar untuk Matematika Sekolah. AS: NCTM.
18. Peningkatan Kemampuan Konsep Matematika Awal Anak Usia 4–5 Tahun melalui Media Papan Semat. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 3[2], 396–403. <https://doi.org/10.31004/obsesi.v3i2.214>
19. Pratama, R. A., Ulfa, S., & Kuswandi, D. (2018). Mobile Learning Berbasis Game Based Learning Pelajaran Matematika Pokok Bahasan Bangun Ruang Sisi Datar. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, 3[6], 771–777. <https://doi.org/10.17977/jptpp.v3i6.11167>
20. Qusyairi, L. A. H., & Sakila, J. (2018). Pengaruh Model Cooperative Learning Tipe Inside-Outside Circle [IOC] terhadap Prestasi Belajar dengan Memperhatikan Minat Belajar Matematika. *Palapa: Jurnal Studi Keislaman Dan Ilmu Pendidikan*, 6[1], 34–49. <https://doi.org/10.36088/palapa.v6i1.57>
21. Royantoro, F., Mujasam, M., Yusuf, I., & Widyaningsih, S. W. [2018]. Pengaruh Model Problem Based Learning terhadap Higher Order Thinking Skills Peserta Didik. *Berkala Ilmiah Pendidikan Fisika*, 6[3], 371.
22. Sumarmo, U., Hendriana, H., & Eti, E. (2017). Hard Skills dan Soft Skills Matematik Siswa. Bandung: Penerbit Refika Aditama.

23. Widari, I Gusti Ayu Arista, dkk. 2013. Penerapan Pendekatan Pembelajaran Matematika Realistik Sebagai Upaya Meningkatkan Aktivitas dan Prestasi Belajar Siswa Dalam Pembelajaran Bangun Ruang pada Siswa Kelas IVA SDN 9 Sesetan Tahun Pelajaran 2011/2012. *Jurnal Santiaji Pendidikan*, 3 [2]: Juli 2013. ISSN 2087–9016.

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