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Implementation of Wordwall Interactive Media in The Digital Age to Improve Numeracy Skills in Students at SDN Mangaran 04

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Abstract

This study aims to improve the numeracy skills of fifth-grade students at SDN Mangaran 04 through the application of Wordwall-based interactive learning media. The main problems faced are low numeracy skills among students, particularly in understanding the meaning of numbers in story problems, accuracy in basic arithmetic operations, and simple reasoning skills in determining solution strategies. This study used the Classroom Action Research (CAR) method with the Kemmis and McTaggart model, which was carried out in two cycles. The research subjects consisted of 30 fifth-grade students. Data were collected through numeracy tests, observations, and interviews, then analyzed descriptively, quantitatively, and qualitatively. The results showed an increase in students' numeracy skills after the implementation of Wordwall, marked by an increase in the average numeracy score from 22% in the pre-cycle to 80% at the end of Cycle II, as well as an increase in learning completeness from 22% to 80%. This improvement occurred because Wordwall facilitated repetitive numeracy exercises, presented contextual questions through gamification, and provided immediate feedback that helped students correct their mistakes and strengthen their understanding of concepts. Thus, the use of Wordwall-based interactive learning media was found to contribute positively to the improvement of elementary school students' numeracy skills, especially in the context of schools in areas with limited learning facilities.
Keywords: *Numeracy, Wordwall, Interactive Media*

1. Introduction

Education plays an important role in shaping and developing the quality of human resources. One important aspect of basic education is numeracy, which includes the ability to understand and apply mathematical concepts in everyday life (Annisa, et al., 2024; Ferdianto, et al., 2022). Strong numeracy skills help individuals in decision-making, problem-solving, and active participation in society (Nurwalidainismawati et al., 2024). This is in line with the Regulation of the Minister of Education, Culture, Research, and Technology Number 5 of 2022, which emphasizes that students need to have the ability to reason by utilizing mathematical concepts, procedures, facts, and tools to solve problems in various contexts, ranging from the immediate environment to the global context.

Although numeracy has been designated as an essential competency, Indonesian students' numeracy achievements are still relatively low. The 2018 Programme for International Student Assessment (PISA) results placed Indonesia 74th out of 79 countries with a reading score of 371, far below the global average of 487. This condition is reinforced by the 2023 Indonesian Education Report Card, which shows that only 46.67% of elementary/MI students achieved numeracy competencies above the minimum threshold (Ministry of Education, Culture, Research, and Technology, 2023). These findings confirm that numeracy is a national issue that requires serious attention. At the local level, a similar situation was found at SDN Mangaran 04, where out of 30 fifth-grade students, only 9 students

experienced an increase in learning outcomes in the odd semester exam for the 2023/2024 academic year, while the other 21 students experienced a decline. This condition reflects a gap between national education policy direction and student numeracy achievement in the field. Grawe and Vacher (2017, in Maulyda et al., 2021) emphasize that understanding place value, arithmetic operations, and the application of number concepts are key components of numeracy that are often not fully mastered by elementary school students.

The low achievement in numeracy cannot be separated from learning practices in schools, which are still dominated by conventional approaches. The learning process tends to be teacher-centered and one-way, limiting students' active involvement in understanding numeracy concepts. This condition is reinforced by the lack of variety in methods and the use of interactive media, so that student involvement in numeracy learning is still limited (Kusnadi & Azzahra, 2024; Sari et al., 2023; Syarovina et al., 2024). In fact, learning media plays an important role in concretizing abstract concepts, increasing learning motivation, and facilitating student understanding (Yunitasari & Hanifah, 2020). Arsyad (2019) emphasizes that learning media functions as a tool to clarify the delivery of material, increase learning motivation, and facilitate conceptual understanding. In line with this, Government Regulation No. 19 of 2005 emphasizes that learning must be carried out in an inspiring, enjoyable, challenging manner that encourages active student participation. Through two-way interactions in the form of discussions, collaboration, and experiments, students play an active role in learning, thereby improving their understanding of concepts, creativity, and critical thinking (Ginanjar, et al., 2024).

