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Numeracy Drama: A Creative Approach to Improving Numerical Literacy at Elementary School

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Abstrak

Pembelajaran matematika sering dianggap sulit dan kurang menarik, yang berdampak pada rendahnya literasi angka siswa di sekolah dasar. Tujuan penelitian ini adalah untuk mengetahui seberapa efektif Numerasi-Drama (N-Drama) sebagai metode inovatif untuk meningkatkan literasi angka siswa kelas V. Penelitian ini menggunakan metode kuantitatif dan merancang penelitian tindakan kelas dengan 20 siswa dari tiga kelas di salah satu sekolah dasar di Kabupaten Tangerang. Hasil penelitian menunjukkan peningkatan signifikan pada nilai rata-rata skor pretest meningkat dari 20 menjadi 29,5, dan skor peningkatan rata-rata sebesar 9,5. Metode N-Drama meningkatkan pemahaman siswa tentang matematika dengan menyediakan lingkungan belajar yang interaktif dan menyenangkan. Namun, perbedaan dalam pencapaian individu menunjukkan bahwa pendekatan pengajaran yang lebih adaptif diperlukan. Jadi, N-Drama membantu siswa lebih memahami matematika sekaligus memberikan pengalaman belajar yang kreatif, sehingga berpotensi menjadi solusi untuk meningkatkan kualitas pendidikan matematika di Indonesia.

Kata Kunci: Numerasi berbasis drama, keterlibatan dalam matematika.

Abstract

The study of mathematics is frequently viewed as challenging and uninteresting, which has a detrimental effect on elementary school pupils' numeracy abilities. The purpose of this study is to evaluate Numeracy-Drama (N-Drama) as an innovative approach to raising fifth-grade students' numeracy proficiency. The study uses a classroom action research design and a quantitative approach with 20 students from three classes in a Tangerang Regency elementary school. With an average gain score of 9.5 and pretest scores rising from 20 to 29.5, the results show a significant improvement in average scores. By offering a fun and engaging learning environment, the N-Drama method improves students' comprehension of mathematics. Individual achievement disparities, however, point to the need for more flexible teaching strategies. Consequently, N-Drama assists students in comprehending mathematics while offering a creative learning experience, making it a potential solution to improving the quality of mathematics education in Indonesia.

Keywords: Drama based numeracy, Mathematics engagement.

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INTRODUCTION

Numerical literacy, or numeracy, is an essential skill that underpins the ability to navigate and solve real-world problems. Despite its significance, mathematics instruction frequently fails to engage students in a meaningful way, which results in poor performance and negative attitudes about the subject. Innovative pedagogical approaches have been investigated with encouraging outcomes to address this, such as incorporating creative theater into mathematics education. Mathematics learning in elementary schools regarding numeration includes material on number operations, geometry, measurement and data processing (Wardhani, 2022).

In every country, mathematics is a required subject at every educational level (Anjariyah & Afkar, 2023). Solving problems in daily life requires mathematical literacy and numeracy (Fauzan et al., 2024). For students to be ready for the challenges of the twenty-first century, numerical literacy is especially important. Therefore, mathematics learning is expected to not only provide the ability to use calculations or formulas in working on test questions, but also be able to involve reasoning and analytical skills in solving everyday problems or what is known as numeracy literacy skills (Rahmah Tahir & Pendidikan Matematika, 2022). However, students often find mathematics boring and challenging, which lowers their motivation and leads to subpar learning outcomes. According to the 2023 Indonesian Education Report, elementary school pupils' numeracy abilities in Indonesia continue to lag behind expectations (Farzana Sukaryo & Mulyati Mustika Sari, 2024).

The abstract nature of mathematics and conventional teaching approaches that don't effectively engage students are both contributing factors to the difficulty of learning the subject (Koerunnisa et al., 2024). Novel strategies, like Numeracy Drama (N-Drama), have been developed to address this problem. N-Drama creates a dynamic and captivating learning environment by fusing the dramatic arts with numeracy instruction. Drama used in teaching may reduce student worries and stress related to the course (Gülderen & Uysal, 2020). Dramatic activities make learning more engaging and efficient by allowing students to investigate mathematical ideas through role-playing, real-life scenarios, and group problem-solving (Elizabeth Ezenwosu et al., 2022).

