Elstic-IJ Volume 6 Number 2 (2026)
P-ISSN 2807-7954; E-ISSN 2807-7350

Research Article

WORDWALL-SUPPORTED GAME-BASED LEARNING AND EFL VOCABULARY ACHIEVEMENT IN JUNIOR HIGH SCHOOL

Siti Aini Nanda Alifkha[1*], Indah Fadhilah Rahman[1], Sophia Azhar[1]
[1]*English Education Department, Faculty of Tarbiyah and Teacher Training, Universitas Islam Negeri Alauddin Makassar, Gowa, Indonesia*
**Corresponding author: st.aininandaa@gmail.com*

Abstract

Vocabulary is a foundation of foreign language learning, but junior high school students often find vocabulary instruction based on explanation, memorisation and written exercises monotonous. This study examined whether game-based learning (GBL) delivered through the Wordwall platform was associated with higher English vocabulary achievement than lecture-based instruction among seventh-grade students at a public junior high school in Makassar, Indonesia. A quasi-experimental non-equivalent control group design was used with two intact classes: 35 students received six sessions of Wordwall-supported GBL (flashcards, open-the-box and matching activities), and 34 students received lecture-based instruction on the same vocabulary topics. Vocabulary was measured with a 50-item multiple-choice test before and after instruction. The classes were not equivalent at baseline: the control class scored higher on the pre-test ($M = 68.82$ vs 64.06; $t(67) = -2.74$, $p = .008$). After instruction, the GBL class scored higher ($M = 90.40$ vs 80.97; $t(67) = 8.15$, $p < .001$, $d = 1.96$), and an analysis of covariance controlling for pre-test scores [[confirmed the difference, $F(1, 66) = x.xx$, $p < .001$, partial $\eta^2 = .xx$]]. The results suggest that Wordwall-supported GBL, combined with teacher explanation and feedback, can support vocabulary learning, but the non-random intact classes, identical test forms and a possible ceiling effect call for cautious interpretation.

Keywords: *EFL vocabulary; Game-based learning; Junior high school; Quasi-experiment; Wordwall*

Article History:
Submitted : 6 October 2026
Revised : 13 October 2026
Accepted : 14 October 2026
Published : 18 October 2026

How to cite this article:
Alifkha, S. A. N., Rahman, I. F., & Azhar, S. (2026). Wordwall-supported game-based learning and EFL vocabulary achievement in junior high school. *ELSTIC-IJ: English Language, Linguistics, and Culture International Journal, 6*(02), https://doi.org/10.24252/elstic-ij.v6i02.73335

Copyright © *2026 by the Authors. Published by ELSTIC-IJ, UPT Pusat Pengembangan Bahasa, Universitas Islam Negeri Alauddin Makassar. This is an open-access article distributed under the Creative Commons Attribution-ShareAlike 4.0 International License (CC BY-SA 4.0): https://creativecommons.org/licenses/by-sa/4.0/.*

INTRODUCTION

English vocabulary is a fundamental part of language learning because vocabulary knowledge supports students in understanding and producing language. Learners need words not only to recognise meaning in texts and classroom interaction but also to express ideas, respond to questions and participate in communication. Vocabulary knowledge involves both

receptive and productive dimensions (Nation, 2022) and both size and depth: learners need to know a sufficient number of words and how those words are used (Schmitt, 2014). For students learning English as a foreign language (EFL), limited lexical knowledge makes other language activities more difficult.

Learning vocabulary can nevertheless be challenging for junior high school students. Students may encounter unfamiliar words repeatedly but still have difficulty remembering their meanings, recognising them in new contexts or using them appropriately, and vocabulary learning may become monotonous when instruction depends mainly on teacher explanation, memorisation and written exercises. The challenge is therefore not simply presenting vocabulary items but creating conditions in which students encounter, retrieve and use words repeatedly and meaningfully.

Game-based learning (GBL) has been widely proposed as one way of creating such conditions, and meta-analyses report positive effects of digital games on second language vocabulary (Dixon et al., 2022; Tsai & Tsai, 2018). Digital platforms such as Wordwall now allow teachers to build game-like vocabulary activities quickly from their own word lists, and Indonesian studies have begun to report gains in junior high school students' vocabulary after instruction with Word Wall media (Basri & Sutrisno, 2025). However, much of the evidence comes from reviews or from studies that compare games with no instruction, and few classroom studies with seventh-grade Indonesian learners have compared teacher-created Wordwall activities with lecture-based instruction on the same vocabulary while accounting for baseline differences between classes. This study addresses that gap by comparing two intact seventh-grade classes in a public junior high school in Makassar. It addresses the following research question:

> RQ. After controlling for pre-test scores, do seventh-grade students taught vocabulary through Wordwall-supported game-based learning achieve higher vocabulary post-test scores than students taught through the lecture method?

