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THE IMPLEMENTATION OF WORDWALL-ASSISTED GAME BASED LEARNING MODEL TO IMPROVE STUDENTS' LEARNING OUTCOMES ON JUNIOR HIGH SCHOOL

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ABSTRACT

Mathematics is a subject that plays a crucial role in developing students' logical and systematic thinking abilities; however, it is often perceived as difficult and tedious by learners. This condition negatively affects learning outcomes, particularly in the topic of Numbers. Therefore, it is essential to implement innovative and engaging learning models, one of which is the Game Based Learning (GBL) model supported by Wordwall. This study aims to determine the improvement in students' learning outcomes through the implementation of the GBL model assisted by Wordwall in the topics of Integers and Fractions among seventh-grade students (class VII-1) at SMP Negeri 2 Suwawa. The research employed a Classroom Action Research (CAR) design based on the Kemmis and McTaggart model, which consists of four stages: planning, action implementation, observation, and reflection. The research subjects were 25 students of class VII-1, comprising 15 male and 10 female students. Data were collected through teacher and student activity observations, attitude assessments, skill evaluations, and learning outcome tests. The results revealed an improvement in each cycle. In the first cycle, the percentage of cognitive learning mastery reached 68%, while the affective and psychomotor domains were categorized as fairly good. After improvements were made in the second cycle, the mastery level increased to 88%, and the affective and psychomotor domains reached good and very good categories, respectively. Thus, the implementation of the Game Based Learning model supported by Wordwall proved to be effective in improving the mathematics learning outcomes of class VII-1 students at SMP Negeri 2 Suwawa in the 2025/2026 academic year.

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INTRODUCTION

Mathematics is one of the subjects that plays a crucial role in developing students' logical, analytical, and systematic thinking abilities. Through mathematics instruction, students are expected to cultivate rational and critical thinking patterns that serve as a foundation for

understanding various scientific concepts. However, in practice, mathematics is still perceived as a difficult and monotonous subject by the majority of junior high school students.

The negative perception of mathematics has an impact on students' low learning motivation, limited active participation, and poor academic achievement. This phenomenon is increasingly evident in fundamental topics such as numbers, which should serve as the foundation for understanding mathematical concepts at higher levels. Research conducted by (Zuhrotul Badriyah et al., 2024) revealed that the low level of interest and motivation in learning mathematics is caused by the lack of innovation in the implementation of engaging and interactive learning models and media.

The study conducted by (Rismawati & Persada Khatulistiwa, 2024) also revealed that students' conceptual understanding of number material remains relatively low. This condition occurs because the learning process is still dominated by conventional methods such as lectures and problem-solving exercises, causing students to take a passive role and become less engaged in the learning process. Therefore, the low achievement in mathematics is not solely attributed to the difficulty of the concepts but also to the lack of instructional approaches that motivate and actively engage students in learning.

A similar condition was also found at SMP Negeri 2 Suwawa based on the results of interviews with the mathematics teacher. The teacher stated that only a small number of students actively participated in the learning process, while the majority were less engaged because they perceived mathematics as difficult and uninteresting. Furthermore, the teaching method applied was still teacher-centered and had not yet utilized interactive media. The impact of this situation can be observed from the results of students' daily assessments over the past four years, which indicate that most students have not yet achieved the Minimum Mastery Criteria (KKM).

The low achievement in learning outcomes indicates the need for innovation in mathematics instruction that can create an active, enjoyable, and meaningful learning environment. A learning model that emphasizes direct student involvement is believed to enhance conceptual understanding and motivate students to engage more actively in the learning process. One model that aligns with the characteristics of 21st-century learners is Game Based Learning (GBL).

The Game Based Learning (GBL) model is a learning approach that integrates game elements into the learning process to foster active participation, collaboration, and student motivation. According to (Paulina et al., 2023), the implementation of GBL in mathematics instruction has been proven to significantly enhance students' conceptual understanding and learning motivation compared to conventional teaching methods. Therefore, GBL serves as a relevant model for addressing the low level of student engagement in mathematics learning.