Several studies have demonstrated the advantages of incorporating drama into mathematics education. Drama students can analyse how the properties of shapes and objects have been manipulated to create meaning or how use of shapes and objects can represent cultural and historical influences in drama. (Yustitia et al., 2021). Drama demystifies abstract mathematical concepts, encouraging student participation and interest, according to Elizabeth Ezenwosu et al. (2022). By offering meaningful learning experiences, Şahin (2018) discovered that creative drama greatly enhanced students' comprehension of geometry and measurement. After investigating teachers' perspectives, Awaji et al. (2024) came to the conclusion that drama improves mathematical understanding, fosters classroom discussion, and encourages emotional involvement in the learning process.

This study expands on these findings by introducing and assessing the influence of N-Drama on the numerical literacy of fifth-grade at an elementary school in Tangerang Regency school. This study takes a complete approach to evaluate the cognitive and emotional effects of incorporating theater into numeracy instruction, in contrast to other research that frequently concentrates on discrete ideas or theoretical frameworks. We claim that Drama in Education (DiE) is a teaching technique which promotes participatory performance and hence democratic access to mathematical ideas for all pupils (Kotarinou & Stathopoulou, 2015). Drama-based learning using the role-playing method positively influences the improvement of students' numeracy literacy skills, as it provides direct experiences that enable students to understand concepts in real-world contexts, increase active participation, and create more engaging and meaningful learning.

(Jurnal et al., 2024). This research is unique since it addresses particular educational issues and provides workable answers in the Indonesian setting.

The critical need for improved numeracy skills in Indonesia highlights the significance of this study. N-Drama aims to increase students' confidence and enthusiasm in mathematics by encouraging active interaction and making learning more applicable to their daily lives. This study is based on the concept that incorporating theater into numeracy lectures can greatly enhance students' engagement, numerical literacy, and general learning results. By offering a cutting-edge teaching methodology that may be modified for use in more extensive educational environments, this project seeks to promote mathematics education in Indonesia.

METHOD

Research Design

This study employs a mixed-method approach, integrating qualitative and quantitative methods to analyze the impact of the numeracy-drama (N-Drama) approach on students' numeracy skills. The quantitative aspect focuses on collecting data through assessments and tests to evaluate students' performance and progress in mathematics. This provides measurable evidence of the effectiveness of N-Drama in enhancing numeracy literacy, addressing challenges in traditional mathematics learning. The statistical results offer insights into the extent of improvement achieved by students.

The qualitative aspect captures students' experiences, emotions, and perceptions during the learning process. Observations and structured interviews are conducted to gather detailed information on how the use of drama influences student engagement, motivation, and attitudes toward mathematics. By combining these approaches, the study offers a comprehensive perspective on both the measurable outcomes and underlying factors contributing to the success of N-Drama.

Research Subject

The subjects of this study were 20 fifth-grade students selected randomly from three classes (V-A, V-B, and V-C) at SDN KEDAUNG BARAT 4 is located at Jl. Jatimulya Kecamatan Sepatan Timur Kabupaten Tangerang . The total population consisted of 130 students, but the sample was limited to 20 students to focus on those with high potential in mathematics but low learning motivation, as identified through prior evaluations. This targeted sampling ensures relevance and depth in analyzing the impact of the N-Drama approach. The research was conducted at an elementary school in Tangerang, Indonesia, from February 26, 2024, to June 16, 2024. This duration allowed for sufficient time to implement the N-Drama approach, conduct interventions, and collect both qualitative and quantitative data effectively.

To ensure the validity of the research findings, a triangulation method was employed. Data from assessments, observations, and interviews were cross-verified to establish consistency and reliability. Expert reviews were conducted to validate the test instruments, ensuring they aligned with the objectives of the study. Additionally, pilot testing of the drama-based activities was carried out to refine the approach and address potential challenges before the full implementation.

The research was conducted in the following stages :

Data collection was conducted using a combination of instruments:

1. Preparation Stage

Development of lesson plans integrating numeracy-drama activities, validation of test instruments by experts, and pilot testing to refine activities and methods.

