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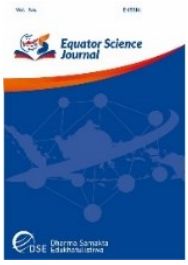

Impact of Wordwall Based Joyful Learning on Science Learning Achievement

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ABSTRACT
This study aims to improve student learning outcomes in Biology through the application of the Joyful Learning approach supported by Wordwall interactive media. The method used in this study was Classroom Action Research (CAR) conducted in two cycles and involving 34 students of class XI SMA Negeri 2 Palu as research subjects. Each cycle of this study included the stages of planning, implementation, observation, and reflection. Data were obtained through observation sheets and learning outcome tests, then analyzed descriptively by considering the average score and percentage of classical mastery. The results showed that in the pre-cycle stage, student learning mastery only reached 41.18% with an average score of 70.00. After the action in cycle I was implemented, mastery increased to 67.65% with an average score of 76.35. A further improvement in cycle II resulted in a significant increase, namely 88.24% mastery with an average of 81.56. Thus, the application of the Wordwall-based Happy Learning approach proved to be effective in creating a conducive learning atmosphere, increasing student participation, and encouraging more optimal understanding of the material.

INTRODUCTION

Education is a conscious effort aimed at humanizing humans. Therefore, optimal guidance is needed to achieve individual maturity. As times change, innovation in education has become a very important aspect. For example, research conducted by Nurharini et al. (2024) shows that MI Al-Islamiyah Bangil actively implements various innovations in student management, facilities, curriculum, and community relations to improve the overall quality of education. In education, there are two interrelated concepts, namely learning and teaching. The concept of learning emphasizes the learner, where learning is an activity carried out by students. As subjects of learning, students directly experience, engage in, and undergo an interactive process that aims to develop mental aspects towards independence. The main objective of education is to produce quality human resources, namely individuals who are able to face the dynamics of the times (Betty, 2023).

One of the efforts that can be made to improve the quality of education is through improving the learning process. Along with the rapid development of science and technology, various new ideas about learning strategies have emerged. Teachers, as figures who have a strategic position in human resource development, are required to keep up with these developments (Haryanti, 2021).

Teachers not only act as educators, but also as facilitators who encourage students' interest in learning. They are tasked with guiding students to grow into mature and responsible individuals (Akib, 2021). Therefore, teachers need to use or develop learning models that are able to attract students' attention and foster a spirit of learning. Learning models can be understood as patterns or designs used by teachers in planning and implementing learning activities (Andriana et al., 2023).

However, in reality, most teachers have not implemented learning models that actively engage students in the learning process. Learning processes that do not utilize appropriate learning models result in low student achievement. The methods used are ineffective, so students tend to play only a passive role as listeners. This problem arises because many teachers are still not innovative enough in the learning process. Low learning outcomes are a common problem in the education sector and require serious attention. Therefore, in the implementation of learning, teachers are required to be able to increase students' motivation and interest in learning so that their academic achievement improves (Andriana et al., 2023).

Observations at Palu State High School 2 show that teachers still tend to use lecture methods in the learning process, resulting in students appearing less active, less enthusiastic, and easily losing focus. This condition has an impact on low student learning outcomes, especially in Biology. Therefore, more interesting and enjoyable learning is needed so that students are more active and motivated to participate in the learning process. Based on research by Batania et al. (2025), it was found that students' learning difficulties in Biology are relatively high, both from internal and external factors—with 27% of students stating that internal factors are the main obstacle, and 31% citing significant external factors. These findings emphasize the importance of applying interactive approaches, such as Wordwall-based Joyful Learning, to overcome these obstacles.

In line with current developments in education, various theories emphasize the importance of active, student-centered learning. Vygotsky's sociocultural theory states that social interaction and learning media support can help students develop their abilities optimally (Newman, 2018). In addition, the Problem-Based Learning (PBL) model has been proven to encourage critical thinking and collaboration skills through contextual problem-solving processes (Savery, 2015). Hmelo-Silver (2017) also shows that PBL is relevant for developing student learning independence at various levels of education. Recent research even confirms that active learning can improve academic achievement while reducing learning gaps (Theobald et al., 2020). This shows that learning that emphasizes active student involvement is very appropriate for overcoming low motivation and learning outcomes in Biology.

