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# Application of Realistic Mathematics Education Approach to Improve Understanding of Mathematics Concepts in Elementary Schools

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**Abstract**
This study aims to improve the learning outcomes of mathematics students in grade IV of SDN Tanjungrejo 2 Malang through the application of Baamboozle interactive media combined with the Numbered Heads Together (NHT) learning model. The background of this research is based on the low mathematics learning outcomes, as shown by the average student score of 66.07 which is still below the Minimum Completeness Criteria (KKM) which is 75. This study uses the Kemmis and McTaggart model Class Action Research (PTK) method which is carried out in two cycles, each consisting of planning, implementation, observation, and reflection stages. The learning outcome data was obtained through an evaluation test at the end of each cycle and was analyzed in a quantitative descriptive manner by calculating the average score and percentage of learning completeness. The results showed that the average student score increased from 66.07 in the pre-cycle to 73.57 with 60.71% learning completeness in the first cycle, and increased again to 80.35 with 85.71% learning completeness in the second cycle. This finding proves that the application of Baamboozle interactive media combined with the Numbered Heads Together model is effective in improving the mathematics learning outcomes of grade IV students of SDN Tanjungrejo 2 Malang. The implications of this study show that the integration of interactive digital media with cooperative learning models can be an alternative to innovative, effective, and fun learning strategies in elementary schools.

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## Introduction

Education is a planned effort to foster and develop the potential of students optimally, both physically and spiritually (Yusuf, 2018). Based on Law Number 20 of 2003 concerning the National Education System, education has the goal of creating a learning atmosphere so that students are able to develop their potential, intelligence, noble morals, and skills needed for themselves and society (Ministry of Education and Culture, 2003). Basic education plays an important role as a foundation in the formation of students' character, moral values, and intellectual abilities (UNESCO, 2020). According to the Ministry of Education, Culture, Research, and Technology (2022), improving the quality of basic education is one of the strategic priorities to face the challenges of the 21st century.

Mathematics is one of the essential subjects taught at the elementary school to university levels because it plays a role in building logical, critical, and systematic thinking skills (Adjie et al., 2021). According to Nanditha et al. (2023), mathematics is very important because it can equip students with problem-solving skills that are applicable in daily life. The results of the Programme for International Student Assessment (PISA) in 2018 show that the numeracy literacy of Indonesian students is still low, ranked 73rd out of 79 participating countries (OECD, 2019). This condition emphasizes the need to improve the quality of mathematics learning since elementary education.

Low understanding of mathematical concepts is one of the problems that students often face in elementary school (Diana et al., 2020). The results of the assessment at SDN Bakalan Krajan 2 Malang show that only 45% of students achieve scores above the Minimum Completeness Criteria (KKM) in the data presentation material (Teacher Observation Data, 2024). According to Susanti et al. (2021), this problem is caused by less varied learning methods, lecture dominance, and lack of use of relevant contextual media. In fact, a good understanding of concepts is an important basis in solving mathematical problems at the next level.

Understanding of mathematical concepts is defined as the ability of students to receive, absorb, process, and apply a material to various contexts (Susanti et al., 2021). According to Diana et al. (2020), indicators of concept understanding include the ability to restate concepts in their own language, classify objects, apply concepts in algorithms, and connect between concepts. Kesumawati (2008) emphasized that this ability is important because it is the basis for mastering principles, procedures, and theories in mathematics learning at the advanced level.

Realistic Mathematics Education (RME) is a learning approach developed by Hans Freudenthal in the Netherlands, which emphasizes the importance of real context in mathematics learning (Gravemeijer, 1994). According to Apriyani (2017), RME has the

principle that mathematics learning should start from contextual problems that are close to students' lives. Widana (2016) added that this approach adjusts to the concrete thinking skills of elementary school students, so that they can more easily understand abstract concepts through direct experience. RME encourages students to actively build concepts through guided reinvention and group discussions.

The RME approach has the advantage of making mathematics more meaningful through a real and relevant context (Apriyani, 2017). According to Khaira Mardiah (2024), one form of implementing RME is to use simple activities such as collecting and presenting data based on students' daily activities. Widana (2016) explained that learning with real context helps students interpret the material more logically and systematically. This approach has also proven to be more effective than conventional methods that tend to be abstract and rote based.

Research by Fia Sufianti and Octaviabi (2022) proves that the implementation of RME can significantly increase students' understanding of mathematical concepts in each learning cycle. Similar findings were presented by Ayunis and Dorisno (2022), which showed that students' numeracy literacy increased with the RME approach compared to conventional methods. In addition, Ramadhani (2018) noted the success of RME in improving the learning outcomes of fractional materials in elementary schools. The results of the study showed that RME was able to increase student active involvement and mathematics learning outcomes.

