



## The Influence of Wordwall Learning Media on Improving Students' Mathematics Learning Outcomes in Elementary Schools

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### ABSTRACT

Mathematics learning in elementary school faces challenges in improving student outcomes because of the conventional teaching methods. The limited integration of technology in the learning process results in low student engagement and suboptimal conceptual understanding. This study aims to determine the impact of using Wordwall learning media to improve the math learning outcomes of third-grade students. This research uses a quasi-experimental method with instruments in the form of test questions. Data collection techniques were carried out through tests and observations. This research was conducted at one of the elementary schools in the city of Yogyakarta, Indonesia. The research sample involved students in two classes; each class had 30 students. The research findings show that there is a difference in the average learning outcomes between the two classes. The experimental class obtained an average score of 89.60, while the control class achieved an average score of 83.33. The increase in the average score of the experimental class was higher than that of the control class. The results of this study it was found that the significance level of the research results is  $0.013 < 0.05$ . It means that the use of Wordwall learning media affects students' mathematics outcomes.

Keywords: Wordwall, mathematics, learning outcomes

### ABSTRAK

Pembelajaran matematika di sekolah dasar mengalami tantangan dalam meningkatkan hasil belajar karena penggunaan metode pembelajaran yang konvensional. Kurangnya pemanfaatan teknologi dalam pembelajaran dapat menyebabkan keterlibatan siswa yang rendah dan kurangnya pemahaman siswa. Penelitian ini mempunyai tujuan guna mengetahui dampak penggunaan media pembelajaran Wordwall untuk meningkatkan hasil belajar matematika siswa kelas III. Penelitian ini dilaksanakan di salah satu sekolah negeri di Kota Yogyakarta. Sampel penelitian melibatkan siswa dua kelas, tiap-tiap kelas ada 30 siswa. Penelitian ini menggunakan metode eksperimen semu dengan instrumen berupa soal tes. Teknik pengumpulan data dilaksanakan melewati tes dan observasi. Temuan penelitian menampilkan terdapatnya perbedaan rerata hasil belajar antara kedua kelas. Kelas eksperimen memperoleh rata-rata nilai 89.60, sementara kelas kontrol mencapai rerata nilai 83,33. Peningkatan rata-rata nilai kelas eksperimen lebih tinggi dari pada kelas kontrol. Di



sampling itu, hasil uji t menunjukkan t hitung sebesar  $0.013 < 0.05$ . Hal ini menunjukkan bahwa penggunaan media pembelajaran Wordwall berpengaruh secara signifikan terhadap peningkatan hasil belajar matematika.

Kata kunci: Wordwall, matematika, hasil belajar

## INTRODUCTION

Mathematics is not only a subject but also a foundation for forming the characteristics of students who are productive, creative, innovative, and insightful, according to the goals of Indonesian National Education (Widayati, 2022). In line with this statement, Ferlina (2024) stated that the existence of Mathematics in the elementary school curriculum is becoming increasingly important because students need an understanding of mathematical concepts to face real-world challenges and solve various problems they face. Since mathematics involves abstract concepts, concrete objects are necessary to aid understanding, so they can be provided in the form of learning media, which makes students feel easier to learn mathematics (Hakim et al., 2019; Tarigan, 2017; Widodo, 2018). The same opinion, Arifin (2019) expressed something similar that Mathematics should be given to all groups, starting from the elementary school level, to provide students with the skills to think logically, have good analytical skills, be able to work systematically, be able to think creatively and critically and be able to have the workability together. It is intended that students can have the skills to obtain, digest, and utilize all the information obtained to survive for a long time (Yunika, 2023). The teachers of mathematics learning need to teach in an interesting, interactive, and innovative way so that students can be able to active in the learning process, which will ultimately increase their interest and mathematics learning outcome (Wijayanti & Yanto, 2023). From this argument conclude that mathematics learning in elementary schools is an interesting and important subject to develop because, at this stage, students are experiencing growth in their thinking and abilities.