2. Implementation Stage

Execution of N-Drama sessions over the research period, where students participated in role-play and interactive drama activities designed to enhance numeracy skills. Sessions were monitored to ensure consistency and active participation.

3. Data Collecting Stage

Quantitative data were gathered through pre-tests and post-tests to measure improvements in numeracy skills. Qualitative data were collected through structured observations and interviews, capturing students' experiences and perceptions.

4. Analysis Stage

Data were analyzed using statistical methods for quantitative results and thematic analysis for qualitative data. The findings were synthesized to provide a comprehensive understanding of the impact of the N-Drama approach.

By systematically implementing these stages, the study ensures robust data collection and analysis, offering actionable insights for improving mathematics education practices.

RESULT AND DISCUSSION

Pretest and Posttest

Table 1. The Student Result Score

Pretest	Posttest	Gain Score
20	29,5	9,5

Students who underwent a pretest and posttest to measure their level of understanding before and after the learning process. The results of the analysis showed that the average pretest score was 20, the average posttest score increased to 29.5, and the average gain score was 9.5. Overall, the students' score on the pretest was 400, and their score on the posttest increased to 590. This increase indicates that students have made great progress in understanding what they learned during the learning process. This can be an indicator of how effective the teaching used is. However, some students saw an increase in scores; some remained at the same level of understanding, and some even saw a decrease in scores. This phenomenon indicates that, although the learning technique is generally effective, there are differences in individual achievement that need to be considered.

The results of this study provide compelling evidence in favor of constructivist learning theory (Piaget, 1964; Vygotsky, 1978), which emphasizes that active, experiential learning is the most effective way for students to learn. According to the Zone of Proximal Development (ZPD), students can attain greater levels of understanding through suitable scaffolding, whether from peers or teachers, than through independent work alone. This framework is made possible by drama-based numeracy learning, such as that used in the N-Drama approach, which makes abstract concepts easier to understand by integrating mathematical concepts into interactive and contextualized experiences.

In addition, Vygotsky's emphasis on the importance of social interaction in learning implies that cooperative activities in drama-based learning give students the chance to talk about, evaluate, and improve their mathematical knowledge with their peers. Research by Mercer (2007) has further emphasized the cognitive advantages of conversation in group learning environments, showing that social interaction promotes a deeper understanding and memory of mathematical ideas.

Furthermore, the use of creative drama resonates with Gardner's Multiple Intelligences Theory (Fisher et al., 1983) particularly in addressing interpersonal and bodily-kinesthetic intelligences. Drama-based learning leverages these intelligences to enhance students' mathematical comprehension and motivation. This

study's findings also corroborate the emotional engagement theory (Pekrun, 2006) which asserts that emotionally engaging methods improve students' motivation and learning outcomes.

The improvement in numeracy skills observed in this study aligns with similar research demonstrating the effectiveness of integrating creative drama into mathematics education. For example: (Elizabeth Ezenwosu et al., 2022) found that drama increased student interest and participation in mathematics by demystifying abstract concepts. The current study's findings extend these results by quantifying the gain in numeracy scores. Şahin (2018) reported significant improvements in students' understanding of geometry and measurement through creative drama, supporting the notion that experiential activities enhance mathematical comprehension. Conversely, some studies, such as Awaji et al. (2024) reported variability in the impact of drama-based methods depending on the educators' proficiency in integrating drama into the curriculum. This study observed a similar phenomenon, where differences in individual achievement highlighted the need for adaptive instructional strategies.

In contrast to research focused solely on cognitive outcomes, this study also examined the emotional and social dimensions of learning, providing a more comprehensive analysis. By focusing on an Indonesian educational context, the findings contribute new insights into the cultural and pedagogical adaptations required for implementing innovative teaching strategies in diverse settings. This study contributes to the growing body of literature advocating for interdisciplinary approaches to education. By integrating arts into STEM education, it reinforces the importance of STEAM (Science, Technology, Engineering, Arts, and Mathematics) as a holistic framework for 21st-century learning. The N-Drama approach not only improves numeracy skills but also fosters creativity, collaboration, and communication skills—key competencies for the modern workforce.