In its implementation, Game-Based Learning (GBL) can be supported by various digital media designed to enhance students' learning experiences. One effective digital platform utilized for this purpose is Wordwall. This platform offers a variety of educational games such as quizzes, puzzles, and concept-matching activities that can be customized to suit different learning topics. According to (Triyani Ruhsoh, 2023), the use of Wordwall has been proven to increase students' motivation and learning outcomes by transforming the learning environment into one that is more competitive and enjoyable.

Several studies have also reinforced the effectiveness of implementing Game-Based Learning (GBL) supported by Wordwall. (Alifa et al., 2024) reported that the Wordwall-based GBL model was effective in improving students' learning outcomes in Informatics subjects.

Meanwhile, research by (Nisa & Susanto, 2022) demonstrated a positive and significant influence between the use of Wordwall educational games and students' motivation in learning mathematics. Similarly, (Mada et al., 2022) found that GBL assisted by Wordwall was effective in enhancing the arithmetic skills of students with mild intellectual disabilities.

Although previous studies have shown positive impacts on students' motivation and learning outcomes, most of them have primarily focused on the affective domain or have been conducted in non-mathematics subjects and at different educational levels. Therefore, a research gap remains regarding the effectiveness of implementing the Game-Based Learning (GBL) model supported by Wordwall in improving junior high school students' learning outcomes on the topic of numbers, which constitutes one of the fundamental concepts in mathematics.

This study seeks to address the identified gap by implementing the Game Based Learning (GBL) model supported by Wordwall in mathematics instruction on the topic of numbers for seventh-grade students at SMP Negeri 2 Suwawa. Through this approach, students are expected to engage actively, collaborate effectively, and enjoy the learning process through educational games that remain oriented toward achieving the learning objectives. The implementation of GBL supported by Wordwall is also expected to foster students' critical thinking skills and enhance their ability to solve mathematical problems effectively.

Furthermore, as articulated by Bloom in Zainudin and Ubabuddin (2023), students' learning outcomes should be evaluated not only in terms of the cognitive domain but also through the affective and psychomotor dimensions. The balanced development of these three domains constitutes a comprehensive indicator of successful learning. This perspective aligns with Sudjana (2016), who asserts that the assessment of learning outcomes must encompass the students' intellectual abilities, attitudes, and practical skills. Accordingly, the implementation of the Game-Based Learning (GBL) model supported by Wordwall in the present study is anticipated to enhance not only the students' cognitive competencies but also to promote their emotional engagement and collaborative proficiencies throughout the instructional process.

Based on the aforementioned description, this study aims to determine whether the implementation of the Game-Based Learning (GBL) model assisted by Wordwall can improve students' learning outcomes on the topic of numbers in Grade VII-1 at SMP Negeri 2 Suwawa. The results of this research are expected to provide a scientific contribution to the development of innovative and effective digital game-based learning models, as well as to serve as a reference for educators in enhancing the quality of mathematics learning in the digital era.

METHOD

This study is a Classroom Action Research (CAR) that refers to the Kemmis and McTaggart model, which consists of four main stages: (1) planning, (2) acting, (3) observing, and (4) reflecting. These stages are carried out repeatedly in cycles until an improvement in students' learning outcomes is achieved. This model was chosen because it enables teachers to systematically, collaboratively, and continuously improve the learning process based on reflection on previous actions.

According to Rahman (2021) and Marlina (2021), the success of the learning process is influenced by two major factors, namely internal and external factors. Internal factors include students' interests, motivation, and learning habits, while external factors encompass the learning environment, instructional strategies, and the use of engaging learning media. Therefore, the implementation of classroom action through the Game-Based Learning (GBL) model assisted by Wordwall in this study not only emphasizes methodological aspects but also seeks to optimize these determinant factors that contribute to students' learning outcomes.

The study was conducted at SMP Negeri 2 Suwawa during the 2025/2026 academic year. The research subjects consisted of 25 Grade VII-1 students, comprising 15 male and 10 female students with diverse academic abilities. The focus of the study was the topic of Numbers, which includes integers and fractions in accordance with the learning outcomes of Grade VII-1 mathematics.

