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Implementation of Wordwall-Based Media as an Effort to Improve The Quality of Mathematics Learning in Elementary Schools

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Abstract
According to the Program for International Student Assessment (PISA) 2022 survey, Indonesia ranked 74th out of 79 countries, indicating low educational achievement, particularly in mathematics. This study aims to identify: (1) the implementation of technology in mathematics learning at the elementary level, (2) teachers' ability to utilize technology in the learning process, and (3) the quality of Wordwall-based learning in mathematics instruction. This research employed a qualitative case study approach using interviews, observations, and questionnaires as data collection techniques. The participants consisted of fourth-grade students, homeroom teachers, and the school principal. Data were analyzed inductively through data collection, reduction, and conclusion drawing, with validity ensured through triangulation of techniques, sources, and time. The results indicate that technology-based mathematics learning has been effectively implemented. Teachers are able to use digital media such as animated videos and illustrated PowerPoints, while the use of Wordwall successfully enhances students' enthusiasm and motivation. Consistent use of technology-based media is believed to improve the quality of mathematics learning in elementary schools.
Keywords: *Learning Media, Wordwall, Mathematics Education, Elementary School*

Abstrak
Menurut survei Program for International Student Assessment (PISA) 2022, Indonesia menempati peringkat 74 dari 79 negara, menunjukkan rendahnya capaian pendidikan, khususnya dalam bidang matematika. Penelitian ini bertujuan untuk mengetahui: (1) penerapan teknologi dalam pembelajaran matematika di sekolah dasar, (2) kemampuan guru dalam memanfaatkannya, dan (3) kualitas pembelajaran berbasis Wordwall pada mata pelajaran matematika. Penelitian ini menggunakan pendekatan kualitatif studi kasus dengan teknik wawancara, observasi, dan angket. Subjek penelitian terdiri dari siswa kelas IV, wali kelas, dan kepala sekolah. Analisis data dilakukan secara induktif melalui pengumpulan, reduksi, dan penarikan kesimpulan dengan uji keabsahan triangulasi teknik, sumber, dan waktu. Hasil penelitian menunjukkan bahwa pembelajaran matematika berbasis teknologi telah diterapkan dengan baik. Guru mampu menggunakan media digital seperti video animasi dan PowerPoint bergambar, sedangkan penggunaan Wordwall mampu meningkatkan antusiasme dan motivasi siswa. Penerapan rutin media berbasis teknologi diyakini dapat meningkatkan kualitas pembelajaran matematika di sekolah dasar.
Kata kunci: Media Pembelajaran,Wordwall, Pendidikan Matematika, Siswa Sekolah Dasar

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INTRODUCTION

Technology encompasses all means capable of providing goods necessary for the continuity and comfort of human life (Nuraeni & Anggraeni Dewi, n.d., 2020). This research was conducted because many elementary schools have not been able to optimize the use of technology in education to provide more inclusive learning development and improve student skills, thereby improving the quality and relevance of education in accordance with the demands of the ever-evolving era (Fricticarani 2023). Technology-based learning media is expected to help students better understand the material being taught. It is understood that school is not the only place for learning; therefore, technology-based learning plays an important role in students' educational activities. Some of the benefits of technology in learning include facilitating learning through various features such as animated videos, audio, text, and graphics that can increase student interest in participating in class activities. Usman (2022) explains that one effective way to improve the quality of learning in mathematics is to implement innovative teaching methods, such as the use of technology. Dwi (2020) in his article explains that teachers can utilize platforms such as Canva to design interesting learning materials, and can also include learning videos from YouTube. By implementing technology-based mathematics learning, students tend to be more interested in the subject and will also become familiar with current technological developments.

Learning is anything that conveys information and knowledge through interactions between educators and students (Diah Kurniawati & Sekreningsih Nita, 2018). Learning can also be defined as a purposeful activity carried out by educators to facilitate teaching and learning activities for students (Nasution, 2022). Gulo (2020) defines learning as an effort to create meaningful teaching and learning experiences. In general, learning refers to any activity aimed at creating an effective teaching and learning environment.

