

Improving Environmental Vocabulary Mastery of Grade 11 Students through Multi-game Intervention

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ABSTRACT

Environmental vocabulary is a fundamental component of EFL learning, enabling students to understand texts and communicate effectively about sustainability issues. However, Indonesian learners often struggle with environmental terminology due to limited exposure and traditional teacher-centered instruction. This pre-experimental study investigated the effectiveness of a multi-game intervention—Crossword Puzzles, Vocabulary Bingo, Word Chain, and Kahoot—in improving Grade 11 students' environmental vocabulary mastery. Using a one-group pretest–posttest design involving 17 grade 11 students, a 20-item environmental vocabulary test measured changes in performance. Results showed a substantial gain: mean scores increased from 9.82 (49.10%) to 17.59 (87.95%), with 70.59% of students achieving the Advanced mastery level after the intervention. A paired sample t-test confirmed a significant difference between pretest and posttest scores ($p = .000$). The findings align with prior research demonstrating that game-based learning enhances motivation, strengthens vocabulary recall, and supports deeper lexical processing. This study recommends integrating diverse games into vocabulary teaching, especially for thematic domains such as environmental education.

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INTRODUCTION

Vocabulary underpins all communicative competence and serves as the foundation for expressing meaning, interpreting messages, and interacting in spoken or written English (Dakhi & Fitria, 2019). Without adequate vocabulary, learners struggle to communicate effectively, even when they possess knowledge of grammar and structure (Christopley, 2017). In EFL contexts such as Indonesia, vocabulary mastery becomes even more critical due to learners' limited exposure to English outside of school. As Harmer (2007) explains, vocabulary strongly influences the accuracy and clarity with which learners express ideas, which positions vocabulary learning as essential to academic and communicative success.

Environmental themes have become increasingly central within national curricula because of growing global concerns regarding pollution, climate change, biodiversity loss, and sustainable living. To understand environmental texts and participate meaningfully in discussions, students must learn specialized vocabulary. However, research indicates that environmental vocabulary is particularly challenging because such terms are often abstract and unfamiliar to learners (Nasution, 2023; Rahmi & Risa, 2020). Students may not intuitively connect these terms to concrete experiences, making memorization difficult and limiting their ability to apply vocabulary in context.

Traditional vocabulary instruction emphasizes memorization, translation, and decontextualized drills. Although such strategies may introduce new words, they often fail to foster long-term retention or meaningful use. Students frequently express disengagement or anxiety when required to memorize long lists of vocabulary, resulting in minimal progress. Hornay, Talok, and Erom (2024) highlight that discrepancies between teacher-centered practices and learners' preference for interactive, dynamic instruction reduce motivation and lead to weaker learning outcomes.

Environmental vocabulary poses additional challenges compared to general vocabulary. Because environmental terminology is conceptually dense and sometimes scientific in nature, learners often struggle to visualize or internalize meaning. Low self-efficacy further compounds this difficulty, with students avoiding speaking tasks or vocabulary application due to fear of mistakes. Hornay and Lomi (2024) argue that learning environments that reduce pressure and promote interaction significantly increase learners' self-efficacy, leading to better academic performance.

Game-Based Learning (GBL) has emerged as a promising approach to overcoming such challenges by creating a low-anxiety environment that increases learners' engagement and motivation. Studies consistently show that games promote vocabulary mastery by providing repetition, contextualized use, and enjoyment (Huyen & Nga, 2003; Bakhsh, 2021; Bin-Hady, 2023). Games also encourage active participation and make vocabulary learning an enjoyable experience, which is especially important in environments where students may feel intimidated by complex or unfamiliar terms.

The theoretical foundation supporting GBL includes multimedia learning theory, which suggests that learners retain information more effectively when it is processed through multiple sensory channels (Mayer, 2017). Digital games such as Kahoot leverage visual cues, interaction, and immediate feedback to sustain attention and improve recall (Kustina & Sudiar, 2022; Chen & Li, 2022). Traditional games such as Crossword Puzzles and Vocabulary Bingo help learners build semantic associations and strengthen recognition skills (Hamid, 2021; Winarsih & Kusuma, 2021). Retrieval-based games, like Word Chain, enhance productive vocabulary knowledge by reinforcing spontaneous recall (Diyannah & Nurahmi, 2023).