This study was carried out in two cycles, with each cycle consisting of two meetings and one evaluation session.

1. Planning Stage

   The researcher prepared learning instruments such as the teaching module, learning scenario, Student Worksheet (LKPD), teacher and student observation sheets, and Wordwall-based games tailored to the topic of numbers.

2. Implementation Stage

   The teacher implemented the Game-Based Learning (GBL) model assisted by Wordwall in the learning process to foster an interactive, challenging, and enjoyable learning atmosphere.

3. Observation Stage

   The researcher and collaborator observed the activities of the teacher and students during the learning process using observation sheets to collect data on engagement, participation, and the overall learning atmosphere.

4. Reflection Stage

   The results of the observations and tests were analyzed to identify the successes and challenges of the learning process. This reflection served as the basis for improvements in the subsequent cycle to ensure continuous enhancement of students' learning outcomes.

The research data were collected using several techniques, namely:

1. Observation: used to monitor the activities of the teacher and students during the learning process.
2. Learning Achievement Test: used to assess students' cognitive abilities after participating in the learning process in each cycle.
3. Attitude and Skill Assessment: used to measure the affective and psychomotor domains of students during the learning process using the GBL model assisted by Wordwall.

The instruments used in this study included observation sheets, attitude and skill assessment sheets, and learning achievement tests in the form of essay questions. All instruments were developed based on learning outcome indicators and underwent expert validation by lecturers and mathematics teachers, as well as empirical testing to determine their levels of validity and reliability.

- The validity test was conducted using the Product Moment correlation formula, and the results indicated that the validity levels ranged from moderate to high.
- The reliability test was carried out using the Cronbach's Alpha formula, yielding a reliability coefficient above 0.80, which indicates that the instrument possesses a high level of reliability and is suitable for use in the study.

Data analysis was conducted using both quantitative and qualitative approaches.

1. Quantitative Analysis was used to determine the improvement in students' learning outcomes based on the average score and the percentage of learning mastery using the following formula:

$$P = \frac{Number\ of\ students\ who\ achieved\ mastery}{Total\ number\ of\ students} \times 100\%$$

The minimum mastery criterion (KKM) used in this study is 75, in accordance with the school's standard.

2. Qualitative analysis is used to describe changes in students' behavior, attitudes, and skills based on observations of teacher and student activities during the learning process. The assessment categories refer to the following guidelines:

Table 1. Assessment Category

Percentage	Symbol	Criteria
85%-100%	A	Excellent
70%-84%	B	Good
60-69%	C	Fairly Good
0-59	D	Poor

This study is considered successful if it meets the following criteria:

1. At least 80% of the students achieve a score ≥ the minimum mastery criterion (KKM) of 75.
2. Teacher and student activities during the learning process fall within the categories of Good and Excellent
3. The affective and psychomotor domains of the students demonstrate improvement within the categories of Good and Excellent.

RESULTS AND DISCUSSION

Results

Before being used in the study, the learning outcome test instrument was first tested for its validity and reliability. The validity test was conducted using the Product Moment correlation, while the reliability test employed the Cronbach's Alpha coefficient.

The validity test results showed that, out of 10 items on the Integers topic, 8 items were valid (numbers 1, 2, 3, 5, 6, 8, 9, and 10) and 2 items were invalid (numbers 4 and 7). Meanwhile, for the Fractions topic, 7 items were valid (numbers 1, 2, 3, 4, 7, 8, and 10). These results indicate that most of the test items were appropriate for measuring students' learning outcomes.

Furthermore, the reliability test results revealed Cronbach's Alpha coefficients of 0.8549 for the Integers test and 0.8342 for the Fractions test. Based on the reliability classification, both values fall into the high category, indicating that the instrument was reliable and suitable for use in this study.