Although various studies have proven the effectiveness of RME, studies on the application of this approach in the context of data presentation learning at SDN Bakalan Krajan 2 Malang have not been widely conducted. Therefore, this study aims to apply the Realistic Mathematics Education approach to improve the understanding of mathematics concepts of grade V students of SDN Bakalan Krajan 2 Malang. The results of the research are expected to contribute to the development of contextual-based innovative learning strategies in elementary schools (Fia Sufianti & Octaviabi, 2022; Ayunis & Dorisno, 2022).

## Method

This research aims to improve the understanding of mathematics concepts of grade V students of SDN Bakalan Krajan 2 Malang in Data Presentation material through the application of the Realistic Mathematics Education (RME) approach. The type of research used is Classroom Action Research of the spiral model of Kemmis and McTaggart (1988) which consists of four repeated stages in each cycle, namely planning, implementation, observation, and reflection. The research was carried out over two cycles, each cycle lasting two weeks with two meetings per week. The subjects of the study were all students of class V of SDN Bakalan Krajan 2 Malang which amounted to 23 students, consisting of 14 males and 9 females, using total sampling. The research

instruments include student activity observation sheets, concept comprehension evaluation test questions, and learning documentation, which are compiled based on concept comprehension indicators according to Giriansyah et al. (2023). The validity of the instrument was carried out through expert judgement by two elementary school mathematics teachers. In the planning stage, the researcher compiles teaching tools, real-context-based learning media, and success indicators. At the implementation stage, students collect and present data based on real situations such as object data in the classroom and canteen. Observation is carried out to observe student involvement and the learning process, while reflection analyzes the results of observations and test scores to determine the success of actions and improvements in the next cycle. The data were analyzed qualitatively descriptively through reduction, presentation, and conclusion drawing (Miles & Huberman, 1994), and quantitatively using the percentage of learning completeness and average scores. The assessment guidelines use a five-category Benchmark Reference Assessment (PAP) to measure the level of understanding of students' concepts.

## Results and Discussion

### Results

This class action research was carried out in two cycles, each consisting of two meetings. To find out the development of students' understanding of mathematical concepts, a post-test is carried out at the end of each cycle. The post-test results were analyzed based on the category of concept understanding level using the Benchmark Reference Assessment (PAP) on a scale of five categories, namely very high, high, medium, low, and very low.

Based on the results of the first cycle post-test, most students obtained scores in the very high and high categories. A total of 12 students (52.17%) were in the very high category, 7 students (30.43%) in the high category, 2 students (8.70%) in the medium category, and 2 students (8.70%) in the low category. There are no students in the very low category. Full data are shown in Table 1 below.

**Table 1.** Post-test Assessment of Concept Understanding Cycle 1

| Yes | Criterion | Value interval | Frequency | Presentase |
|---|---|---|---|---|
| 1 2 3 4 5 | Very High | 90 - 100 | 12 | 52,17% |
| | Tall | 75 - 89 65 - 74 | 7 2 | 30,43% |
| | Keep | 40 - 64 | 2 | 8,70% |

| | | | | |
|---|---|---|---|---|
| | Low | 0 - 39 | - | 8,70% |
| | Very Low | | | - |
| | Sum | | 23 | 100% |

Furthermore, in cycle II, there was an increase in learning outcomes. The number of students in the very high category increased to 15 people (65.21%), while in the high category there were 6 people (26.09%), the medium category remained 2 people (8.70%), and there were no more students in the low or very low category. Complete data is presented in Table 2.

**Table 2.** Post-test Assessment of Concept Understanding Cycle 2

| No | Criterion | Value interval | Frequency | Presentase |
|---|---|---|---|---|
| 1 2 3 4 5 | Very High | 90 - 100 | 15 | 65,21% |
| | Tall | 75 - 89 65 - 74 | 6 | 26,09% |
| | Keep | 40 - 64 | 2 | 8,70% |
| | Low | 0 - 39 | - | - |
| | Very Low | | | |
| | Sum | | 23 | 100% |

The development of student learning completeness can also be seen from the comparison of the number of students who achieve complete scores. In the first cycle, there were 19 students (82.60%) who completed, while in the second cycle it increased to 21 students (91.30%). Completeness data is presented in Table 3.