Although numerous studies have investigated the effectiveness of single-game interventions, fewer have explored the impact of integrating multiple games into a coordinated instructional sequence. Research indicates that varied games may sustain engagement longer and address diverse learning styles (Prívará & Valovičová, 2023; Febriyanti & Adhitya, 2024). Because environmental vocabulary requires conceptual understanding and strong retrieval skills, a multi-game approach may be particularly advantageous.

The present study addresses this gap by investigating the use of four different games—Crossword Puzzles, Vocabulary Bingo, Word Chain, and Kahoot—to support environmental vocabulary mastery among Grade 11 students in Kupang, Indonesia. Accordingly, this study was guided by the following question: *To what extent does a multi-game intervention improve Grade 11 students' environmental vocabulary mastery?* By examining this integrated approach, the study contributes to ongoing discussions regarding learner-centered instruction, GBL, and effective vocabulary pedagogy in EFL classrooms.

LITERATURE REVIEW

Vocabulary Mastery in EFL Contexts

Vocabulary mastery is widely recognized as a foundational component of second and foreign language learning, as it enables learners to comprehend texts, express ideas, and participate effectively in communication. Wilkins (1972) famously asserted that while grammar allows limited expression, vocabulary enables meaningful communication. In EFL contexts, particularly in Indonesia, vocabulary acquisition remains a persistent challenge due to limited exposure to English outside the classroom (Harmer, 2007). Learners often encounter difficulties in retaining new lexical items and transferring them into active use, especially when instruction relies heavily on memorization and translation.

Environmental vocabulary presents an additional layer of complexity. Environmental terms are often abstract, technical, and conceptually dense, making them difficult for learners to visualize and contextualize (Rahmi & Risa, 2020; Nasution, 2023). Without meaningful engagement, students struggle to internalize such vocabulary, resulting in low comprehension and limited productive use. This challenge highlights the need for instructional approaches that support deeper processing, contextualization, and repeated exposure.

Game-Based Learning and Vocabulary Acquisition

Game-Based Learning (GBL) has gained increasing attention as an effective strategy for enhancing vocabulary mastery in EFL classrooms. Research consistently demonstrates that games promote learner engagement, motivation, and enjoyment, which in turn facilitate vocabulary acquisition and retention (Huyen & Nga, 2003; Bakhsh, 2021; Bin-Hady, 2023). Through repetition, contextualized practice, and immediate feedback, games provide meaningful opportunities for learners to encounter and use new vocabulary.

Empirical studies in both traditional and digital contexts support the effectiveness of GBL. Hamid (2021) and Winarsih and Kusuma (2021) found that word games such as crossword puzzles and educational card games significantly improved vocabulary retention by strengthening semantic associations. Similarly, Diyanah and Nurahmi (2023) reported that game-based activities enhanced both receptive and productive vocabulary knowledge by encouraging active recall and spontaneous word use.

Digital games further amplify these benefits. Studies on platforms such as Kahoot show that interactive digital environments enhance vocabulary mastery through visual

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stimuli, competition, and immediate feedback (Kustina & Sudiar, 2022; Arsyad & Rosnawati, 2022). Chen and Li (2022) argue that digital game-based learning increases learners' motivation and sustained attention, which are critical for vocabulary retention. Meta-analyses by Tsai and Tsai (2018) and Febriyanti and Adhitya (2024) confirm that digital games have a positive and significant effect on second language vocabulary acquisition across educational levels.

Affective and Cognitive Dimensions of Game-Based Learning

Beyond cognitive gains, GBL also addresses affective factors that influence vocabulary learning. Anxiety, low confidence, and fear of making mistakes are commonly reported barriers in EFL classrooms (Siregar, 2021). Games create a low-anxiety learning environment where students can experiment with language without fear of negative evaluation. Hornay and Lomi (2024) emphasize that supportive and interactive learning environments enhance learners' self-efficacy, which positively impacts language performance.