The conditions at SDN Mangaran 04 pose real challenges to numeracy learning. Observations and interviews with fifth-grade teachers show that low student interest in learning and limited interactive learning media are the main factors. Limited infrastructure and internet access also exacerbate this situation, as stated by Sucipto (2024), who mentions that limited infrastructure and internet access are major obstacles in the implementation of technology-based learning, while most teachers still need further training to be able to utilize technology effectively in the learning process. This condition necessitates interactive learning media that are suitable for the limitations of schools and the characteristics of students.

Through the Merdeka Belajar Kampus Merdeka (MBKM) Kampus Mengajar program, researchers had the opportunity to identify numeracy problems directly at SDN Mangaran 04. This program provides space for students to act as teacher partners in developing creative, innovative, and enjoyable learning strategies (Bhoki & Suparmi, 2024). One strategy that is considered to have potential is the use of technology-based learning media, which can increase interest and motivation and have a positive psychological effect on the learning process of students (Halawa et al., 2022). Therefore, educators in elementary schools are advised to integrate technology-based learning media to increase student engagement and understanding of numeracy concepts (Ma'wa & Purwati, 2024).

One interactive learning medium that has the potential to support numeracy learning is Wordwall. Wordwall is an educational application that contains various games, pictures, or diagrams that can be filled with material or questions as evaluation material for students (Kholik & Muthi, 2024). Compared to similar media such as Quizizz, Kahoot, or Liveworksheets, Wordwall is more adaptive because this application provides various attractive templates that are easily accessible to educators, thereby creating a more interactive, interesting, and enjoyable learning process (Ratnasari et al., 2022). These features are in line with the needs of numeracy learning, which requires the gradual and contextual reinforcement of basic concepts. However, at SDN Mangaran 04, technology-based interactive learning media, including Wordwall, have never been utilized in numeracy learning. This condition is influenced by limited supporting facilities and the teachers' lack of competence in integrating technology into mathematics learning, so that numeracy learning is still dominated by conventional methods.

Previous studies have shown the effectiveness of Wordwall in increasing learning interest, but they are still limited to general contexts or non-numeracy subjects (Marlita, Patonah, Ariestanti, & Miyono, 2024). In this study, learning was designed by combining Wordwall media, object manipulation games, and singing activities to identify advanced students, with the aim of increasing active participation, motivation, and understanding of numeracy concepts in a gradual and enjoyable manner.

This study used Classroom Action Research (CAR) to improve the numeracy literacy of fifth-grade students at SDN Mangaran 04 through the application of Wordwall, while also encouraging active involvement and learning motivation among students in numeracy learning.

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2. Method

This study used Classroom Action Research (CAR) with the aim of improving students' numeracy skills through the use of Wordwall-based interactive learning media. The research design was based on the Kemmis and McTaggart model, which was implemented cyclically through four main stages, namely planning, implementation of actions, observation, and reflection. The research was conducted in three stages, including pre-cycle, Cycle I, and Cycle II, as shown in Figure 1.

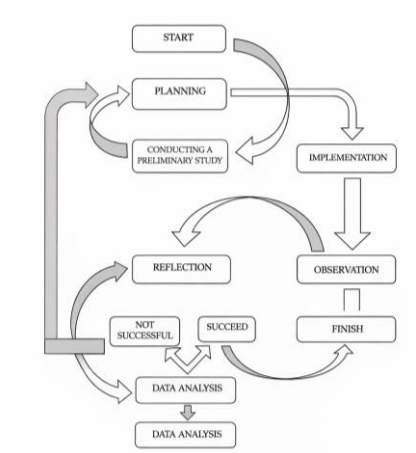

Figure 1 Research Design Flowchart

The Classroom Action Research approach was chosen because it was relevant to the research objective, which was to improve and enhance students' numeracy skills in a gradual and sustainable manner. Through a reflective action cycle, CAR enables researchers to improve learning based on the results of each cycle's evaluation so that improvements in students' numeracy skills can be observed systematically and measurably.