Learning outcomes or achievements are the realization of the development of an individual's potential competencies or capacities (Y. Novianti et al., 2022). A person's mastery of learning outcome can be observed through their behaviour, whether from knowledge acquisition, thinking skill, or motor skill (Syaodih, 2006). According to Sudewiputri & Dharma (2021), it is consistent with the view that poor learning motivation affects student learning results, making the learning process seem less than ideal. Similarly, increased learning motivation leads to improved learning outcomes, according to Isnaeni & Hildayah (2020). Learning outcomes are behavioural changes brought about by the learning process that might subsequently reveal how well students comprehend the presented content (Irawati et al., 2021). Based on these perspectives, learning outcomes are the manifestation of an individual's competency development, observable through behaviour, where motivation plays a crucial role in determining results, as higher motivation leads to improved learning outcomes and reflects the extent of students' understanding of the given material.

Several studies have found low mathematics learning outcomes (Nabillah & Abadi, 2020). Novianti (2020) found that the average value of mathematics learning outcomes in Ende 11 Elementary School for classes III, IV, and V is still low, at 60, compared with other subjects. The

research conducted by Ananda (2018) shows that the average daily test score of fourth-grade students at Langgeni Bangkinang Kota Elementary School is 55; this score has not yet met the minimum competency standard set for mathematics, which is 65. In line with this, the research conducted by Pujiarti (2024) at Dompus 3 Elementary School shows that students' mathematics learning outcomes in arithmetic operations are low, with an average class core of 49. The low achievement in students' mathematics learning outcomes can be attributed to their weak understanding of mathematical concepts, as learning mathematics holds little meaning for them (Su'udiah, 2019). The use of learning media can be an alternative for teachers in teaching. Media makes students feel more excited during lessons and can help students better understand the materials provided by the teacher and improve their learning outcomes (Ningrum et al., 2023; Safitri & Koeswanti, 2021; Verawati et al., 2022). Elementary school students need learning media assistance to support their learning process, enabling them to understand and absorb the information from the teacher more quickly (Novitasari et al., 2023; Widodo et al., 2025). Based on the statements above, we can conclude that mathematics learning outcomes in elementary school are still low. According to several researchers, learning media can be used to resolve this issue.

The term learning media has various definitions. One of them is the opinion of Nurrita (2018), who states that learning media is a tool used by teachers when teaching that has a function as a support for learning activities conducted by a teacher. The use of media in the classroom is a classroom management skill, a part of the learning conditioning framework, and an element of pedagogical competence, which is a key teacher competence (Susanto & Rozali, 2022). It is strongly advised that media be used in education for teachers to convey learning to students, especially those who do not yet understand the material (Simanjuntak et al., 2019). Learning media can be divided into three categories, namely, audio media that only present sound, visual media that present still images, and audiovisual media that present sound and images at the same time (Pandu et al., 2021; Widodo, 2020). Learning media and various other tools are used to support the learning process, making it more interactive and interesting for students (Raras, 2018). From the many opinions expressed by the experts above, the media is an essential supporting component in providing information to students. With the media, teaching can be done better and easier for students to understand. The focus of the learning media in this research is audiovisual media because this media presents sound and images at the same time.

One way to organize interesting learning, interactive, and innovative learning is by utilising technology (Aisyah et al., 2025). One of the developments in the area of education is the use of technology as a teaching aid or learning media (Nugroho et al., 2021). Teachers must employ ICT-based media in their lessons as a result of this policy (Tjahjono et al., 2020). Wordwall is one of the interactive technology-based educational resources and learning media (Putri & Hamimah, 2023). The website (<https://wordwall.net/create/picktemplate>) allows us to rapidly and directly utilise this application. In the modern day, Wordwall media is an interactive tool that helps make learning more imaginative and creative (Nisa & Susanto, 2022). The program, which is shown as games and quizzes, is meant to serve as a fun evaluation tool, media, and learning resource, particularly for students (Ma'rifah & Mawardi, 2022). The use of Wordwall can be easily accessed by students via

gadgets or centrally using the teacher's laptop. This media allows students to compete to achieve the best champion or grade so that student motivation can continue to increase (Lestari, 2021). The advantages of Wordwalls include being easily accessible, plus the presence of features that attract students' attention, facilitating students' comprehension of the instructional content to prevent boredom (Pradani, 2022). Wordwall is a website that offers a variety of educational games designed to help students have fun and assess their learning. In order to entice educators or students to access the media, the Wordwall display is made to blend colours, sounds, and pictures. With a reliable internet connection, Wordwall material may be accessible at any time and from any location. The following are some advantages of using Wordwall media in the classroom: 1) developing the idea of learning while playing, 2) increasing students' enthusiasm in studying, 3) making it simple for students to use, 4) encouraging a feeling of fun in learning, 5) encouraging creativity in students, 6) enhancing memory, and 7) being appropriate for acquiring mathematical literacy (Maghfiroh, 2018). According to the opinions, Wordwall enhances learning by making interactive learning accessible and boosting motivation. Among the various Wordwall templates, activities like quizzes, matching games, and ranking tasks are most suitable for improving learning outcomes, as they encourage active participation and engagingly reinforce understanding.

