



WORDWALL QUIZ ASSESSMENT ON GLOBAL WARMING IMPACTS ON STUDENT LEARNING ACTIVITIES AND OUTCOMES

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Abstracts. Physics learning is a learning process that contains elements of interest and involves scientific information and the environment. The application of the Wordwall quiz assessment on the subject of global warming in class X-1 students at SMA Negeri 5 Jember has the objectives of (1) increasing student learning activities after applying the Wordwall quiz assessment and (2) improving student learning outcomes after applying the Wordwall quiz assessment. The type of research used is classroom action research with the Kemmis and McTaggart model. The research subjects were X-1 class students with a total of 36 people. Data collection techniques used questionnaires, tests, interviews, observations, and documentation. Data on student learning activities in cycle I obtained an average value of 72.86. Based on the results in cycle I, improvements were made in cycle II with an average student score of 75.39. Data on student learning outcomes in cycle I obtained a percentage of 58%. The learning outcomes obtained in cycle II were 94%. Based on the results of the study, it was found that the activity and learning outcomes of students increased with the application of the Wordwall quiz assessment in the classroom. The implication of this study is that the use of the Quiz Wordwall assessment on the topic of global warming can increase student engagement, which has a positive impact on their learning activities and outcomes. This supports the integration of interactive technology in the science learning process.

Keywords: global warming, learning activities, learning outcomes, wordwall

INTRODUCTION

Physics learning is a learning process that contains elements of interest and involves scientific information and the environment (Jufriadi et al., 2022; Wati et al., 2023). Physics learning is also defined as learning based on pedagogical social interaction between teachers and students with the aim of understanding physics concepts and natural phenomena (Bertiarso et al., 2023).

At the beginning of the research, interviews and observations were conducted in class X-1 and also to the teaching teacher and several students before and after the implementation of physics learning in class. The results of the interview found that student learning outcomes in physics learning were still low. Students find it difficult to understand physics concepts and are unable to answer some physics questions correctly. Some students do not like the assessment process at the end of learning because they only answer questions without knowing which answer is correct. Students tend to get bored with physics learning in class, which is less interesting. The results of student learning activities tend to be passive and do not focus on learning, so they do not listen to the material presented by the teacher while in class. Based on observations made, student learning activities are still lacking, and

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students tend to be uninterested in learning physics. In addition to the interview results, which show that students have difficulty understanding physics concepts and are unable to answer some questions correctly, this is also reinforced by the results of Pradana & Wahyuni's research (2023), which shows that more than 60% of students have difficulty understanding physics material due to the limitations of interactive learning media. In addition, a study by Utami et al., (2022) in the Indonesian Journal of Physics Education SINTA 2 confirms that conventional-based learning has a significant impact on low concept understanding and student learning outcomes.

Learning activities also include all forms of action, both physical and cognitive. Learning activities are learning activities that refer to the steps taken by teachers and students in the process of interaction in the classroom with the aim of acquiring new knowledge and skills, both cognitive, affective, and psychomotor in nature. To influence student engagement and learning outcomes in the classroom, it is very important to provide learning activities that encourage interaction between teachers and students during the teaching and learning process (Salisanti et al., 2024). Interaction between teachers and students can go well by applying the right learning model and involving interactive learning media. Some studies show that there is an influence between learning activities and student learning outcomes, namely in student learning activities when participating in the learning process where many student activities are still crowded, talking to their friends, so they do not focus on listening to the teacher when explaining this affects student learning outcomes (Bhoko et al.; Fatmawati, 2023; Pratiwi et al., 2023).

Learning outcomes are closely related to the ability to obtain the desired learning targets. The main obligation of an educator in teaching and learning activities is to create tools that can collect data on how students achieve learning objectives (Jundu, 2020). Learning outcomes refer to the steps taken to evaluate students' educational values, which include tests and non-tests to find out how well students' learning activities and results are in class (Simaremare, 2021). According to Wahab in Hidayatullah (2022), the factors that influence learning outcomes include internal factors, which include physiological and psychological components. The physiological aspect relates to how the body does its work, while the psychological aspect relates to how intelligent, motivated, interested, and talented the student is. On the other hand, there are two types of external factors: social and non-social. The natural environment and the resources available to a person are examples of the non-social environment, while the community, family, and school are examples of the social environment.