Cycle I Results

The implementation of learning in Cycle I did not fully achieve the established success indicators. Teacher and student activities were categorized as "Fair," with student participation still limited and learning motivation not yet optimal. The results of the observations of teacher activities conducted in Cycle I can be presented in the following table:

Table 2. Results of Teacher Activity Observations in Cycle I

Assessment Criteria	Number of Aspects	
	Meeting 1	**Meeting 2**
Excellent	3 Aspects	5 Aspects
Good	9 Aspects	11 Aspects
Fairly Good	9 Aspects	7 Aspects
Poor	2 Aspects	0 Aspects
Total	**23 Aspects**	**23 Aspects**

The results of observations of student activities carried out in cycle I can be presented in the form of a table as follows:

Table 3. Results of Student Activity Observations in Cycle I

Assessment Criteria	Number of Aspects	
	Meeting 1	**Meeting 2**
Excellent	2 Aspects	4 Aspects
Good	10 Aspects	10 Aspects
Fairly Good	7 Aspects	6 Aspects
Poor	3 Aspects	2 Aspects
Total	**22 Aspects**	**22 Aspects**

The results of the cognitive test showed that only 17 out of 25 students (68%) achieved the minimum mastery criterion (KKM ≥ 75). Meanwhile, the remaining 32% of students did not achieve mastery as they still experienced difficulties in understanding operations with integers, and the assessment of attitudes and skills—or learning outcomes in the affective and psychomotor domains—remained in the "Fair" category. This condition indicates that the initial problems, namely low participation and conceptual understanding, were still present in Cycle I.

Cycle II Improvements

After reflection and improvements in the learning strategies, the implementation of Cycle II demonstrated significant improvement. The teacher became more skilled in managing the learning process by effectively integrating game elements, providing motivation, and directing activities clearly. The results of the observations of teacher activities conducted in Cycle II are presented in the following table:

Table 4. Results of Teacher Activity Observations in Cycle II

Assessment Criteria	Number of Aspects	
	Meeting 1	**Meeting 2**
Excellent	7 Aspects	11 Aspects
Good	12 Aspects	12 Aspects
Fairly Good	4 Aspects	0 Aspects
Poor	0 Aspects	0 Aspects
Total	**23 Aspects**	**23 Aspects**

In addition to teacher activities, the students also appeared more active, enthusiastic, and demonstrated good cooperation during the Wordwall game. The results of student activity observations conducted in Cycle II are presented in the following table:

Table 5 Results of Student Activity Observations in Cycle I

Assessment Criteria	Number of Aspects	
	Meeting 1	**Meeting 2**
Excellent	7 Aspects	9 Aspects
Good	11 Aspects	13 Aspects
Fairly Good	4 Aspects	0 Aspects
Poor	0 Aspects	0 Aspects
Total	**22 Aspects**	**22 Aspects**

The improvement in learning outcomes was observed not only in the affective and psychomotor domains, which reached the categories of Good and Excellent, but also in the cognitive domain. The following presents the changes in the students' average cognitive test scores and standard deviations, indicating an increase in learning outcomes in Cycle II as well as the leveling of students' abilities.

Table 6 Students' Cognitive Test Results in Cycles I & II

	Number of Students	Description		Average	Standard Deviation
		Mastery	Not Mastery		
CYCLE I	25	17 students	8 students	76,2324	9,782143
CYCLE II	25	21 students	4 students	80,408	7,1133

As evidence of the digital media implementation used in this study, the figure 1 are screenshots of several Wordwall games integrated into mathematics learning:

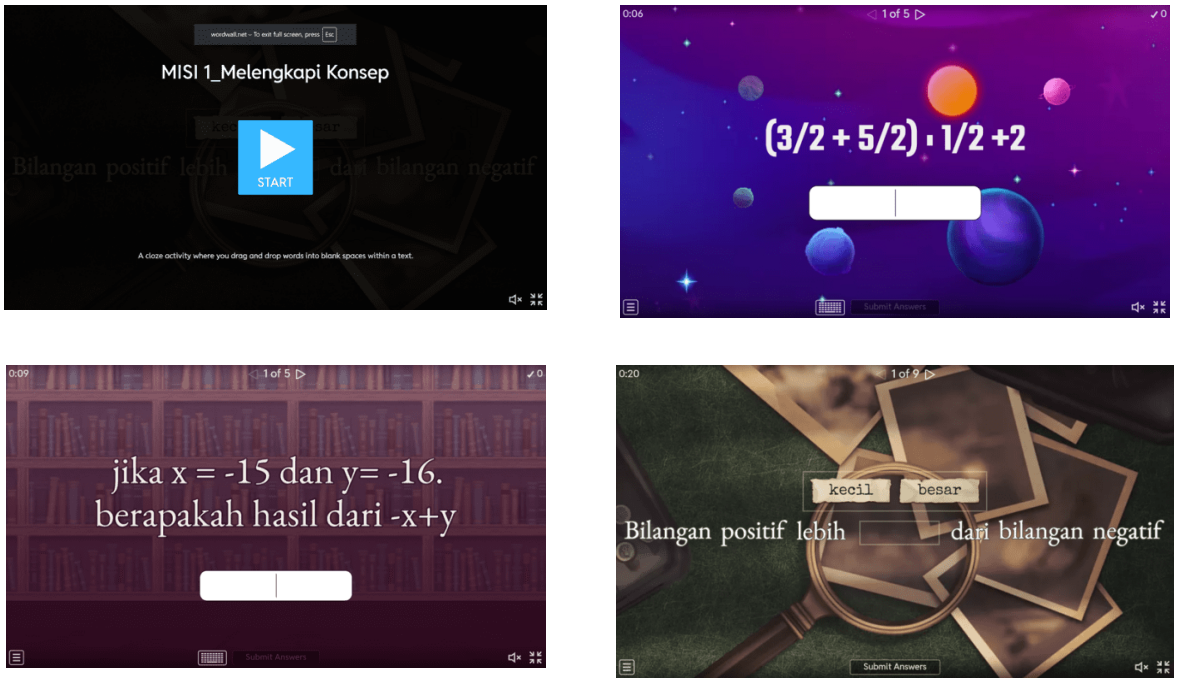

Figure 1. Wordwall screenshots

The Wordwall game links used in this study can be accessed at:

Meeting 1 : Mission 1 : https://wordwall.net/play/95689/999/942
Mission 2 : https://wordwall.net/play/95691/229/514
Mission 3 : https://wordwall.net/play/95692/245/239

Meeting 2 :	Mission 1 :	https://wordwall.net/play/95692/919/318
	Mission 2 :	https://wordwall.net/play/95692/517/638
	Mission 3 :	https://wordwall.net/play/95693/386/702
Meeting 3 :	Mission 1 :	https://wordwall.net/play/95693/841/430
	Mission 2 :	https://wordwall.net/play/94616/281/657
	Mission 3 :	https://wordwall.net/play/95694/494/327
Meeting 4 :	Missioni 1 :	https://wordwall.net/play/95695/011/501
	Mission 2 :	https://wordwall.net/play/95694/758/920
	Mission 3 :	https://wordwall.net/play/95695/228/881

The use of such interactive media provides students with the opportunity to engage in self-directed learning, receive immediate feedback from the system, and strengthen their understanding of mathematical concepts through challenge-based games.

According to the Game-Based Learning (GBL) theory proposed by Pratiwi (2024) and Wahyuning (2022), game-oriented learning can enhance students' engagement and motivation by providing a more meaningful learning experience through elements of competition and challenge. In the context of the present study, the implementation of Wordwall games functions not only as an evaluative tool but also as a medium for reinforcing conceptual understanding. This finding is consistent with Purnamasari et al. (2022), who reported that the use of Wordwall media fosters active interaction and student participation, as well as improves concentration in comprehending the learning material.

Discussions

The improvement in students' learning outcomes in Cycle II occurred due to changes in the learning strategy that positioned students at the center of the learning activities. The Game Based Learning model encouraged students to think critically through interactive and competitive game challenges. In addition, the Wordwall media helped create an engaging and enjoyable learning environment, motivating students to participate actively.