From a cognitive perspective, multimedia learning theory provides a strong theoretical basis for GBL. Mayer (2017) explains that learning is more effective when information is processed through multiple channels, such as visual, auditory, and textual modes. Digital games, in particular, integrate these modalities, thereby enhancing memory and recall (Kustina & Sudiar, 2022; Jia & Zhang, 2022). Repetition across varied game formats further strengthens lexical retrieval and depth of processing (Bin-Hady, 2023).

Multi-Game Approaches in Vocabulary Instruction

While many studies focus on single-game interventions, recent research highlights the advantages of combining multiple games within one instructional sequence. Prívvara and Valovičová (2023) argue that varied game formats accommodate different learning preferences and sustain engagement over time. Febriyanti and Adhitya (2024) similarly conclude that diversified game-based instruction leads to stronger vocabulary gains than isolated activities.

In the Indonesian context, studies show that both digital and non-digital games improve vocabulary mastery across different proficiency levels (Saputri & Ardi, 2022; Haryanto & Sutrisno, 2023; Andriani et al., 2024). However, research integrating multiple games—such as puzzles, competitive word games, and digital quizzes—remains limited, particularly for thematic vocabulary such as environmental education. Given that environmental vocabulary requires both conceptual understanding and retrieval fluency, a multi-game approach may offer a more comprehensive solution by addressing recognition, recall, and application simultaneously.

RESEARCH METHODS

Research Design

This study employed a pre-experimental approach using a one-group pretest-posttest design to investigate the effectiveness of a multi-game intervention in improving students' environmental vocabulary mastery. This design involves administering a pretest prior to the intervention and a posttest after the intervention to measure changes in students' performance.

This design was selected because the number of available participants was limited ($N = 17$), making the use of a true experimental or quasi-experimental design with a control group impractical. Despite its limitations, the one-group pretest-posttest design is widely

used in classroom-based educational research to evaluate instructional innovations in authentic settings.

While this design allows for the measurement of learning gains following the intervention, it does not permit strong causal claims due to the absence of a comparison group. Therefore, the findings of this study are interpreted as evidence of learning improvement associated with the intervention, rather than definitive proof of causality.

Population and Sample

The participants consisted of 17 Grade 11 students (aged 15–17 years) from Class XI A at SMAK Sint Carolus Kupang, Indonesia. The group comprised 9 female and 8 male students.

Based on the English teacher's assessment and students' previous semester results, the participants' English proficiency was at the lower-intermediate level, approximately corresponding to CEFR level A2–B1. This proficiency level indicates that students were able to understand familiar topics but experienced difficulty with specialized and academic vocabulary, particularly environmental terminology.

The class was selected using purposive sampling because preliminary classroom observations and diagnostic activities indicated low mastery of environmental vocabulary, making the group suitable for the intervention. This sampling technique was appropriate because the study aimed to examine the effectiveness of the intervention among learners who genuinely needed vocabulary support. The selected class also represented a typical EFL classroom context in Indonesian senior high schools, making the findings pedagogically relevant.

Data Collection Methods and Instruments

The data collection method used in this study was testing. A vocabulary test served as the research instrument to measure students' environmental vocabulary mastery before and after the intervention. The vocabulary test was researcher-developed based on environmental themes prescribed in the Grade 11 English curriculum. The test consisted of 20 objective items, including multiple-choice and fill-in-the-blank questions, designed to assess students' receptive and controlled productive vocabulary knowledge.

To establish content validity, the test items were reviewed by an experienced senior high school English teacher to ensure alignment with curricular objectives and appropriateness of difficulty level. Item clarity and relevance were refined based on this expert feedback.

Given the small sample size, formal statistical reliability testing was not conducted. However, consistency was ensured by using the same test format and scoring criteria for both pretest and posttest.

