Utilization of Wordwall in Formative Assessment to Improve Students' Learning Outcomes in Physics Subjects

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Abstract

In the era of modern education, the use of digital platforms can be designed to facilitate inter-active learning and formative assessment. This study aims to examine the use of the wordwall platform in formative assessment to determine the level of learning outcomes in physics sub-jects. The scope of the study includes the application of digital-based formative assessment on the topic of measurement in class X. The study applies a quantitative method with a quasi-experimental approach using the Post-test Only Control Group design. The study population consisted of all 210 class X students at SMA Negeri 1 Selakau. The sample taken was 70 stu-dents consisting of two groups: 35 students from class XD as the control group and 35 students from class XE as the experimental group. The data were analyzed using parametric statistical tests to identify significant differences between the post-test results of the control group and the experimental group, which were assessed through multiple-choice questions. The results showed a significance value (2-tailed) of 0.00, which is smaller than 0.05, so there is a signifi-cant influence in the use of Wordwall media compared to Google Form. This finding identifies that Wordwall can be an effective formative assessment media in improving student learning outcomes, especially in physics subjects. Therefore, the use of Wordwall as a formative assess-ment media can be considered not only for physics subjects, but also for other subjects, in order to support a more interactive and efficient formative assessment process.

Keywords: formative assessment; physics; learning outcomes; wordwall

INTRODUCTION

In the world of education, technology makes the educational process easier.(Mulyani F & Haliza N, 2021). In today's era, technology and learning media are almost inseparable from everyday life. Technology plays an important role in influencing various human activities, actions, and behaviors. In addition, technology is also able to change patterns of relationships and interactions between individuals. As a learning medium, technology can be utilized effectively by students in the modern era(Zahwa & Syafi'i, 2022).

Along with technological advances, teachers continue to innovate in utilizing and developing learning methods. This innovation is applied from planning, implementation, to evaluation of learning. To help students develop critical, creative, communicative and collaborative thinking skills, the role of creative and innovative teachers is very much needed in creating an interesting and enjoyable learning process.(Noermanzah & Friantary, 2019). To make learning more meaningful for students, teachers must have the necessary technological knowledge and skills to deliver the subject matter to students.(Firmansyah, 2019).

Media is a communication tool used by teachers in learning, designed in such a way that it supports learning activities.(Saleh & Syahruddin, 2023). Learning media as a means to support the learning process or a tool to deliver learning more quickly and effectively. Learning media as a teacher's tool to deliver learning materials so that students are interested in the material delivered.(Wulandari et al., 2023). Effectively designed learning media can be a very valuable tool for students in constructing an understanding of the subject matter. Therefore, teachers have an important role in selecting, designing, and developing learning media that are relevant and in accordance with the characteristics and learning needs of students.(Pulungan, 2021).

Assessment plays an important role in helping teachers identify the strengths and weaknesses experienced by students during the learning process. The better the quality of the assessment carried out, the more effective the students' understanding of the material that has been learned. Information obtained from formative assessments provides guidance for teachers to make the right decisions in designing more effective learning strategies. In implementing evaluations, several things that must be considered are that evaluations must be integrated into the learning process, evaluations must be carried out flexibly, evaluations must be fair, proportional, and valid; evaluations must be easy to understand and informative; and evaluation results must be useful for improving the quality of learning.(Arifin. Z, 2013; Fernandez et al., 2024; Mujiburrahman, et al., 2023). These principles are in line with the main purpose of assessment, to collect accurate information about students' progress in learning. The broader purpose is to find out how effective the learning that has been implemented is so that an idea can be obtained about the follow-up actions to be taken.(Munaroh, 2024).

According to Ramadhani (2021), the implementation of formative tests can improve various aspects of student learning outcomes, especially in terms of understanding and mastery of concepts. Formative assessment has many benefits in the learning process because it focuses on providing ongoing feedback to support student learning development. Here are some important benefits of formative assessment, namely planning differentiated learning (initial formative), and improving the quality of learning (process formative). Formative assessment is not used for report card assessments, class promotions, or graduation. Formative tests used in physics learning for various topics of material taught can be integrated with the web. Utilizing digital technology is one way for teachers to conduct evaluations in high schools. One example is the wordwall application. Because this application is interactive. Wordwall can help students become more active during assessments(Qiftiyah et al., 2024). The advantage of wordwall is that it provides various types of games, so it seems fun for students. Teachers can change questions into quizzes, arrange words, pair words, and so on.(Lestari et al.,, 2023;Triaswariet al., 2023).