Assessment is a tool used in assessment in the learning process. Assessment is used to determine how effective learning is, which includes cognitive, affective, and psychomotor aspects of students either in groups or individually. There are two ways to assess the assessment itself, namely the test and non-test system. Tests consist of four categories, namely descriptive, objective, oral, and action tests. There are also several types of non-tests, such as observation, research, attitude measurement, and so on (Hamidah & Wulandari, 2021). An online assessment that is interesting, effective, and interactive is one of the functions of the Wordwall web application.

Wordwall is a web-based digital platform that allows teachers and educators to create various interactive and engaging activities for learning, such as quizzes, educational games, and other activities that can increase student engagement. Teachers can design fun learning media in the classroom. One of the learning media is Wordwall, which contains many templates that can be created by teachers. In addition, Wordwall also provides five basic template options that are free of charge. This Wordwall quiz can be sent to various online applications or online learning

applications such as WhatsApp, Google Classroom, e-mail, and so on. One of the benefits of this quiz is that it can be printed in PDF, so it is easier for students to access it. Previous research that has been conducted with the help of word wall quiz game media with global warming material was conducted by Anisa (2022) with the title The effectiveness of the TGT learning model assisted by wordwall educational games on global warming material on the activities and learning outcomes of junior high school students. One of the main advantages of this wordwall is that the platform is presented thoroughly and provides direct access during learning, and can be used directly when creating new learning games (Miftah & Lamasitudju, 2022). Research conducted by Miftah & Lamasitudju (2022) found that the Wordwall quiz games can improve children's learning achievements as well as their cognitive skills.

Global warming is one of the most pressing environmental issues of the 21st century, with impacts ranging from extreme climate change to threats to biodiversity and human life. Human-induced increases in the average temperature of the atmosphere and oceans, particularly emissions of greenhouse gases such as carbon dioxide, methane, and nitrous oxide, exacerbate this situation (Rembulan et al., 2024). Global warming is the process of increasing levels of greenhouse gases, including increasing concentrations of carbon dioxide (CO₂), that contribute to changes in Earth's temperature. Temperature is closely related to other climate elements (such as pressure, wind, humidity, evaporation, and precipitation) because these elements directly and indirectly affect ecosystems. The average global temperature has increased by almost 1°C since 1880 (Kurniawan et al., 2024).

The novelty of using the Wordwall interactive media as a formative assessment tool for the topic of global warming has not been explored in depth in the context of its relationship with students' activities and learning outcomes. Previous research has generally focused on the effectiveness of learning media or understanding environmental concepts in general but has not focused on how digital quiz-based assessments such as Wordwall can increase student engagement and have a direct impact on learning outcomes in complex science themes such as global warming. This research gap lies in the lack of studies that integrate interactive assessments with global issue topics and their effect on student learning engagement at the secondary level. Thus, this research offers an innovative approach to science learning that is more adaptive to the digital era. Based on the description above, this study was conducted to solve problems related to student learning activities and outcomes in the classroom by applying assessment media that suits the needs of students. The purpose of this study is to improve student learning activities and outcomes through the application of a Wordwall quiz assessment on the subject of global warming.

METHOD

The type of research used is classroom action research (*Penelitian Tindakan Kelas/PTK*). The PTK model used refers to the Kemmis & McTaggart model. The stages in the PTK consist of planning, implementation, observation, and reflection. Before the implementation of cycle I and cycle II, there was a pre-cycle stage. The pre-cycle stage consisted of observation and reflection conducted by the researcher. Observation and reflection were used to obtain relevant information, documentation, and the situation directly. The data found was compared with the results of teacher and student interviews in order to obtain problems in the classroom. Through the data that has been collected in the pre-cycle activities, it is necessary to identify solutions that are in accordance with the problems. Researchers compiled several potential solutions according to the problem and made lesson plans to improve learning

activities and outcomes. The stages of the Kemmis and McTaggart PTK model can be seen in Figure 1.