One approach that can be applied to overcome this problem is the Wordwall-based Joyful Learning model. This approach is effective because it creates a fun and interactive learning atmosphere that prevents boredom. This model aims to make the learning environment more interesting, so that students become more interested and focused on the material being presented. Aftalina et al. (2024) explain that the Joyful Learning model emphasizes the importance of making the learning process enjoyable and interesting for students. This model involves games, creative activities, and positive social interactions. The goal is for students to feel happy and motivated to learn. With a conducive and

enjoyable atmosphere, students tend to be more active and motivated, which in turn improves their concentration and understanding of the material. In addition, the Joyful Learning model also helps reduce the stress and anxiety that students often experience. Thus, a pleasant learning atmosphere will contribute to more optimal learning outcomes.

Wordwall is one of the media that supports the implementation of the Joyful Learning model. This media can be used to support a more innovative and varied learning process (Putri, 2020). The use of Wordwall has been proven effective in improving students' academic achievement, as stated by Aprilia (2023) in her research, which shows that the application of Wordwall-based media significantly improves student learning outcomes. Similar findings were also reported by Lestari and Mahmudah (2024), which showed the effectiveness of Wordwall in increasing participation and learning achievement in science at the elementary school level. Research by Nascimento et al. (2022) even emphasized that Wordwall can be utilized in distance learning in Biology because it helps facilitate a more interactive understanding of concepts.

Although the joyful learning approach and the use of Wordwall media have been widely applied in various subjects such as language and mathematics, research on the application of this approach in biology learning at the secondary school level is still relatively rare. In particular, research examining the effectiveness of this approach on human reproductive system material is still very limited.

This study is also in line with the demands of 21st-century education. Mardhiyah et al. (2021) emphasize that critical thinking, collaboration, creativity, and communication skills are important competencies that must be developed. Magay (2025) adds that technology-based learning innovations and active approaches can help students face the challenges of the modern era. Based on this background, this study examines the effect of applying the Wordwall-based Joyful Learning method on improving the biology learning outcomes of 11th grade students at SMA Negeri 2 Palu. This study is expected to provide an alternative learning strategy that is both enjoyable and innovative to improve student academic achievement.

METHOD

This research is classified as Classroom Action Research (CAR). This Classroom Action Research was conducted in stages over several cycles in order to improve the quality of learning and learning outcomes. CAR is an approach used by teachers to identify and improve problems in the learning process through systematic and reflective actions (Utomo et al., 2024). The research design refers to the Kemmis and McTaggart model, which contains four core components: planning, implementation, observation, and reflection. This model is considered appropriate because it provides opportunities for teachers to evaluate their teaching practices and adjust them to the needs of students.

The research subjects were 34 students of class XI C at SMA Negeri 2 Palu. The research process was carried out in two cycles, with details shown in Figure 1.

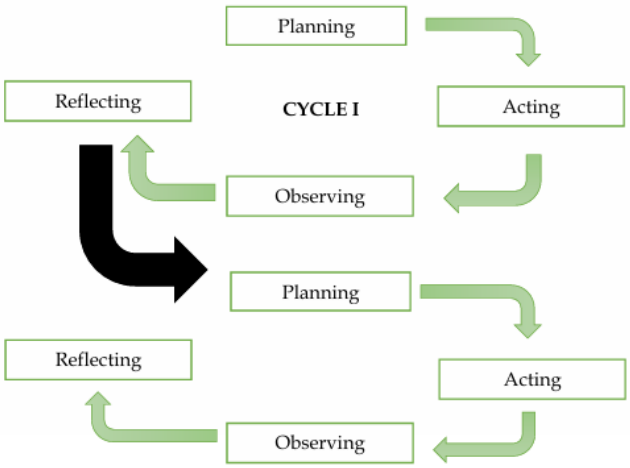

Fig 1. The PTK Framework according to Kemmis and McTaggart (in Gayatri, 2023: 793)

The research process began with the planning stage, during which the researchers prepared all necessary instruments and tools for the study. This included developing action scenarios, designing learning modules, and preparing supporting materials such as media, student worksheets, observation sheets, questionnaires, and evaluation instruments in the form of learning outcome tests.

The next stage was the implementation of actions, where the learning process was carried out using the modules that had been designed in accordance with the Lesson Plan (RPP) developed during the planning phase. The teaching and learning activities followed the predetermined scenarios to ensure consistency with the research objectives.

During the observation stage, data were collected using the previously prepared observation sheets. Two observers were assigned to monitor and record both the teacher's activities during the teaching process and the students' responses, engagement, and participation throughout the lessons. The observations also focused on assessing the impact of the Wordwall-based Joyful Learning model on students' behavior and interaction in the classroom.