Learning quality is an effort to improve the quality of school assessments based on communication, facilities, and infrastructure (Purwanugraha, 2022). Learning quality is also defined as the extent to which learning objectives are achieved in the teaching and learning process (Oktavia Ningsih, 2020). Several indicators of successful learning quality, according to the Ministry of National Education (Depdiknas, 2019), include:

1. Students' physical and non-physical activities
2. Teacher skills in managing the learning process
3. Student learning outcomes and behavioral changes
4. Interaction between learning components such as teachers and students
5. Alignment with predetermined learning objectives
6. Availability of learning media that provide learning experiences to students
7. The presence of a school-based learning system

Therefore, this study was conducted to motivate all teachers to optimize technology-based learning by using engaging wordwall-based applications to improve the quality of learning, especially in elementary school mathematics. Wordwalls are expected to contribute significantly to the quality of learning in elementary schools because the question types available on Wordwalls include essays, multiple-choice questions, matching questions, and categorization questions. Wordwalls can also be used as interactive learning media for teachers when delivering material to students (Husniah & Azka, 2022). Therefore, it is hoped that the Wordwall application will be proven to improve the quality of learning in elementary schools. Furthermore, the use of wordwalls in all...

METHOD

This study uses a qualitative research approach. Qualitative research is a method that involves collecting, analyzing, and interpreting data directly by observing individuals, resulting in data in the form of words and images. According to Dr. Suwartono (2014), a case study is a component of a research method that requires researchers to conduct a more comprehensive, in-depth, and careful analysis of an event or case, whether related to individuals or groups. In the context of this literature review, the researcher aims to explore the topic of case studies as an important aspect of research methodology. This study collected data through interviews, observations, and questionnaires administered to fourth-grade students of SDN Mulur 01 Sukoharjo.

This research was conducted at SDN Mulur 01 Sukoharjo, located in Dondong Village, Mulur District, Bendosari District, Sukoharjo Regency, Central Java 57514. The research was conducted for one week starting in August 2023. The stages included obtaining permits, conducting observations, collecting data, and completing the research process. The object of this research was the fourth grade students of SDN Mulur 01 Sukoharjo. The subjects of this research were the principal, the fourth grade homeroom teacher, and the fourth grade students of SDN Mulur 01 Sukoharjo. The fourth grade consists of 10 students, consisting of 5 boys and 5 girls. The homeroom teacher acts as a source of information regarding mathematics learning activities that have been implemented at the school. The principal provided information regarding the extent to which teachers are able to utilize technology to support the learning process at school.

The data collection techniques used in this study included observation, interviews, and questionnaires. Observation is a data collection technique by monitoring school activities in the research area, namely the classes of SDN Mulur 01 Sukoharjo. Interviews were conducted to obtain information from subjects who could provide concrete data. Interviews were conducted with the principal and the fourth grade homeroom teacher of SDN Mulur 01 Sukoharjo. Questionnaires were distributed to all fourth grade students to determine their level of interest in using the Wordwall application to improve the quality of mathematics learning. This data analysis technique usedData Reduction(Simplification, classification, and removal of unnecessary data to produce more meaningful information)

RESULTS AND DISCUSSION

Application of Technology in Mathematics Learning

SDN Mulur 01 Sukoharjo is an elementary school located in Bendosari District, Sukoharjo Regency, specifically in the Mulur area. Currently, the school has nine teachers led by a female principal. There are many elementary schools in Sukoharjo, some of which have even closed due to a lack of students. According to representatives from the Sukoharjo Regency Education Office, there are 43 public elementary schools and 10 private elementary schools in the area. Therefore, all schools strive to provide quality facilities and infrastructure to attract parents to enroll their children.

This is indeed a major challenge for public schools. They must also be able to provide engaging and high-quality programs. At SDN Mulur 01 Sukoharjo, the principal and teachers have taken the initiative to strengthen literacy and numeracy programs to foster students' interest in reading and critical thinking. These programs have been running for over five years and continue to be implemented. These initiatives have shown positive results—for example, first-grade students can now read fluently, and nearly 97% of students scored above 75, even though the concept of a Minimum Passing Score (KKM) is no longer formally used.