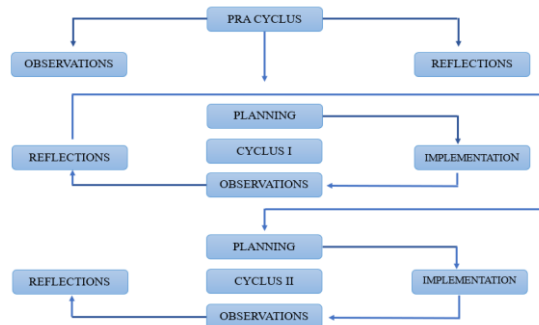


Figure 1. Classroom Action Research model according to Kemmis and McTaggart (Burns, 2010)

This research was conducted in class X-1 SMA Negeri 5 Jember in the even semester of the 2024/2025 school year with a total of 36 students. Data collection techniques used in this study were questionnaires, tests, interviews, observation, and documentation. The N-gain test was conducted to analyze student learning outcomes after learning in each cycle.

Student Learning Activity

The statement indicators contained in the student learning activity questionnaire sheet contain positive and negative statements. Each positive statement on the indicator is given a value/score, namely disagree (1), disagree (2), agree (3), strongly agree (4). Negative statements are given a value/score, namely disagree (4), disagree (3), agree (2), strongly agree (1).

$$T_x = \frac{A}{B} \times 100\% \quad (1)$$

Description:

T_x : Percentage value sought

A : The number of scores obtained by students in each indicator

B : Total maximum score in each indicator

N-gain test

Students' cognitive learning outcomes during physics learning that applies the Wordwall quiz assessment are evaluated through the N-gain test, namely:

$$N - gain = \frac{S_{post} - S_{pre}}{S_{max} - S_{pre}} \quad (2)$$

Description:

N-gain = normalized gain score

S_{post} = post-test score

S_{pre} = pre-test score

S_{max} = maximum score

RESULTS AND DISCUSSION

The initial stage of this class action research is pre-cycle activities. The pre-cycle activities consisted of observation and reflection stages. Based on the pre-cycle stage, initial data findings were obtained related to student learning activities and outcomes. The implementation of the pre-cycle aims to find out the problems that exist in the classroom related to student learning activities. Student learning activities during learning are still relatively low, as evidenced by observations made by

observers that many students are passive. Many students are still silent, do not pay attention to the teacher when explaining, and are sleepy during learning. Students tend to do activities outside of learning so that they do not focus on the material explained by the teacher. Based on the data findings, there is a need for better learning planning in cycle I.

Student learning outcomes in the pre-cycle were measured by a pretest on greenhouse effect material. The number of questions that students must do is 5 questions in the form of essays. After students have finished working on the questions, the researcher assesses the results of student answers. Each question has the same score of 20 so that the total for correct answers is 100. The acquisition of student learning outcomes at the pre-cycle stage can be seen in Table 1.

Table 1. Student learning outcomes in pre-cycle

Score Range	Frequency	Criteria
80-100	16	Very Good
70-79	0	Fairly Good
60-69	10	Good
40-59	5	Less
0-39	5	Very Less

Based on Table 1, student learning outcomes in the pre-cycle obtained 16 students get very good criteria, 10 students getting good criteria, 5 students getting fewer criteria, and 5 students getting very poor criteria. Researchers conducted interviews to obtain supporting data on observations and student learning outcomes. Based on the interview results obtained, the teacher still uses learning methods such as lectures, questions and answers, and daily tests at the end of each lesson. Technology is rarely used by teachers in physics learning in the classroom. Researchers reflected on the pre-cycle findings and planned learning so that student learning outcomes could improve.

In Cycle I there are several stages carried out, namely planning, implementation, observation, and reflection. In the planning stage, the teacher did several things, namely (1) finding solutions to improve physics learning in the classroom based on the pre-cycle; (2) making teaching modules on the impact of global warming using Wordwall quizzes as learning assessment media; (3) preparing media or teaching aids; (4) preparing activity rubrics and student learning outcomes test questions; (5) compiling scoring guidelines; and (6) compiling student interview guidelines.

The implementation stage in cycle I was carried out in accordance with the teaching module on the impact of global warming by using LKPD as student learning material. In the implementation stage, researchers used the PBL (problem-based learning) learning model. The PBL stages used in this study are orienting students to the problem, organizing students, guiding and directing investigations, developing and presenting results, and analyzing and evaluating the problem-solving process. Wordwall quizzes are used at the stage of evaluating the problem-solving process. The number of questions used was 20 multiple-choice questions.

In the observation stage in cycle I, researchers and observers made observations to see the activities carried out by students. Observations were also made to obtain student learning outcomes during learning and assessment using a Wordwall quiz. From the observations that have been made, there are still some students who have not been active in the learning process.