The corresponding hypothesis was that, after adjustment for pre-test scores, students in the GBL class would obtain higher vocabulary post-test scores than students in the lecture class.

LITERATURE REVIEW

Conditions for Vocabulary Learning

Vocabulary knowledge develops through repeated encounters with words over time rather than through a single presentation (Nation, 2022). Nation identifies three processes that make vocabulary learning more likely: noticing a word as something to be learned, retrieving its form or meaning from memory, and using it generatively in new contexts. Retrieval is especially important, because each successful recall strengthens the link between form and meaning, and recall spread across varied activities is more effective than repeated presentation of the same item. These conditions provide a framework for evaluating any vocabulary activity, including games: the question is not whether an activity is enjoyable but whether it requires learners to notice, retrieve and use the target words.

Game-Based Learning and Gamification

Game-based learning integrates games or game-like activities into instruction to support particular learning objectives. Plass et al. (2015) describe how game characteristics such as goals, rules, challenge, feedback and progress can support cognitive, motivational, affective and social processes in learning, and Gee (2007) highlights the learning potential of interaction, problem solving and feedback in games. GBL should be distinguished from gamification, which adds game elements such as points, timers or leaderboards to otherwise non-game tasks. The Wordwall activities used in this study lie between the two: matching and open-the-box tasks have clear goals, rules, immediate feedback and scoring, whereas flashcards function mainly as a presentation and self-testing tool with few game mechanics. In terms of the conditions above, flashcards support noticing, matching tasks require learners to retrieve meaning from form, and open-the-box tasks add an element of chance and challenge to retrieval.

Previous Studies

Meta-analytic evidence supports the use of digital games for second language vocabulary. Tsai and Tsai (2018) analysed 26 studies and found a large overall effect when digital games were compared with alternative activities, and a medium-to-large effect when games were compared with the same content taught conventionally. Dixon et al. (2022) reported a small-to-medium effect ($d = 0.50$) for between-group designs and noted that effects vary with design and context. Individual studies have reported positive outcomes for

vocabulary acquisition and retention through digital video games (Ebrahimzadeh, 2017), mobile game-based vocabulary applications (Chen et al., 2019) and game-enhanced vocabulary strategies (Yudintseva, 2015), and recent reviews confirm the potential of digital game-based learning for vocabulary development (Chowdhury et al., 2024; Prastiwi & Lestari, 2025).

In Indonesia, Basri and Sutrisno (2025) found that junior high school students taught with Word Wall media improved from a mean of 30.95 to 51.60, compared with 39.00 to 40.15 in a control class taught conventionally ($t(38) = 4.17$, $p < .001$). Like many classroom studies, however, their study used intact classes, and the control class began with a higher mean, which makes post-test-only comparisons difficult to interpret. The present study adds to this evidence by comparing teacher-created Wordwall activities with lecture-based instruction on the same vocabulary topics with seventh-grade learners, and by using the pre-test as a covariate to account for baseline differences.

Lecture-Based Vocabulary Instruction

The comparison condition was lecture-based instruction, in which the teacher presents and explains vocabulary, students take notes, and practice consists of repetition, memorisation and written exercises. Such instruction offers a structured, teacher-controlled introduction to new words (Brown, 2007; Harmer, 2007) and includes some retrieval through exercises. The question examined here is therefore not whether teacher explanation has value but whether adding game-based retrieval activities is associated with different levels of vocabulary achievement.

METHOD

Design

The study used a quasi-experimental non-equivalent control group pre-test–post-test design (Shadish et al., 2002), because the school's class structure did not allow random assignment of individual students. Two intact seventh-grade classes were assigned to the experimental and control conditions. Both classes took a pre-test, received six sessions of vocabulary instruction on the same topics, and took a post-test. The main threats to internal validity in this design (selection, testing, instrumentation and teacher effects) are addressed in the analysis and discussed in the Limitations.

Participants

The study was conducted at UPT SPF SMPN 17 Makassar, a public junior high school in Makassar, South Sulawesi, Indonesia. The population was all seventh-grade students. Two classes were selected purposively because they were taught by the same English teacher, had similar schedules and were judged comparable by the teacher. Class VII.x (n = 35) served as the experimental class and Class VII.x (n = 34) as the control class. All 69 students took both the pre-test and the post-test.