Following the implementation and observation, the reflection stage was conducted. At this stage, the researchers analyzed and reviewed the observation results to evaluate the strengths and weaknesses of each phase of the action. The outcomes of this reflection served as the basis for designing improvements in the subsequent cycle to enhance the effectiveness of the intervention.

The success of the implemented actions was measured through students' learning outcomes. Achievement indicators were determined based on the Minimum Passing Criteria (KKM), which was set at a score of 75 or higher, with a minimum classical passing target of 75%. Data collection techniques in this study consisted of observation and tests. Observation was used to evaluate student activities during the learning process, focusing on aspects such as engagement, participation, and responses to the learning media, with data recorded systematically through observation sheets. Meanwhile, tests were administered at the end of each cycle in the form of written exams to measure students' understanding of the material and to assess improvements in learning outcomes across the different stages of the research.

RESULTS AND DISCUSSIONS

RESULTS

Pre-Cycle

Pre-cycle activities were conducted prior to the implementation of cycle I. This stage began with observation to identify problems in the teaching of Biology in grade XI at SMA Negeri 2 Palu and to find appropriate solutions. The researchers also reviewed previous learning activities and analyzed the evaluation results obtained by students.

Table 1. Pre-cycle Test Scores

Number of students	Mean Score	Achieved Mastery	Non-Mastery
34	70	14 persons (41,18%)	20 persons (58,82%)

Based on the pre-cycle test (Table 1), it was found that student learning outcomes were still low. Of the 34 students, only 14 (41.18%) achieved a score above the minimum passing grade (≥75), while 20 students (58.82%) did not. The class average score was 70, which is still below the passing standard. These findings indicate that most students did not understand the material well and were not very active in learning activities. Therefore, improvement efforts are needed by introducing more interactive and enjoyable learning strategies.

Cycle I

After implementing Wordwall-based Joyful Learning in Cycle I, learning outcomes showed improvement.

Table 2. Test Scores Results for Cycle 1

Number of students	Mean Score	Achieved Mastery	Non-Mastery
34	76,35	23 persons (67,65%)	11 persons (35,35%)

In cycle I, learning used interactive media Wordwall on the topic of the human reproductive system. Evaluation results showed an increase in learning achievement (Table 2). A total of 23 students (67.65%) were declared to have mastered the material, while 11 students (32.35%) had not reached the standard. The average score increased from 70.00 (pre-cycle) to 76.35. This increase indicates that the use of Wordwall was able to make students more enthusiastic, because the questions posed resembled an interesting educational game. However, several obstacles were still found, such as the need for more intensive guidance for students who had not mastered the material, clearer instructions, and more opportunities for questions and discussions. This became the basis for improvements in cycle II.

Cycle II

The results of cycle II can be seen in Table 3.

Table 3. Test Scores Results for the Cycle 2

Number of students	Mean Score	Achieved Mastery	Non-Mastery
34	81,56	30 persons (88,24%)	4 persons (11,76%)

After the strategy improvements were implemented, the results in cycle II showed a significant improvement. Of the 34 students, 30 (88.24%) achieved a score of ≥75, while 4 students (11.76%) did not. The class average score rose to 81.56, an increase of 5.21 points compared to cycle I. The improvements made included providing more detailed explanations of the material, individual assistance for students who were experiencing difficulties, and increasing interaction in the form of questions and answers and discussions. As a result, students appeared more confident, active, and able to understand the material well. With a classical completion rate of 88.24%, the actions in cycle II were declared successful.

The percentage of student learning outcomes from pre-cycle, cycle I, to cycle II continued to increase, as shown in Figure 1.

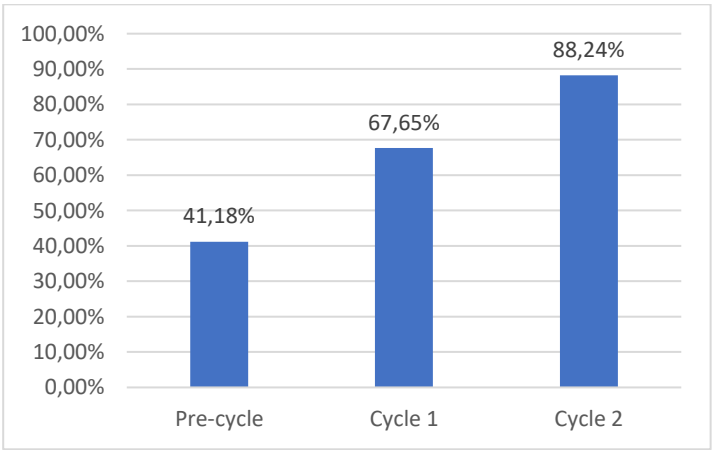

Fig 1. Comparison of Student Learning Outcome Percentages in The Pre-Cycle, Cycle I, and Cycle II