Reflection is done to analyze, explain, and evaluate the results of the research. In cycle I, there are several shortcomings that need to be improved in the

next cycle, namely, (1) students still do not understand the meaning of the questions in the LKPD (*Lembar Kerja Peserta Didik*); (2) students still do not understand the concept of the material on the impact of global warming; (3) student learning activities have increased, but there are still some students who have not dared to ask questions to the teacher; (4) there are still many students whose scores have not met the KKM (*Kriteria Ketuntasan Minimal*).

The learning carried out in cycle I was learning related to physics material on the impact of global warming on everyday life. At the end of cycle I, students are required to fill out a learning activity questionnaire to find out what activities students do during learning. From the results of learning activities in cycle I, 5 students got very good criteria, 23 students got good criteria, and 8 students got good enough criteria. The results of the analysis of student learning activities in cycle I can be seen in Table 2.

Table 2. Cycle I learning activities

Percentage Range	Frequency	Criteria
81.25-100	5	Very Good
62.50-81.25	23	Good
47.74-62.50	8	Good Enough
0-43.75	0	Less Good

Based on Table 2, learning in cycle I obtained post-test scores, namely, 17 students getting very good criteria, 4 students getting good criteria, 6 students getting good enough criteria, 8 students with fewer criteria, and still 1 student getting very poor criteria, so the results of cycle 1 have improved in class compared to the pre-cycle stage. Student learning outcomes in cycle I can be seen in Table 3.

Table 3. Student learning outcomes cycle I

Value Range	Frequency	Percentage	Criteria
80-100	17	47%	Very Good
70-79	4	11%	Good
60-69	6	17%	Good Enough
40-59	8	22%	Less
0-39	1	3%	Very Less

Based on Table 3, cycle II has the same stages as cycle I, namely revision of planning, implementation, observation, and reflection. At the planning revision stage, the researcher carried out learning in accordance with the results of the reflection in cycle I. In the implementation stage of cycle II, the researcher still acted as a teacher. At this stage, LKPD is still used as teaching material for students with a Wordwall quiz assessment on efforts to overcome global warming. The observation stage in cycle II has increased from cycle I for student learning outcomes, where at this stage the average student score has met the KKM in accordance with the expectations of the researcher. The final stage in cycle II is reflection. Reflection is used to determine whether cycle II is sufficient or still needs to be continued in the next cycle. The results of the reflection in cycle II compared to the results of cycle I for student learning outcomes have improved. The number of students who have met the KKM is 94%, so there is no need to do the next cycle.

Learning in cycle II used physics material on efforts to overcome global warming. As in cycle I, students also filled out a learning activity questionnaire at the end of cycle II learning. Based on the results of student learning activities, there was an increase compared to the previous cycle. There were 13 students getting very good criteria, 19 students getting good criteria, and 4 students getting good enough criteria.

The results of learning activities filled out by students in cycle II can be seen in Table 4.

Table 4. Cycle II learning activities

Percentage Range	Frequency	Criteria
81.25-100	13	Very Good
62.50-81.25	19	Good
47.74-62.50	4	Good enough
0-43.75	0	Less Good

Based on Table 4, student learning outcomes in cycle II have improved. Shown in Table 5 below, 34 students get very good criteria, and 2 students get fewer criteria. So it can be said that student learning outcomes in cycle II have improved compared to cycle I.

Table 5. Cycle II learning outcomes

Value Range	Frequency	Criteria
80-100	34	Very good
70-79	0	Good
60-69	0	Good enough
40-59	2	Less
0-39	0	Very Less

Based on Table 5, namely from the results of the analysis of student learning outcomes from the pre-cycle stage to Cycle II, the N-gain test was carried out to determine the comparison of student learning outcomes in each cycle. The results of the N-gain test on student learning outcomes can be seen in Table 6.

The findings in this study are in line with the results of research conducted by Sari & Kurniasih (2022), who found that the use of digital-based assessments such as Kahoot and Wordwall significantly improved students' activities and learning outcomes in science materials. Another study by Lee et al., (2023) also supports the results of this study by showing that interactive assessments can encourage deeper conceptual understanding and higher student engagement than traditional evaluation methods.

Table 6. N-gain test

Cycle	Average N-gain Score	N-gain criteria
Cycle I	11.49	Low
Cycle II	91.09	High

Based on Table 6 above, it shows an increase in student learning outcomes consisting of learning outcomes in the pre-cycle, cycle I, and cycle II. In cycle I, the average N-gain value was 11.49 in the low category, and in cycle II, the average N-gain value was 91.09 in the high category. The increase in student learning activities is presented in Figure 1.