Wordwall applications can be used at all levels of education, even in high schools. An additional benefit of this application for assessment is that students become more interested in learning. (Etika Sari et al., 2023; Herta et al., 2023; Mujahidin et al., 2021). This happens because the wordwall feature fosters curiosity and student engagement. A way to measure the level of success in learning by conducting assessments, fun evaluations allow students to improve their abilities so that their learning outcomes increase.

In the learning process, technology is used in the learning process, so it becomes one of the important factors in the implementation of the independent curriculum, especially in assessment. Teachers as facilitators in learning should be aware of the importance of using technology. Based on the explanation above, this study aims to carry out formative assessments by utilizing the Wordwall application, with the hope of having a positive impact on improving student learning outcomes.

RESEARCH METHODS

This study uses a quantitative approach with an experimental method, specifically a quasi-experimental design of the Post-test Only Control Group type. In the quasi-experimental method, there are two class groups involved, namely the experimental group and the control group. The experimental group received formative assessment with an interactive wordwall quiz during learning, while the control group only used google forms when the formative assessment was carried out.

The quasi-experimental research design of the Post-test only control group type can be seen in Table 1.

Table 1. Research Model

Group	Treatment	Post test
Experimental Group	X	Q1
Control Group	–	Q2

Information:
Q1   : Post-test on experimental group
Q2   : Postt-test on control group
X   : The treatment given, namely the use of wordwall quiz media
–   : No treatment was given using wordwall quiz media

This study took place at SMA Negeri 1 Selakau involving grade X students in the odd semester of the 2024/2025 academic year. The population in this study includes all individuals, cases, or objects whose results will be generalized (Swarjana & SKM, 2022). The subjects studied consisted of all grade X students at SMA Negeri 1 Selakau, divided into six classes with a total of 200 students. Meanwhile, the sample is an individual, object, or other element selected through the sampling method (Swarjana & SKM, 2022). In this study, the number of students used as samples was 70 people, taken from two classes, namely class XD as the control group and class XE as the experimental group.

This study used multiple-choice questions as an instrument to measure student learning outcomes after using Wordwall. Data were collected through a post-test conducted at the end of each lesson. This study consisted of three main stages, namely the initial stage is preparation such as observation, making a learning plan, and developing research instruments. In the implementation stage, the experimental class was given treatment in the form of an interactive Wordwall quiz, while the control class used Google Forms. The final stage involves data analysis to test the research hypothesis.

The hypothesis in this study is as follows: The null hypothesis (H0) states that there is no significant relationship between the use of interactive Wordwall quiz media and the improvement of physics students' learning outcomes. Conversely, the alternative hypothesis (H1) argues that there is a significant relationship between the use of Wordwall quiz media and

the improvement of students' learning outcomes in physics subjects. This hypothesis, as explained by(Yam & Taufik, 2021), is a temporary assumption which is the starting point and guide in this research.

RESULT AND DISCUSSION

The research data obtained from the formative assessment for the experimental group and the control group are described in Table 2;

Table 2. Data Description

	Experimental Group Learning Outcomes	Control Group Learning Outcomes
N	35	35
Mean	76..57	42.71
Median	75.00	40.00
Mode	76.90	42.46
Std. Deviation	10,966	13,358
Minimum	50	20
Maximum	95	70

Based on the data in Table 2, there is a significant difference in physics learning outcomes between the experimental class and the control class. The average value obtained by the experimental class reached 76.57, while the control class was only 42.71. For the median value, the experimental class recorded a figure of 75.00, while the control class was at 40.00. In addition, the mode value of the experimental class was recorded at 76.90, while for the control class it was 42.46. In terms of standard deviation, the experimental class had a value of 10.966, while the control class had a value of 13.358. The lowest value obtained by students in the experimental class was 50, while in the control class it was 20. On the other hand, the highest value achieved by the experimental class reached 95, while the control class got the highest value of 70.

Next, a prerequisite analysis test is carried out, namely the normality test.and homogeneity test.