Additionally, the findings underscore the potential for drama-based methods to 'address long-standing challenges in mathematics education, such as low engagement and negative attitudes toward the subject. Educators and policymakers can leverage these insights to design curricula that are both engaging and effective, particularly in contexts with low numeracy proficiency. The study's small sample size of 20 students from a single school limits the generalizability of the results. Future research should involve larger, more diverse populations to validate these findings. The research primarily assessed short-term outcomes. Longitudinal studies are needed to evaluate the sustained impact of the N-Drama approach on numeracy skills and broader academic performance. The effectiveness of drama-based methods may vary depending on the teachers' familiarity with and ability to integrate such approaches. Professional development programs are essential to standardize and enhance the implementation process.

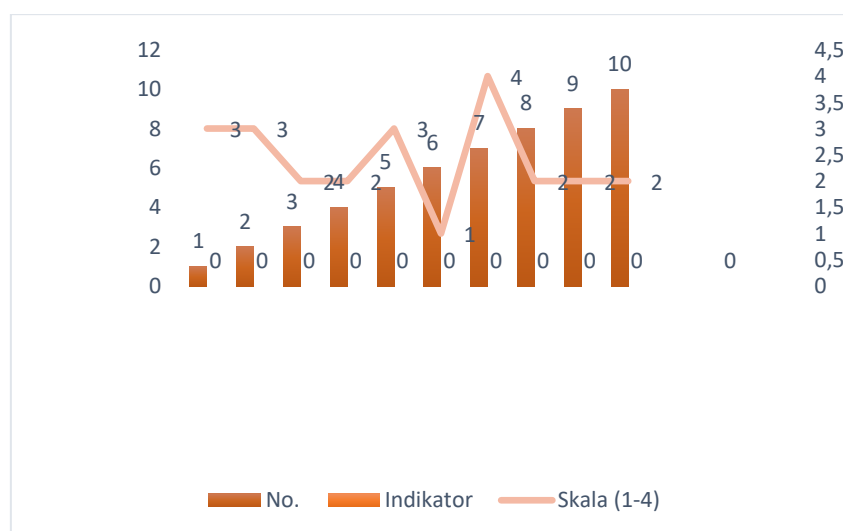


Figure 1.

The N-Drama method creates a dynamic and emotionally stimulating learning environment, making it a promising method for enhancing numeracy abilities. The integration of the arts to improve cognitive and creative abilities is emphasized by multidisciplinary frameworks such as STEAM (Science, Technology, Engineering, Arts, and Mathematics), which is in line with this approach (Bequette & Bequette, 2012). Teachers can demystify abstract mathematical topics and help pupils relate to them by using drama-based tactics. Student disengagement and anxiety have long been problems in mathematics instruction (Ashcraft et al., 2007). Our results suggest that by fostering an immersive and cooperative learning environment, drama-based techniques can help to lessen these problems. Curriculum designers and policymakers want to think about incorporating theater into math lessons, especially in areas where low numeracy proficiency is persistent.

For drama-based methods to be effectively implemented, educators must receive adequate training in theatrical pedagogy. Research by Sawyer (2014) suggests that teacher expertise significantly influences the success of creative teaching approaches. Therefore, professional development programs should include workshops on drama integration, lesson planning, and assessment strategies tailored to arts-based learning.

CONCLUSION

This study highlights the effectiveness of the numeracy-drama (N-Drama) approach in improving the numeracy skills of grade V students in an elementary school in Tangerang. The goal of the study was to improve learning outcomes, and the results showed notable improvements in students' engagement, comprehension, and application of mathematical ideas. The N-Drama method reduced students' anxiety and promoted a more positive attitude toward mathematics by creating an engaging and dynamic setting. These results highlight how crucial it is to include innovative and student-centered teaching strategies into conventional mathematics instruction in order to produce more memorable learning opportunities. The findings of the study promote the investigation of the N-Drama technique among different age groups and in a variety of educational contexts. Future studies should also look at how well it works in conjunction with other cutting-edge teaching techniques to optimize its potential for resolving issues in mathematics education and promoting the overall development of students.

GREETING

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