The usage of Wordwall media in primary schools has been studied by several earlier academics. Gandasari & Pramudiani's (2021) study found that the Wordwall application had an impact on the science students' desire to learn at SDN Bojong Rawalumbu VI. Next are the findings of a study conducted by (Imanulhaq & Prastowo, 2022), which found that using Wordwall education game media to teach mathematics to students in grade II was able to boost their enthusiasm to learn. Savira & Gunawan (2022) also found similar findings, indicating that Wordwall application media had an impact on IV-grade scientific learning outcomes. Rachmawati et al., (2020) also proved that the Wordwall learning media can enhance problem-solving skills. In line with the research findings of Fidian (2023), the use of interactive learning media Wordwall can improve social study learning outcomes.

From this study, it can be concluded that Wordwall learning media positively impact students' motivation, learning outcomes, and problem-solving skills in various subjects. However, there is still limited research that specifically examines the effect of Wordwall media on elementary school students' mathematics learning outcomes. Therefore, this study aims to fill this gap by investigating the effects of using Wordwall media on mathematics learning outcomes in elementary school. This research is essential because mathematics is often considered a challenging subject for elementary school students. By identifying an effective method, such as using Wordwall, it is expected that students' learning outcomes will improve while making the learning process more engaging and interactive. Based on this background, the research question arises: Does the use of Wordwall learning media affect the improvement of elementary school students' mathematics learning outcomes? To answer this question, this study aims to examine the influence of Wordwall learning media on improving students' mathematics learning outcomes in elementary school.

## **METHOD**

### **Research Design**

The method used in this study is a quantitative experiment with a quasi-experimental design type, a posttest-only control group design. This study employed a quasi-experimental design. The data collection methods used were test and observation. Prerequisites are a test of data balance, homogeneity and normality test. The research step included observing mathematics learning activities in the third-grade at Ungaran 1 Elementary School, preparing research proposals and test instruments, coordinating with the principal and teachers, compiling teaching modules and learning designs, conducting a pretest, conducting treatment of experimental and control group classes, administering a posttest, and analyzing and summarizing the research findings. Two class groups participated in this study: the experimental group and the control group. While the control group was instructed using conventional techniques or picture-based media, the experimental group was treated using Wordwall as a learning tool. A pretest and posttest were administered to both groups; however, the experimental group did not receive the therapy (Sugiyono, 2014).

### **Research Participants**

The population used in this study were students in third grade at Ungaran 1 Elementary School in the 2024/2025 academic year. The research sample involved students in grades III-A and III-D; each class had 30 students. The control group is the III-A class, and the experimental group is the III-D class. The control group used conventional picture-based media, and the experimental group utilized Wordwall as a learning tool. These classes were selected based on their similar basic mathematics abilities using a purposive sampling technique and had an equal number of participants in each class. The study was conducted voluntarily with prior coordination and approval from the school authorities. The research location was chosen because Ungaran 1 Elementary School is directly related to a research problem, providing relevant data that supports the study's objective, and provides a suitable learning environment for this study.

### **Instrument**

The data collected in this study include students' mathematical ability test results and observational data recorded during the learning process. The data collection method involved tests and observation. The test consists of pretest and posttest questions designed to measure students' mathematical abilities, while observations were conducted to document students' learning activities throughout the research.

### **Data Analysis**

The data analysis techniques used in this study included normality and homogeneity tests as prerequisites before conducting the main analysis. The Independent Sample T-test was employed to evaluate the effect of the Wordwall learning medium on students' mathematics learning outcomes. Data analysis was performed using SPSS software to ensure accuracy and reliability.