Technology-based learning has been implemented at SDN Mulur 01 Sukoharjo for approximately one year. With the implementation of the Independent Curriculum, which mandates the use of technology in teaching, the school has strived to integrate technology into the learning process. The principal stated that several classes, such as grades 1 and 4, have implemented this curriculum and are equipped with LCD projectors and speakers to support the teaching and learning process. However, the use of technology has not been implemented in all classes due to the limited number of LCD projectors. In classes without permanent equipment, teachers often bring portable projectors to project material onto the whiteboard.

Teachers' Ability to Operate Technology

The government has implemented the Independent Curriculum (Curriculum Merdeka) in all schools in Indonesia, requiring teachers to be proficient in using technology in the learning process. This presents a challenge, especially for teachers in rural areas. SDN Mulur 01 Sukoharjo has adopted the Independent Curriculum and begun integrating technology into the classroom.

Following the change in leadership, the school gradually adapted to technology-based learning. This shift proved effective in increasing student enthusiasm and engagement. Teachers utilized animated educational videos and visually engaging PowerPoint presentations, going beyond textbook-based learning. The principal emphasized that with rapid technological advancements, schools must adapt, and teachers must be trained to use technology effectively in learning.

Currently, SDN Mulur 01 Sukoharjo implements the Merdeka Curriculum and the 2013 Curriculum. The Merdeka Curriculum is implemented in grades 1 and 4, while other grades continue to use the 2013 Curriculum due to its gradual implementation. This curriculum change is expected to improve the quality of education, particularly at the elementary school level.

According to the principal and fourth grade teacher, all teachers are supported to become proficient in using technology in their teaching. Over the past year, all teachers have been able to create attractive presentations using Canva and incorporate animation media into their lessons.

Figure 2. Fourth grade students of SDN Mulur 01 Sukoharjo

This was clearly evident during observations of a fourth-grade class following the Independent Curriculum. This class consisted of 10 students (5 boys and 5 girls). During the observation, the class was learning about numbers up to trillions. These students were adaptable and comfortable using technology. For example, when the teacher presented material using PowerPoint, all students listened attentively and actively engaged in answering critical thinking questions.

Students demonstrated high levels of enthusiasm during the lesson. When given practice, most students were able to answer correctly. Furthermore, they were enthusiastic when questions were presented in the form of games or quizzes with prizes. This reward system was highly effective in increasing student motivation.

Although the scientific learning model is generally used at SDN Mulur 01 Sukoharjo, in this study, the teacher employed a Problem-Based Learning model. At the beginning of the lesson, students were given a problem to solve using the material being taught.

Mr. Nunung, a fourth-grade math teacher, stated that various teaching styles and models have been implemented, including the use of animated videos and group work. Students tend to be more engaged when learning in groups, although they can sometimes become distracted and noisy. So far, no group assignment has completely eliminated this problem.

Currently, all teachers at SDN Mulur 01 Sukoharjo are technologically proficient. They can create engaging PowerPoint presentations using Canva and deliver

lessons using animation. Nearly all learning activities at the school now involve technology. In mathematics, students frequently use various forms of educational technology, recognizing that mathematics is often perceived as a difficult subject. The school has taken proactive steps to change this perception by making mathematics fun and accessible.

Principals and teachers hope that future technological advances will continue to support quality learning. They also hope the government will ensure equitable internet access and provide laptops or computers in all schools so that technology can be used effectively in the classroom.

Improving the Quality of Learning Using Wordwall Media

The research at SDN Mulur 01 Sukoharjo was conducted over a week in a fourth-grade class of five boys and five girls. The topic was mathematics, focusing on integers up to trillions. These students were already familiar with the use of technology through the Independent Curriculum.