**Table 3.** Recapitulation of Post-test Scores of Students

| No | Value | Siklus 1 | | Siklus 2 | |
|---|---|---|---|---|---|
| | | Frequency | % | Frequency | % |
| 1 | Tuntas | 19 | 82,60% | 21 | 91,30% |

| | | | | | |
|---|---|---|---|---|---|
| 2 | Incomplete | 4 | 17,40% | 2 | 8,70% |
| Sum | | 100% | | 100% | |

**Discussion**

The results of the study show that the application of the Realistic Mathematics Education (RME) approach contributes significantly to improving the understanding of mathematical concepts of grade V students in data presentation materials. This increase can be seen from the increase in the number of students who reached the very high category from 52.17% in the first cycle to 65.21% in the second cycle (Table 1 and Table 2). In addition, the percentage of students who completed increased from 82.60% to 91.30% (Table 3), while students with low and very low scores were successfully minimized to 0%.

This improvement is closely related to the main principles of RME which relate mathematical concepts to the real-life context of students. Students can more easily understand the concept of data presentation when they themselves observe the school environment, record data, and present it in the form of tables and bar charts. This activity is in line with the principle of guided reinvention in RME, where students build their own understanding of concepts through active exploration with the guidance of teachers (Freudenthal, 1991).

From the results of learning observations, students are not only able to present data appropriately, but also interpret the content of the diagram and explain the results of their observations. This is in accordance with the indicators of concept understanding according to Giriansyah et al. (2023), namely restating concepts, classifying objects, presenting concepts in various forms, and conveying concepts appropriately. The improvement in the results of the second cycle post-test showed that the learners had improved in presenting visual data and interpreting the bar charts they created.

These findings are strengthened by research by Eka Apriyanti et al. (2021) who stated that the RME approach is effective in improving understanding of mathematics concepts in elementary schools because real-world context-based learning is able to motivate learners and increase their active engagement. Similar results were also found in the study of Nida Jarmita et al. (2020), where RME was able to improve the understanding of geometry concepts through contextual activities. Theoretically, the success of RME is supported by the theory of constructivism which emphasizes that knowledge is constructed by learners through direct experience and social interaction (Bruner, 1966; Vygotsky, 1978).

From the reflection of the actions, it can be concluded that the improvement of actions in cycle II, such as strengthening guidance in the preparation of tables and the selection of appropriate diagrams, has a positive impact on improving learning

outcomes. Overall, the implementation of RME not only has an impact on improving quantitative results in the form of grades, but also improves the quality of the mathematics learning process that is more active, meaningful, and fun for students.

## Conclusion

This study shows that the application of the Realistic Mathematics Education (RME) approach through activities that are close to the lives of students is able to create an active and meaningful learning environment. This approach involves students directly in every stage of learning, from data collection, processing, to data presentation, thereby increasing engagement, concept understanding, and problem-solving skills. The results of the study proved that there was an increase in the completeness of students' learning from 82.60% in the first cycle to 91.30% in the second cycle. Thus, the RME approach is effectively applied to improve the understanding of Mathematics concepts in elementary schools.

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## Authors' Note

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

## References

Adjie, A., Putra, P., & Sari, L. (2021). *Basic mathematics: Concepts and applications*. CV Literasi Nusantara Abadi.

Arikunto, S., Suhardjono, & Supardi. (2015). Classroom action research. PT Bumi Aksara.

Ayunis, & Dorisno. (2022). The effectiveness of the RME approach to the mathematical literacy of elementary school students. *Tarbiyah Al-Awlad: Journal of Islamic Education at the Elementary Level, 12*(1), 8.

Eka Apriyanti, S., et al. (2021). The effectiveness of realistic mathematics education (RME) to improve students' understanding of mathematics concepts. *Jurnal Elemen, 7*(1), 112-123.

Fia Sufianti, A., & Octaviani, S. (2022). The application of the realistic mathematics education (RME) approach to improve the understanding of mathematical concepts of grade IV elementary school students. *Indonesian Research Journal on Education, 2*(2), 894.

Giriansyah, F. E., Pujiastuti, H., & Ihsanudin, I. (2023). The mathematical comprehension ability of students based on Skemp's theory is reviewed from the learning style. Journal of Scholars: Journal of Mathematics Education, 7(1), 751–765. https://doi.org/10.31004/cendekia.v7i1.1515

Hikmah, N., & Sukestiyarno, Y. L. (2020). The effectiveness of RME approach on mathematical problem solving ability viewed from learning independence. Unnes Journal of Mathematics Education, 9(1), 18–25. https://doi.org/10.15294/ujme.v9i1.35471

Indriani, N., Salsabila, Z. P., & Firdaus, A. N. A. (2018). Understanding the concept of multiplication using the RME method in third grade students of MI Mifftahul Huda. Auladuna: Journal of Islamic Basic Education, 9(1), 105–113.