Overall, a comparison of learning outcomes from the pre-cycle, cycle I, and cycle II shows a consistent upward trend. The mastery level increased from 41.18% (pre-cycle) to 67.65% (cycle I) and finally to 88.24% (cycle II). These findings are in line with the results of research by Mubakhirah et al. (2023), which showed a gradual increase in student achievement in each learning cycle.

DISCUSSIONS

The implementation of the Wordwall-based Joyful Learning approach has been proven to improve the biology learning outcomes of 11th grade students at Palu 2 Public High School. In the pre-cycle stage, student achievement was still low, with only 41.18% mastery and an average score of 70. These low results were due to the dominant lecture method, which made students passive. This is in line with Haryanti's (2021) opinion that monotonous learning can reduce the effectiveness of student achievement.

With the implementation of Wordwall in cycle I, completion rates increased to 67.65% with an average score of 76.35. This game-based media provides a more enjoyable learning experience and encourages active student participation. These findings are reinforced by Aprilia et al. (2023), who state that Wordwall can increase motivation and learning outcomes in digital learning. These findings are also in line with the research by Fadilla et al. (2023), which shows an increase in student learning outcomes when analyzing the language of articles using Wordwall media. Similarly, Nascimento et al. (2022) emphasize that game-based digital media can strengthen the understanding of biological concepts more effectively.

In addition to the improvement in test results, classroom observations also revealed significant developments in student behavior and learning dynamics. During cycle I, many students showed enthusiasm because the activities designed through Wordwall resembled interactive games, which made them more engaged in answering quizzes and collaborating with peers. Nevertheless, some students still struggled to follow instructions at the beginning, which required the teacher to provide clearer guidance and scaffolding. The interaction between teacher and students began to grow, although a small portion of students remained less active in discussions.

In cycle II, after adjustments such as providing more intensive individual guidance and creating greater opportunities for two-way interaction, student participation became more optimal. Almost all students were actively involved in answering questions, responding to peers, and engaging in classroom discussions. Those who were previously passive gradually became more confident in expressing their ideas, while the overall classroom atmosphere turned more lively and student centered. Although challenges such as time management and the need for continuous teacher facilitation remained, these obstacles were successfully addressed. These observational findings reinforce the quantitative data, indicating that the Wordwall-based Joyful Learning approach not only improved achievement scores but also fostered motivation, interaction, and active engagement during the learning process. This condition was further confirmed by the results of cycle II, which demonstrated a higher level of student mastery and average achievement.

In cycle II, mastery increased again to 88.24% with an average of 81.56. The determining factor for this increase was the improvement in strategies, such as individual guidance and two-way interaction. This is in line with Vygotsky's constructivism theory (Newman, 2018), which emphasizes the importance of social interaction in the learning process. Aftalina et al. (2024) also confirm that a pleasant learning environment can increase student engagement and understanding of the material.

Overall, this approach not only improves academic achievement but also builds student motivation and engagement in learning. Faizin et al. (2022) proved that Wordwall is capable of creating a creative and enjoyable learning atmosphere that is more student-centered. These results align with the demands of 21st-century education, which emphasizes critical thinking, collaboration, and communication skills (Lubis, 2022). Thus, Joyful Learning-based Wordwall is an effective learning strategy for improving biology learning outcomes while also being relevant to the needs of modern education, which demands interactive and sustainable learning.

CONCLUSION AND SUGGESTION

This study shows that the Wordwall-based Joyful Learning strategy successfully improved the biology learning outcomes of 11th grade students at Palu 2 Public High School. Student learning achievement gradually increased: pre-cycle 41.18% with an average of 70, cycle I reached 67.65% with an average of 76.35, and cycle II increased again to 88.24% with an average of 81.56. These results prove that educational game-based learning is effective in creating an interactive learning atmosphere, fostering motivation, and strengthening material comprehension.

Although this study shows positive results, there are several limitations. The study was only conducted in one class with two cycles, so the results cannot be generalized widely. Therefore, it is recommended that further research be conducted with a larger sample size, a longer duration, and additional variables such as the development of 21st-century skills—for example, collaboration, creativity, and critical thinking skills.

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