In the first session, technology was deliberately not used. Learning relied solely on the whiteboard and the teacher's guide. Despite this, students demonstrated high levels of enthusiasm and attention. When given practice, approximately 50% of students were able to answer correctly and received a score above 80. The other half struggled to find the correct answer.

In subsequent sessions, various technological tools were used, including animated videos, illustrated PowerPoint slides, songs related to integers, and a Wordwall application. The animated videos were used to generate interest in the material, and the Wordwall served as a platform to assess student understanding through interactive quizzes. Some videos even included exercises that students could work on directly. Often, students volunteered to answer questions first, especially if there were prizes.

The students were then divided into two groups of five. Each group participated in a wordwall quiz competition. Each correct answer earned two points. The students were enthusiastic and motivated to participate, especially since prizes were awarded to the group with the highest score.

At the end of the lesson, students sang a song related to the topic of integers. A questionnaire was then distributed to all students to assess the perceived benefits of the Wordwall and other learning materials used in the classroom.

No	Aspect	Strongly agree	Agree	Neutral	Don't agree	Strongly Disagree
1.	Learning with LCD is fun	7	3	-	-	-
2.	Animated videos help me understand the material	5	1	1	-	-
3.	Learning with wordwalls makes me excited	8	2	-	-	-
4.	I really like math lessons	3	3	4	-	-
5.	I understand math lessons better with integer material through wordwall quizzes	7	2	1	-	-

Source: primary processing data

Based on the questionnaire results, all fourth-grade students were more motivated to learn when technology was involved. They also expressed great enjoyment using the Wordwall application for learning. Wordwall proved to be an effective tool for increasing student interest in learning mathematics. Observations in the fourth-grade classrooms showed that technology-based learning, specifically with Wordwall, was an effective solution for increasing student engagement—especially for those who initially had little interest in mathematics. Students were highly enthusiastic, especially when the Wordwall design was visually appealing and age-appropriate. Many students also expressed hope that future mathematics instruction would include more technology-based learning.

CONCLUSION AND SUGGESTIONS

From the results of the distributed questionnaire, all students agreed that the Wordwall quiz game was very enjoyable. They also showed high enthusiasm for the integration of technology in mathematics learning, including the use of LCD projectors, PowerPoint presentations, animated videos, educational songs, and Wordwall-based quizzes. Given the students' enthusiasm for the application of technology in elementary schools, teachers must be able to optimize the use of innovative technology during learning at school. Several conclusions can be drawn:

1. SDN Mulur 01 Sukoharjo has long implemented technology in its teaching and learning process, including the use of PowerPoint and animated videos. Going forward, the principal plans to further improve facilities and infrastructure to maximize learning activities. One proposal is to allow students to use their personal devices during certain lessons to support learning activities.
2. All teachers at SDN Mulur 01 Sukoharjo are now proficient in using technology. The principal has instructed teachers to support each other when facing difficulties. At the very least, every teacher is now able to create and use PowerPoint presentations to aid the classroom learning process. Furthermore, the principal plans to equip each classroom with an LCD projector and provide speakers to encourage more innovative and engaging teaching methods.
3. Based on findings in fourth grade, it was observed that students were more motivated when learning was supported by technology such as LCD projectors and speakers. Furthermore, they showed increased enthusiasm when exposed to visual PowerPoint presentations, animated videos, songs, and quizzes via Wordwall. The use of Wordwall-based quizzes was highly effective in increasing students' enthusiasm for answering questions, compared to traditional paper-based exercises. Students reported feeling more enthusiastic and less bored during math lessons. As a result, all students achieved scores above 80 when assessed using quiz-based exercises via Wordwall.

Given these results, both the principal and the fourth-grade teacher agreed to continue using the Wordwall app for future assessments. They hope that the use of technology can be optimized at SDN Mulur 01 Sukoharjo and bring significant improvements to the overall learning environment. Furthermore, despite its simplicity, the Wordwall app has proven highly effective in engaging students in mathematics and helping them achieve scores above the school's minimum competency standards.

In conclusion, the integration of technology into mathematics education has been shown to significantly improve the quality of teaching and learning in schools.

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