Table 3. Results of Normality Test Calculation

no	Group	α	N	Count	LTable	Criteria	Description
1	Experimental Class	0.05	35	0.291	0.150	L0 < Lt	Normally Distributed
2	Control Class	0.05	35	0.316	0.150		

Based on table 3, normality testing was carried out using the Liliefors test.. In this test, the criteria used are LCount < Ltable, which means that the data is normally distributed. In the experimental and control classes, the number of students in each class is 35 people and the test uses a significance level of α = 0.05. The Ltable value is 0.150. Based on data processing, the LCount for the experimental class is 0.291 and for the control class is 0.316. For both LCount values, it is greater than LTable, so it can be concluded that the data is normally distributed.

Afternormally distributed data, followed by a homogeneity test to determine whether the two samples come from the same population. The F test is used to compare the variances of two groups of data and test whether the two variances are homogeneous. The criteria for the homogeneity test are FCount < Ftable The results of the homogeneity test calculation are in table 4.

Table 4. Results of Homogeneity Test Calculation

No	Group	N	FCount	Ftable	Criteria	Description
1	Experimental Class	35	1,449	1.78	FCount <	Homogeneous
2	Control Class	35			Ftable	

From table 4, we get FCount= 1.449 and Ftable = 1.78 at the degrees of freedom (dk) of the numerator (n1 – 1) = 35 – 1 = 34 and the degrees of freedom (dk) of the denominator are the same (n2 – 1) = 35 – 1 = 34 with a significance level of 0.05. Because FCount < Ftable, namely 1.449 < 1.78, it can be concluded that the two groups of data above have a homogeneous population.

The analysis requirement test shows that the population of the experimental class and the control class are normally distributed and homogeneous. Furthermore, a hypothesis test was carried out using the t-test. The t-test was carried out to determine whether there was a significant difference between the experimental class and the control class. The results of the hypothesis test using the t-test are presented in table 5.

Table 5. Hypothesis Test Results

Group	N	Sig 2-tailed	Mean	Std Deviation	Criteria	Description
Experimental Class	35	0,000	76.57	10,966	Sig 2-tailed < 0.05	H1 accepted
Control Class	35		42.71	13,358		

Based on the data results in table 5 for the independent sample T-Test, the sig.(2-tailed) value was obtained < 0.05.meaning H0 is rejected and H1 is accepted which shows that there is a significant influence. It can be concluded that there is an influence of the use of interactive wordwall media, rather than using google form media on physics learning outcomes at SMA Negeri 1 Selakau. The results of this study are in accordance with previous research conducted byAgusti & Aslam, (2022), which states that the use of basic wordwall application learning media has a significant effect on the results of school science learning. This is further strengthened by research conducted by(Khofifah Indra Sukma & Trisni Handayani, 2022)that the use of interactive media based on word walls has a positive impact on student learning outcomes.

The results of the study, the increase in learning outcomes occurred by chance, but because they received different treatments applied to both classes, namely the experimental class using wordwall media during the assessment and the control class was assessed using Google Form. Students who were given formative assessment using wordwall looked more active and challenged to complete all questions correctly and quickly, they needed recognition that their efforts to learn were assessed directly. By using the features available on the wordwall, it can fulfill students' desires.The presence of challenges, points, and assessment results that are displayed directly, increases motivation to learn, and ultimately results in improved learning outcomes.

Research on the use of wordwalls in formative assessment is considered to have an effect on student learning outcomes and make the assessment process interesting and challenging for students. When formative assessments are carried out, students try to get as many points as possible and do it as quickly as possible correctly, they want to get the best grades.Hopefully this research will provide benefits in the form of providing various assessments that can be used as material for teachers to conduct assessments for students.

CONCLUSIONS

From the results of the observations that have been carried out, the Wordwall media applied in the classroom as a formative assessment showed better values compared to classes that only used Google Form. During the assessment in the experimental class that used Wordwall, students were actively involved, tried to get points, and solved the questions quickly and correctly. In contrast, in the control class that did not use Wordwall in the formative assessment and only used Google Form, students seemed less motivated to achieve higher

scores and could not immediately see the ranking of the results they obtained after taking the formative assessment. Thus, it can be concluded that the use of Wordwall media in formative assessment has the potential to improve student learning outcomes in Physics at SMA Negeri 1 Selakau.

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