## Hypothesis

A hypothesis is a provisional response or presumption that requires verification (Sugiyono, 2014). The hypotheses tested in this study are the null hypothesis ( $H_0$ ) that the use of Wordwall learning media does not affect students' mathematics learning outcomes and the alternative hypothesis ( $H_1$ ), which states that the use of Wordwall learning media affects students' mathematics learning outcomes. This hypothesis is derived from previous research and theoretical frameworks suggesting that interactive learning media can influence students' academic performance. This study aims to validate this assumption through empirical data collection and statistical analysis. To test this hypothesis, an independent sample t-test was conducted using SPSS. This test was chosen to compare the mean mathematics learning outcomes between two independent groups: students who used Wordwall learning media and does who did not. The analysis aimed to determine whether there was a statistically significant difference in the learning outcomes between the two groups. By using this method, the study sought to assess the effectiveness of Wordwall as an interactive learning tool in enhancing students' mathematics outcomes.

## RESULTS AND DISCUSSION

Before conducting the treatment, a pretest was administered to both the experimental and control groups to assess their initial mathematics abilities. The first data from the experimental and control classes demonstrate the third-grade students' learning results in mathematics before treatment. Wordwall was used as a learning tool for the experimental class, whereas traditional learning with just visual aids was used for the control group. The pretest result indicated that the scores in both groups were relatively similar, suggesting that students in both groups had comparable mathematical abilities before the intervention. The equivalence of these groups was further tested through an equivalence test, which confirmed that both groups were statistically equivalent before treatment. The result of the pretest of third-grade students' learning mathematics outcomes is shown in Table 1.

Table 1. Pretest third-grade students' learning mathematics outcomes

Description	Experimental Group	Control Group
Mean	79.3333	78.8333
Std. Deviation	12.50747	12.77682
Minimum	60.00	55.00
Maximum	100.00	100.00

Table 1 indicates that the pretest score for the experimental class in mathematics was 79,33 with a high score of 100 and a lowest score of 60. Meanwhile, the control class had an average score of 78.83, with a highest score of 100 and a lowest score of 55. The experimental class received mathematics instruction using Wordwall as a learning medium, whereas the control class utilised conventional methods with visual media. Four sessions were held to provide the Wordwall therapy to the experimental class. After that, the researcher takes the post-test score. The posttest of mathematics learning outcomes is shown in Table 2.

**Table 2. Post-test third-grade students' learning mathematics outcomes**

Description	Experimental Group	Control Group
Mean	89.6000	83.7333
Std. Deviation	7.14443	10.26522
Minimum	75.00	63.00
Maximum	100.00	100.00

Following the intervention, a posttest was conducted to evaluate the impact of the Wordwall learning media. The experimental class (III-D), which was treated with Wordwall as a learning medium, achieved an average post-test score of 89.60. The highest score of this class is 100, and the lowest score is 75. With a lower minimum score of 63 and the same maximum score of 100, the control class (III-A) achieved an average score of 83.33. The posttest result showed that the experimental group achieved a higher mean score compared to the control group. That shows a positive impact of the Wordwall learning media on students' mathematics performance. This improvement highlights the effectiveness of interactive learning tools in enhancing student engagement and understanding.

The data in this study were analysed through several stages of pre-requisite tests, including normality and homogeneity tests. To ascertain if the data has a regularly distributed distribution, a normality test was performed. Both before and after treatment, this normalcy test is carried out. This study's Shapiro-Wilk normality test has a significance level of 0.05. This indicates that if the normality test's significance level is greater than 0.05, the data is regarded as regularly distributed. The findings of this study's normality test demonstrate that the data are normally distributed because the significance value is higher than 0.05. Table 3 displays the results of the normalcy test.

**Table 3. Normality Test**

Group	Kolmogorov-Smirnov			Shapiro Wilk		
	Statistics	df	Sig.	Statistics	Df	Sig.
Pre-test_Experiment	.139	30	.145	.938	30	.080
Post-test_Experiment	.166	30	.034	.935	30	.066
Pre-test_Control	.151	30	.078	.948	30	.153
Post-test_Control	.129	30	.200*	.950	30	.172

Finding out whether the data is homogeneous or not is the goal of the homogeneity test. The homogeneity test in this investigation has a significance level of 5%, or 0.05. Therefore, the study data is homogenous if the significance level is greater than 0.05. It is possible to infer that the data in this research are homogeneous since the results of the homogeneity test have a significance level greater than 0.05. Table 4 displays the findings from the homogeneity test.