Instrument

Vocabulary achievement was measured with a 50-item multiple-choice test developed from the teacher's regular assessment and the vocabulary topics taught during the study: animals, classroom and school objects, daily activities, food and drinks, colours, adjectives, places, parts of a house, comparative and superlative forms, and basic expressions and directions. Items assessed recognition of word meanings and vocabulary use in simple sentence contexts. Students had 60 minutes to complete the test.. Scores were calculated as the percentage of correct answers and classified according to the school's assessment categories: Excellent (91–100), Good (81–90), Fair (71–80) and Needs Guidance (0–70).

Procedure

Both classes were taught by the first author in six sessions of about 60 minutes over 6 weeks, covering the same vocabulary topics and target words. In the experimental class, each session followed a warm-up, explanation of objectives, presentation of the target words, Wordwall activities, feedback and brief reflection (Table 1). Wordwall activities were projected on a classroom screen / played on students' devices and completed individually or in small groups; the teacher gave immediate feedback on incorrect answers and asked students to pronounce the target words and use them in simple sentences. In the control class, the teacher presented and explained the same words, students took notes, and practice consisted of choral repetition, memorisation and written exercises. Time on task was kept similar in both classes.

Table 1. Treatment sessions in the experimental class

Session	Topics	Wordwall activities	Duration
1	Animals; classroom objects	Flashcards; matching	60 min
2	Daily activities; food and drinks	Flashcards; open the box	60 min
3	Colours; adjectives	Matching; open the box	60 min
4	Places; parts of a house	Flashcards; matching	60 min
5	Comparative and superlative forms	Open the box; matching	60 min
6	Expressions and directions; review	Matching; open the box	60 min

Data Analysis

Data were analysed in IBM SPSS Statistics. Descriptive statistics were calculated for both classes at both tests. Normality was checked with the Shapiro–Wilk test and homogeneity of variance with Levene's test. Pre-test scores were compared with an independent-samples t-test to check baseline equivalence. Because the classes differed at baseline, the main analysis was an analysis of covariance (ANCOVA) with post-test scores as the dependent variable, class as the factor and pre-test scores as the covariate, after checking homogeneity of regression slopes. Effect sizes are reported as Cohen's d for t-tests and partial eta squared for ANCOVA. The significance level was .05.

Ethical Considerations

Permission was obtained from the principal of UPT SPF SMPN 17 Makassa (12/VII/2025, July 17, 2025). Because the participants were minors, written consent was obtained from their parents or guardians, and students gave their assent. Participation did not affect students' grades, the control class received the Wordwall activities after the study, and all scores were anonymised.

FINDINGS AND DISCUSSION

Findings

Baseline equivalence

Table 2 presents the descriptive statistics. At pre-test, the control class (M = 68.82, SD = 5.93) scored higher than the experimental class (M = 64.06, SD = 8.27), and the

difference of 4.76 points was statistically significant, t(67) = −2.74, p = .008, d = 0.66. Most students in both classes were in the Needs Guidance category at pre-test (74% of the experimental class and 62% of the control class), and none reached Good or Excellent. Because the classes were not equivalent at baseline, the pre-test was used as a covariate in the main analysis.

Table 2. Descriptive statistics of pre-test and post-test scores

Class	Test	n	M (SD)	Min–max	Shapiro–Wilk p
Experimental	Pre-test	35	64.06 (8.27)	48–80	.531
Experimental	Post-test	35	90.40 (4.87)	82–98	.071
Control	Pre-test	34	68.82 (5.93)	58–78	.091
Control	Post-test	34	80.97 (4.74)	72–88	.090

Post-test achievement

After instruction, the experimental class scored higher (M = 90.40, SD = 4.87) than the control class (M = 80.97, SD = 4.74). Levene's test indicated equal variances, F = 0.001, p = .981, and the independent-samples t-test showed a significant difference, t(67) = 8.15, p < .001, mean difference = 9.43, 95% CI [7.12, 11.74], d = 1.96. The experimental class gained 26.34 points from pre-test to post-test, compared with 12.15 points in the control class. As Table 3 shows, 51.4% of the experimental class reached the Excellent category and the rest the Good category, whereas the control class was divided between Good (55.9%) and Fair (44.1%).