Ismail, M. T., & Jusoh, R. (2022). Enhancing students' mathematical reasoning through context-based tasks in primary schools. International Journal of Instruction, 15(2), 121–136. https://doi.org/10.29333/iji.2022.1527a

Kesumawati, N. (2008). Understanding of mathematical concepts in mathematics learning. In the Proceedings of the National Seminar on Mathematics and Mathematics Education, FMIPA, State University of Yogyakarta (pp. 229–235). https://eprints.uny.ac.id/6928/

Marlina, I., & Fauziawati, L. (2021). The effect of the realistic mathematics education (RME) approach on improving students' understanding of mathematical concepts in elementary school. Didactic: Scientific Journal of PGSD FKIP STKIP Subang, 7(1), 140–162.

Masriyah, M. (2016). The effect of realistic mathematics education (RME) approach on students' mathematical reasoning abilities. Journal of Education and Learning (EduLearn), 10(2), 139–146. https://doi.org/10.11591/edulearn.v10i2.3260

Murizal, A., Yarman, Y., & Yerizon. (2012). Understanding Mathematical Concepts and Quantum Teaching Learning Models. Journal of Mathematics Education and Research, 1(1), 19–23.

Muslihatun, A., & Sugiman, S. (2022). Learning to build flat using traditional Indonesian children's games. Axiom: Journal of the Mathematics Education Study Program, 11(3), 2131. https://doi.org/10.24127/ajpm.v11i3.5111

Nurmanto, Y., & Ashari, M. Y. (2023). Benchmark assessment in the evaluation of Islamic education. Ats-Tsaqofi: Journal of Islamic Education and Management, 5(1), 39–51. https://doi.org/10.61181/atstsaqofi.v5i1.362

Pohan, D. N. (2020). Effect of realistic mathematics education model on students' mathematical problem-solving ability. International Journal of Instruction, 13(3), 65–80. https://doi.org/10.29333/iji.2020.1335a

Prahmana, R. C. I., & Deta, U. A. (2017). Learning geometry using the Indonesian traditional game of "Dakon": Nurturing students' geometry understanding. Journal on Mathematics Education, 8(2), 185–198. https://doi.org/10.22342/jme.8.2.4055.185-198

Putri, R. I. I., & Zulkardi. (2020). Designing realistic mathematics education (RME) learning environment to support students' conceptual understanding on fractions. Journal on Mathematics Education, 11(1), 87–108. https://doi.org/10.22342/jme.11.1.9785.87-108

Ramadhani, D. (2018). The effect of the realistic mathematics education (RME) learning model on the mathematics learning outcomes of students in class V MIN 7 Medan Denai T.A 2018/2019 [Thesis, UIN North Sumatra].

Sunny, V., Siti Sundari, F., & Kurniasih, M. (2023). The application of the project-based learning model with concrete media to improve the learning outcomes of mathematics in grade V at SDN Polis 1 Bogor City. Didactic: PGSD Scientific Journal STKIP Subang, 9(2), 1070–1079. https://doi.org/10/36989/didaktik.v9i2.788

Susanti, N. K. E., Asrin, A., & Khair, B. N. (2021). Analysis of the level of understanding of science concepts for grade V students of SDN Cluster V, Cakranegara District. Scientific Journal of the Education Profession, 6(4), 686–690.

Syahputra, E. (2016). The effect of realistic mathematics education approach on mathematical problem-solving ability of junior high school students. Journal on Mathematics Education, 7(1), 53–60. https://doi.org/10.22342/jme.7.1.2815.53-60

Utami, N. P. A., & Widana, I. W. (2021). Realistic mathematics education for increasing primary students' mathematical communication ability. International Journal of Instruction, 14(3), 565–582. https://doi.org/10.29333/iji.2021.14333a

Widana, I. W. (2021). Realistic mathematics education (RME) to improve the mathematical problem-solving skills of students in Indonesia. Journal of Elements, 7(2), 450–462.

Wijaya, A. (2012). Teachers' perception about context-based mathematics tasks: A survey study in Yogyakarta, Indonesia. Journal on Mathematics Education, 3(2), 119–134. https://doi.org/10.22342/jme.3.2.571.119-134

Yuliani, K., & Saragih, S. (2015). The development of learning devices based guided discovery model to improve understanding concept and critical thinking mathematically ability of students at Islamic junior high school of Medan. Journal on Mathematics Education, 6(2), 123–134. https://doi.org/10.22342/jme.6.2.2165.123-134

Yusuf, M. (2018). Introduction to Education. IAIN Palopo Campus Publishing Institution.