**Table 4. Homogeneity Test**

Description	Levene Statistics	df1	df2	Sig.
Based on Mean	.003	1	58	.957
Based on Median	.008	1	58	.930
Based on Median and with adjusted df	.008	1	55,593	.930
Based on the trimmed mean	.003	1	58	.956

This study uses the t-test (independent sample test) with SPSS version 26 analysis to test the hypothesis. The hypothesis testing can be done after the data through the pre-requisite tests: equality, homogeneity, and normality tests. The hypothesis in this study is the initial hypothesis or  $H_0$ : There is no effect of the use of Wordwall learning media on students' Mathematics outcomes. The final hypothesis or  $H_1$ : There is an effect of the use of Wordwall learning media on students' mathematics outcomes. The significance level of the hypothesis test in this study is 0.05. The decision of the hypothesis test states that  $H_0$  is rejected if the data significance level is less than 0.05. It means that the use of Wordwall learning media affects students' mathematics outcomes. The results of the hypothesis test in this study are shown in Table 5.

Table 5. Hypothesis Testing

Description							Std. Error
	F	Sig.	t	df	Sig.	Mean Diff.	Diff.
Equal variances assumed	6.190	.016	2,569	58	.013	5.867	2.283
Equal variances not assumed			2,569	51,756	.013	5.867	2.283

Based on the independent sample t-test, to test the hypothesis, the result of the significance level is 0.013. From these results, it was found that the significance level of the research results is  $0.013 < 0.05$ . It means that  $H_0$  is rejected and  $H_1$  is accepted. So, the use of Wordwall learning media affects students' mathematics outcomes.

The results of the study are similar to Siagian (2023), who discovered a significant impact of using Wordwall learning media to enhance the mathematics performance of fourth-grade students, as evidenced by and get improvement in post-test scores compared to the pretest result. Rahmadanti (2024) also found in the study, it was found that Wordwall learning media positively affected the mathematics outcomes of four grade students at Cigombong 02 State Elementary School. The results of Sukma's research (2022) show that the use of interactive media, especially Wordwall quizzes, positively influences student learning outcomes. Students who used this interactive Wordwall quiz performed better than those who experienced conventional learning methods or did not use media.

Based on observations, it was found that the process of learning mathematics with Wordwall learning media makes students more engaged and interested in participating in the lesson. The diverse Wordwall media templates make children excited about working on math problems. Mathematics, which was previously considered difficult, has become more fun because it is a package of interactive games and learning. These findings can be further analysed through the lens of constructivist learning theory, which emphasises active student engagement in knowledge construction. The interactive nature of Wordwall quizzes fosters active participation, enabling students to develop a deeper understanding of mathematical concepts. Additionally, the study supports the principle of gamification in education, where game-based elements such as immediate feedback, competition, and rewards enhance motivation and learning outcomes. By integrating these

broader educational theories, the study highlights the pedagogical benefits of interactive digital tools in improving mathematics achievement.

## CONCLUSION

The results of this study that passed the analysis test, it was concluded that the class that was treated using Wordwall learning media got better results than the class that was not treated with Wordwall media. This can be observed from the student's learning outcomes. The two groups' average learning results vary from one another. The experimental class (III-D) had an average posttest score of 89.60 after using Wordwall as a learning tool. The control class (III-A) had an average score of 83.33 in contrast. The experimental class's average score increased more than that of the control group. This suggests that educators should consider integrating Wordwall into their teaching strategies to enhance student performance. In addition, based on observations, students who were treated with Wordwall learning media were more active and had increased interaction. Wordwall is best suited for teaching mathematical concepts that require visual interaction, repetitive practice, and educational games.

The result of the test using an independent sample test also indicated that the use of Wordwall learning media enhanced the mathematics learning outcomes of the third-grade students at Ungaran 1 Elementary School of Yogyakarta. However, this study has certain limitations. The research was conducted in a single school in Indonesia, which may limit the generalizability of the findings. Additionally, the sample size was relatively small (N= 60), which suggests that further studies with a larger and more diverse sample are needed to validate these results.

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