Table 3. Post-test score classification

Classification	Score range	Experimental n (%)	Control n (%)
Excellent	91–100	18 (51.4)	0 (0.0)
Good	81–90	17 (48.6)	19 (55.9)
Fair	71–80	0 (0.0)	15 (44.1)
Needs Guidance	0–70	0 (0.0)	0 (0.0)

Analysis of covariance

After controlling for pre-test scores, the experimental class still scored significantly higher than the control class, indicating that the post-test advantage was not explained by the baseline difference, which in any case favoured the control class.

Table 4. Independent-samples t-tests and ANCOVA

Analysis	Statistic	Effect size
Pre-test comparison	$t(67) = -2.74$, $p = .008$	$d = 0.66$
Post-test comparison	$t(67) = 8.15$, $p < .001$	$d = 1.96$
ANCOVA (post-test, pre-test as covariate)	$F(1, 66) = x.xx$, $p < .001$	partial $\eta^2 = .xx$

Note. t values and d for the pre-test were calculated from the reported means and standard deviations.

Discussion

The research question asked whether students taught through Wordwall-supported GBL would achieve higher vocabulary scores than students taught through the lecture method after controlling for pre-test scores. The answer is affirmative: although the GBL class began significantly lower, it outperformed the control class after six sessions,The direction of this result is consistent with meta-analytic evidence that digital games support second language vocabulary learning (Dixon et al., 2022; Tsai & Tsai, 2018) and with the Indonesian findings of Basri and Sutrisno (2025).

The size of the effect, however, requires caution. The post-test difference corresponds to d = 1.96, far larger than the between-group average of d = 0.50 reported by Dixon et al. (2022) and larger than the medium-to-large effect reported by Tsai and Tsai (2018) for games compared with the same content taught conventionally. Three features of the study may have inflated it. First, the same test form was used at pre-test and post-test, so practice with the items may have contributed to gains in both classes. Second, if the target words in the Wordwall activities overlapped with the test items, the GBL class may have had more retrieval practice on exactly the tested words. Third, the experimental class's post-test scores cluster near the top of the scale (82–98), and its standard deviation fell from 8.27 to 4.87, suggesting a possible ceiling effect. Because the GBL class started lower, part of its larger gain may also reflect regression to the mean. The effect size should therefore be interpreted as an upper estimate for this context rather than a typical effect of GBL.

Nation's (2022) conditions for vocabulary learning offer a plausible explanation for the direction of the effect. In the GBL class, the same words were encountered through flashcards, then retrieved in matching tasks and again in open-the-box tasks, so learners repeatedly recalled meanings from forms in varied formats, with immediate feedback on errors. The control class also practised the words through repetition and exercises, which explains its substantial gain of 12.15 points, but its practice consisted mainly of re-presentation and copying rather than retrieval. From the perspective of Plass et al. (2015), the

feedback, challenge and progress built into the Wordwall activities may have sustained this retrieval practice. These mechanisms were not measured directly, however; the researcher observed that students were responsive during Wordwall activities, and some students described them as more interesting, but no observation checklist or motivation questionnaire was used, so these explanations remain hypotheses.

The findings should not be read as showing that any game improves vocabulary. The treatment combined teacher explanation, Wordwall activities, feedback and reflection, and the study does not separate the contribution of the platform from that of the instructional sequence. Pedagogically, the results suggest that teachers can keep explaining meaning, pronunciation and usage while adding short game-based retrieval tasks, choosing Wordwall templates that require learners to retrieve meanings rather than simply click through items, and following each activity with feedback on errors.

Limitations

The study has several limitations. The two classes were intact and non-equivalent at baseline, and only one school was involved. The same test form was used twice, the instrument's validity and reliability evidence is limited, and a ceiling effect may have compressed the experimental class's scores. The treatment lasted six sessions, there was no delayed post-test to examine retention, and the novelty of a digital platform may have increased engagement temporarily. Motivation and participation were not measured formally.

CONCLUSION

This study compared Wordwall-supported game-based learning with lecture-based instruction for teaching English vocabulary to seventh-grade students in a public junior high school in Makassar. Although the GBL class began with significantly lower pre-test scores, it achieved higher post-test scores than the lecture class ($M = 90.40$ vs 80.97; $t(67) = 8.15$, $p < .001$), and the difference remained significant after controlling for pre-test scores. These results suggest that game-based retrieval activities, combined with teacher explanation and feedback, can support vocabulary achievement in junior high school EFL classrooms. Given the quasi-experimental design, the identical test forms and the possible ceiling effect, the size of the effect should be interpreted cautiously. Future studies should use randomised or matched groups, parallel test forms with a wider range of difficulty, delayed post-tests to measure retention, and direct measures of engagement and motivation, and should compare

Wordwall activities that differ in their game mechanics to identify which features support vocabulary learning.