The research subjects were 30 fifth-grade students at SDN Mangaran 04, Ajung District, Jember Regency, with heterogeneous numeracy skills, including low, medium, and high categories. The selection of classes was based on the results of the pre-cycle test, which showed low mastery of numeracy concepts among students. This research was conducted in the even semester of the 2023/2024 academic year.

Data collection techniques included observation, learning outcome tests, and interviews. Observations were conducted using structured observation sheets to observe student activities, levels of engagement in learning, and student interactions with Wordwall media. Learning outcome tests were used to measure students' numeracy skills at each stage of learning, in the form of multiple-choice and essay questions compiled based on numeracy indicators. Semi-structured interviews were conducted with classroom teachers to obtain supporting data related to the implementation of learning and student responses to the use of Wordwall media.

The research procedure began with a pre-cycle, which aimed to identify initial problems through learning observations and initial numeracy tests. In Cycle I, the researcher developed a learning plan that included lesson plans, Wordwall media development, and research instruments, then implemented numeracy learning using Wordwall, conducted observations, and reflected on the results of the actions. Based on the results of the Cycle I reflection, improvements were made to the learning in Cycle II through refinement of the learning strategies and use of Wordwall media, which ended with an evaluation of student learning outcomes.

Data analysis was conducted using descriptive quantitative and qualitative methods. Quantitative data were analyzed by calculating the class average score, the percentage of learning completeness, and the improvement in student learning outcomes between cycles. Qualitative data were analyzed through the stages of data reduction, data presentation, and conclusion drawing to describe the learning process and student responses to the use of Wordwall media. Data validity was strengthened through triangulation techniques by comparing observation, test, and interview data.

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3. Results and Discussion

This classroom action research was conducted at SDN Mangaran 04 with 30 fifth-grade students as subjects. The action was carried out in two cycles with the aim of improving numeracy skills through the application of Wordwall interactive learning media. Research data were obtained through numeracy tests (pre-tests and post-tests), observation sheets, and interviews, then analyzed descriptively, quantitatively, and qualitatively..

CYCLE I

Before the intervention was implemented, students took a numeracy pre-test to assess their initial abilities. The pre-test results showed that students' numeracy skills were still relatively low. Quantitatively, only a small number of students were able to solve numeracy problems correctly.

Table 1. Results of the Numeracy Pre-Test for Fifth Grade Students (Cycle I)

No.	Assessment Aspect	Results
1.	Number of Students	30
2.	Average Score	22
3.	Percentage of Mastery	22%
4.	Students who mastered the material (≥ KKM)	7 Students
5.	Students who did not master the material	23 Students

The low pre-test results indicate that most students have not mastered the measured numeracy indicators. Based on item analysis and observation results, students' errors were mainly apparent in their understanding of the meaning of numbers in the context of story problems, their accuracy in performing basic arithmetic operations, and their ability to use simple reasoning in determining solution strategies. These findings were reinforced by interviews with classroom teachers, who stated that previous mathematics learning was still dominated by lecture methods and the use of textbooks, resulting in relatively low student engagement in the learning process. This condition caused students to tend to be passive, easily bored, and lack opportunities to build a deep understanding of numeracy concepts. The results of observations during Cycle I also showed that students still had difficulty following the learning process and did not show active participation evenly, so it was necessary to improve the learning strategy through the use of more interactive and student-centered media.

CYCLE II

In Cycle II, learning improvements were made by applying Wordwall media in a more structured manner through various quizzes and numeracy games. After the entire series of actions in Cycle II was completed, students were given a numeracy post-test to measure their improvement.