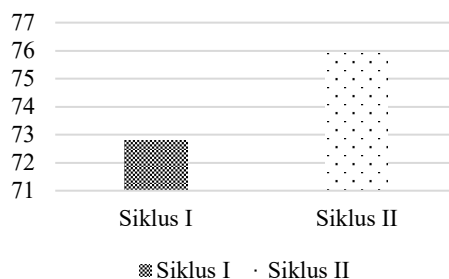


Figure 1. Improvement in learning activities of cycle I and cycle II

Based on graph 1, it can be explained that there is an increase in student learning activities from cycle I to cycle II. Student learning outcomes during the learning process using Wordwall quiz assessments have increased in each cycle. This can be seen in Figure 2.

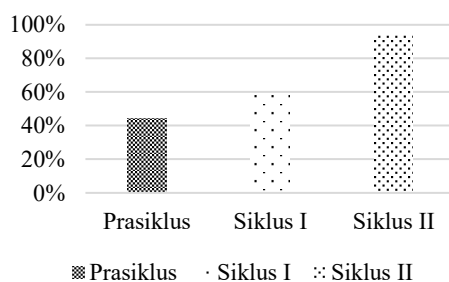


Figure 2. Improvement in student learning outcomes cycle I and cycle II

Student activity and learning outcomes in each cycle have increased in accordance with the researcher's objectives. This happened because students had begun to understand the concept well and were used to answering questions such as diagrams or graphs in the Wordwall quiz. Based on Fatimah's research (2024), it was concluded that the use of Wordwall media in class X SMA Muhammadiyah Ponjong has proven that there are significant changes in student learning outcomes, especially in math learning. After 2 cycles were carried out, it can be concluded that the application of Wordwall quiz assessment was able to improve students' ability to understand physics lessons. Based on the description above, the reason researchers use the PBL learning model is that it is easy to support the use of WordWall quiz assessments. Students are more active in following the learning process, and students not only listen to the teacher's explanation in learning, but they can also learn directly inside and outside the classroom. The next reason why researchers use the application of Wordwall quiz assessment is in carrying out the evaluation of student learning outcomes in each cycle because the Wordwall itself has very interesting advantages, for example, in terms of appearance or form in making question exercises (Zahroh, 2024). From the advantages of Wordwall quizzes, student learning activities have also increased (Yusni, 2024). In this study, researchers used a form of Wordwall quiz with a type of Pili test.

During the research, there were obstacles experienced, namely, the difficulty of the signal and network in the place, so that the activity of working on the learning outcomes test was constrained. There were several student cell phones that were dead because the battery ran out. The solution that has been done to overcome this obstacle is to prepare internet data quotas so that students can access Wordwall quizzes and

check cellphones before learning takes place. Another obstacle is related to the time in learning that is too short, which requires adding learning hours on the next day. The Wordwall quiz assessment can be an interactive student assessment and can improve student activity and learning outcomes during the learning process.

Based on the description presented above, the solution to improve student learning activities and outcomes is to implement Wordwall quiz assessment. The application of the Wordwall quiz assessment has been proven to improve student learning activities and outcomes. The research findings are that the application of the Wordwall quiz assessment makes students active in learning, especially when working on learning outcomes test questions, which can make students more interested and compete to get more than KKM results so that student learning activities increase and learning outcomes are greatly improved. Some studies that are relevant to this research are research conducted by Afriliana & Diyana (2024) and Rahmawati et al., (2024) that the use of Wordwall can increase student interest in learning gas kinetic theory material.

CONCLUSION

The application of a Wordwall quiz assessment on the subject of global warming can improve student learning activities and outcomes in class X-1 at SMA Negeri 5 Jember. Learning activities can increase from the original 86% in cycle I to 92% in cycle II. Learning outcomes increased from 44% in the pre-cycle, 58% in cycle I, and 94% in cycle II. The Wordwall quiz assessment can be an alternative solution and learning innovation that can be applied at school during the offline learning process. It is recommended that the use of interactive media such as Wordwall quizzes continue to be developed in learning because it can increase student engagement and their understanding of global warming material. This also has a positive impact on students' overall learning activities and outcomes.

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