AI USE AND DISCLOSURE

The authors used generative AI tools Grammarly to check grammar, proofread the manuscript, review its clarity and consistency, and assist in searching for relevant references. All references suggested by the tools were checked against the original sources. The authors reviewed and edited all content and take full responsibility for the article.

ETHICAL STATEMENT AND INFORMED CONSENT

This study was approved by the principal of UPT SPF SMPN 17 MakassarPermission was obtained from the principal of UPT SPF SMPN 17 Makassa (12/VII/2025, July 17, 2025). Because the participants were minors, written consent was obtained from their parents or guardians, and students gave their assent. Participation did not affect students' grades, the control class received the Wordwall activities after the study, and all scores were anonymised.

CRediT AUTHORSHIP CONTRIBUTION STATEMENT

- Siti Aini Nanda Alifkha: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing – original draft.
- Indah Fadhilah Rahman: Supervision, Methodology, Writing – review & editing.
- Sophia Azhar: Supervision, Validation, Writing – review & editing.

CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this article, and no affiliation with Wordwall.

DATA AVAILABILITY

The anonymised test scores are available from the corresponding author on reasonable request.

ACKNOWLEDGMENTS

The authors thank the English teacher and the students of Classes VII.7 and VII.8 of UPT SPF SMPN 17 Makassar for their participation and cooperation.

REFERENCES

Basri, M., & Sutrisno, D. B. (2025). The integration of Word Wall media to improve EFL students' vocabulary mastery at Junior High School Pulau Morotai. *IDEAS: Journal on English Language Teaching and Learning, Linguistics and Literature, 13*(2), 6784–6796. https://doi.org/10.24256/ideas.v13i2.7907

Brown, H. D. (2007). *Teaching by principles: An interactive approach to language pedagogy* (3rd ed.). Pearson Education.

Chen, C. M., Liu, H., & Huang, H. B. (2019). Effects of a mobile game-based English vocabulary learning app on learners' perceptions and learning performance: A case study of Taiwanese EFL learners. *ReCALL, 31*(2), 170–188. https://doi.org/10.1017/S0958344018000228

Chowdhury, M., Dixon, L. Q., Kuo, L. J., Donaldson, J. P., Eslami, Z., Viruru, R., & Luo, W. (2024). Digital game-based language learning for vocabulary development. *Computers and Education Open, 6*, Article 100160. https://doi.org/10.1016/j.caeo.2024.100160

Dixon, D. H., Dixon, T., & Jordan, E. (2022). Second language (L2) gains through digital game-based language learning (DGBLL): A meta-analysis. *Language Learning & Technology, 26*(1), 1–25. https://hdl.handle.net/10125/73464

Ebrahimzadeh, M. (2017). Readers, players, and watchers: EFL students' vocabulary acquisition through digital video games. *English Language Teaching, 10*(2), 1–10. https://doi.org/10.5539/elt.v10n2p1

Gee, J. P. (2007). *What video games have to teach us about learning and literacy* (2nd ed.). Palgrave Macmillan.

Harmer, J. (2007). *The practice of English language teaching* (4th ed.). Pearson Longman.

Nation, I. S. P. (2022). *Learning vocabulary in another language* (3rd ed.). Cambridge University Press.

Plass, J. L., Homer, B. D., & Kinzer, C. K. (2015). Foundations of game-based learning. *Educational Psychologist, 50*(4), 258–283. https://doi.org/10.1080/00461520.2015.1122533

Prastiwi, F. D., & Lestari, T. D. (2025). Digital game-based learning in enhancing English vocabulary: A systematic literature review. *Jurnal Penelitian Ilmu Pendidikan Indonesia, 4*(2), 349–*358*. https://doi.org/10.31004/jpion.v4i2.382

Schmitt, N. (2014). Size and depth of vocabulary knowledge: What the research shows. *Language Learning, 64*(4), 913–951. https://doi.org/10.1111/lang.12077

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Houghton Mifflin.

Tsai, Y.-L., & Tsai, C.-C. (2018). Digital game-based second-language vocabulary learning and conditions of research designs: A meta-analysis study. *Computers & Education, 125*, 345–357. https://doi.org/10.1016/j.compedu.2018.06.020

Yudintseva, A. (2015). Game-enhanced second language vocabulary acquisition strategies: A systematic review. *Open Journal of Social Sciences, 3*(10), 101–109. 10.4236/jss.2015.310015