Table 2. Post-Test Results for Grade V Students (Cycle II)

No.	Assessment Aspect	Results
1.	Number of Students	30
2.	Average Score	80
3.	Percentage of Mastery	80%
4.	Students who mastered the material (≥ KKM)	24 Students
5.	Students not yet proficient	6 Students

The post-test results showed a significant improvement compared to the pre-test in Cycle I. The average student score increased from 22 to 80, while the learning completeness percentage increased from 22% to 80%. This improvement indicates that most students have achieved mastery of the specified numeracy indicators. When compared directly, the improvement in student learning outcomes can be seen in Table 3 below.

Table 3. Comparison of Pre-Test and Post-Test Numeracy Results

No.	Aspect	Pre-Test (Cycle I)	Post-Test (Cycle II)
1.	Average Score	30	80
2.	Percentage of Mastery	80	80%

3.	Number of students who mastered the material	80%	24

In addition to quantitative improvements, observations showed positive changes in student learning behavior. Students were more active in asking questions, more confident in giving answers, and better able to work with their peers. The most notable improvements in numeracy indicators included the ability to understand contextual questions, accuracy in performing calculations, and the ability to reason and choose solution strategies.

DISCUSSION

The improvement in students' numeracy skills in Cycle II shows that the use of Wordwall media contributes significantly to learning outcomes. Theoretically, these findings are in line with Bruner's (1966) constructivism theory, which states that learning will be more meaningful when students are actively involved in the process of discovering and constructing knowledge through direct experience. Wordwall provides such learning experiences through game-based activities that require students to think, try, and reflect on their answers directly.

In addition, Wordwall applies gamification principles, such as challenges, instant feedback, and repetition, which can increase student motivation and focus. The immediate feedback provided after students answer questions helps them immediately understand their mistakes and correct their understanding. This is one of the main factors in the increase in numeracy indicator mastery in Cycle II. The findings of this study are also consistent with previous studies that state that Wordwall is effective in improving student learning outcomes and motivation (Fariza et al., 2023; Sukma et al., 2024). However, this study expands on these findings by showing that Wordwall is specifically capable of improving numeracy skills, not just learning motivation, in the context of elementary school students.

Improvements in learning outcomes are not only influenced by media factors, but also by internal and external factors. Internal factors include increased student confidence and interest in learning, while external factors include the role of teachers as facilitators and the variety of learning methods used. The combination of interactive digital media and teacher assistance has proven to be effective in creating student-centered learning.

Thus, the results of this study confirm that the use of Wordwall-based interactive learning media is in line with the principles of 21st-century learning and constructivism and can be an alternative solution to improve the numeracy skills of elementary school students, especially in schools with limited learning facilities. Although the results of the study show significant improvement, this study still has limitations in terms of the number of subjects and the duration of the intervention, so further research in a broader context is needed.

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4. Conclusion

Based on the results of classroom action research conducted at SDN Mangaran 04 on 30 fifth-grade students, it can be concluded that the use of Wordwall interactive learning media has proven effective in improving students' numeracy skills. The results of the study showed a significant improvement, marked by an increase in the average numeracy score of students from 22% in the pre-action to 80% at the end of Cycle II, as well as an increase in the percentage of learning completeness from 22% to 80%. These findings indicate that most students have achieved mastery of the specified numeracy indicators after the application of Wordwall media.

This improvement in numeracy skills was also accompanied by positive changes in students' learning behavior, such as increased activity, courage in expressing answers, and the ability to work together. In short, these findings are in line with the principles of constructivist learning, which emphasize the active involvement of students in building conceptual understanding through meaningful learning experiences.

In practical terms, the results of this study show that Wordwall can be used as an effective alternative learning medium for numeracy learning in elementary schools. Therefore, teachers are advised to integrate Wordwall into numeracy learning in a planned manner, both as a medium for reinforcing concepts and as a formative assessment tool. Schools are also advised to support the sustainability of this medium through teacher training in the use of learning technology and the provision of adequate supporting facilities.

Thus, the use of Wordwall not only has a short-term impact on improving numeracy learning outcomes but also has the potential to become part of a sustainable learning strategy in an effort to improve the quality of mathematics learning in elementary schools.

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