According to Erina Hannawita Br Sembiring and Tanti Listiani (2023), the stages of the Game-Based Learning (GBL) model consist of game selection, concept explanation, rule establishment, game implementation, conclusion formulation, and learning reflection. These six stages were effectively implemented during the second cycle of this study, in which the teacher acted as a facilitator while students demonstrated active participation in completing the game-based challenges. This process indicates that the success of GBL implementation depends not only on the use of media but also on the consistent application of each instructional stage.

These results are in line with (Irfah & Kobandaha, 2024) who stated that learning outcomes can improve when the learning process actively involves students and creates a meaningful learning environment. In the context of this study, students not only listened to the teacher's explanations but also participated directly through the Wordwall game, thereby strengthening their conceptual understanding of numbers.

According to (Majid et al., 2023) game-based learning strategies can stimulate intrinsic motivation, as students feel challenged to achieve the highest scores. This was evidenced in the present study, where students showed greater enthusiasm in participating in quizzes and challenges within Wordwall, which directly contributed to the improvement of their cognitive learning outcomes.

Furthermore, Klik atau ketuk di sini untuk memasukkan teks. (Pauweni et al., 2022) emphasizes that learning success should be assessed not only from the cognitive aspect but also from the development of students' attitudes and skills. The results of this study indicate improvements in the affective domain (responsibility, cooperation, and discipline) as well as in the psychomotor domain (accuracy in responding and presenting solutions). This demonstrates that GBL with Wordwall contributes to the development of students' character and thinking skills.

These findings are also consistent with (Bito et al., 2024) who demonstrated that learning assisted by digital media can improve learning outcomes by enhancing students' motivation and focus. Wordwall provides immediate feedback, enabling students to identify their mistakes and correct them independently.

Meanwhile, (Bukoting et al., 2023) emphasizes that learning that integrates elements of games and competition can create an enjoyable learning environment and foster students' interest. The results of this study show a similar pattern: students were more active, motivated, and enthusiastic in learning mathematics through game-based challenges.

Thus, the implementation of the Game Based Learning (GBL) model supported by Wordwall has been proven effective in enhancing students' mathematics learning outcomes across cognitive, affective, and psychomotor domains. The improvement in learning mastery from 68% to 88%, along with the elevation of teacher and student activities to the "Very Good" category, indicates that this model is capable of fostering active, collaborative, and meaningful learning.

Overall, the findings of this study reinforce the notion that the implementation of the Game-Based Learning (GBL) model, supported by digital media such as Wordwall, can enhance learning outcomes while simultaneously fostering students' motivation. This aligns with the theory proposed by Arni Rita (2021), who explains that Wordwall, as an interactive web-based learning medium, can increase students' engagement and motivation through the design of appealing educational games. Thus, the integration of GBL theory with the use of Wordwall media has been proven effective in creating an engaging and productive learning environment in the era of digital education.

CONCLUSION

Based on the research findings and discussion conducted with seventh-grade students of class VII-1 at SMP Negeri 2 Suwawa, it was found that the implementation of the Game Based Learning (GBL) model supported by Wordwall can enhance students' mathematics learning outcomes on the topic of Numbers. The study results indicate that:

1. In Cycle I, only 68% of students achieved mastery in cognitive learning outcomes, while the affective and psychomotor domains remained at the "Fairly Good" category.
2. After improvements were implemented in Cycle II, students' cognitive learning outcomes increased to 88%, with the affective and psychomotor domains reaching the "Good" and "Very Good" categories; and
3. Teacher activity increased from the "Fair" category to the "Good" and "Very Good" categories, and similarly, student activity demonstrated an improvement from the "Fair" category to the "Good" and "Very Good" categories.

These results indicate that the implementation of the Game Based Learning (GBL) model supported by Wordwall is effective in enhancing students' mathematics learning outcomes across cognitive, affective, and psychomotor domains. Accordingly, the more optimally the GBL model is applied utilizing Wordwall as a learning medium, the higher the students' engagement, motivation, and learning achievement in mathematics

It is recommended that future researchers expand the scope of the study to include other topics and educational levels or integrate the GBL model with different digital learning media to further examine its effectiveness.

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