Data Collection Procedures

Data collection was conducted in several systematic stages. First, a pretest was administered to the participants to identify their baseline level of environmental vocabulary mastery. The pretest was conducted before any instructional treatment was introduced.

Following the pretest, the multi-game intervention was implemented over four instructional sessions. Each session focused on a different game-based activity:

1. Crossword Puzzles were used to enhance vocabulary recognition and semantic association.
2. Vocabulary Bingo focused on listening and rapid word recognition.
3. Word Chain was employed to strengthen vocabulary retrieval and productive use.

4. Kahoot was used as a digital game to reinforce vocabulary through interactive quizzes and immediate feedback.

Each intervention session lasted approximately 90 minutes and was conducted during regular English instructional time. All activities were facilitated by the classroom teacher with the researcher present as an observer. Students worked individually or in small groups depending on the game format. The instructional sequence and materials were standardized across sessions to ensure consistency.

After the completion of all intervention sessions, a posttest was administered using a parallel-format vocabulary test. The posttest aimed to measure students' vocabulary mastery after exposure to the multi-game learning activities. All tests were administered under similar classroom conditions to ensure consistency.

Data Analysis Methods

The data collected from the pretest and posttest were analyzed using descriptive and inferential statistical methods. Descriptive statistics, including mean scores, percentages, and mastery-level distributions, were used to summarize students' vocabulary performance before and after the intervention.

To determine whether the improvement in vocabulary mastery was statistically significant, a paired sample t-test was employed. This statistical test was chosen because it is appropriate for comparing the mean scores of the same group measured at two different points in time. The paired sample t-test allowed the researcher to assess whether the observed differences between pretest and posttest scores were due to the intervention rather than chance.

The data analysis procedures were conducted using statistical software commonly used in educational research. The significance level was set at $p < .05$ to determine statistical significance. This combination of descriptive and inferential analysis was appropriate for addressing the research objective of evaluating the effectiveness of the multi-game intervention on students' environmental vocabulary mastery.

FINDINGS

Descriptive Analysis

The descriptive analysis for the 17 participants revealed a substantial improvement in the students' mastery of environmental vocabulary (Table 1). The class mean score rose significantly from 9.82 (49.10%) in the Pretest to 17.59 (87.95%) in the Posttest, yielding an average gain score of 7.77.

Table 1

Summary of Pretest and Posttest Mean Scores Comparison

Aspect	Pretest mean	Posttest mean	Gain
Score (max 20)	9,82	17.59	7.77
Percentage	49.10%	87.95%	

Mastery Level Distribution

The mastery level distribution (Basic: 1-10; Intermediate: 11-16; Advance: 17-20) showed a dramatic categorical shift following the intervention (Table 2).

Table 2

Distribution of Students' Vocabulary Mastery Level (N=17)

Level (Score)	Pretest (N)	Pretest (%)	Posttest (N)	Posttest (%)
Basic (1-10)	9	52.94 %	0	0.00%
Intermediate (11-16)	6	35.29%	5	29.41%
Advance (17-20)	2	11.76%	12	70.59%

Inferential Results

The Paired Sample T-Test was used to compare the mean scores (Table 3)..

Table 3

Inferential Results: Pretest and Posttest Score Comparison (Paired Sample T-Test)

Test	t	df	Sig. (2-tailed)
Pretest-Posttest	-9.09	16	0.000

The T-Test yielded a t-value of -9.09 with a significance value (p-value) of 0.000.

DISCUSSION

The findings of this study clearly demonstrate that the multi-game intervention produced a significant improvement in students’ environmental vocabulary mastery. The marked increase in post-test scores confirms that interactive game-based activities enabled students to acquire and consolidate vocabulary more effectively than traditional techniques. These findings align with Bakhsh (2021), who asserts that game-based learning contributes substantially to vocabulary acquisition through enjoyable engagement, sustained attention, and repeated exposure. In the current study, the combination of Crossword Puzzles, Vocabulary Bingo, Word Chain, and Kahoot collectively provided such repeated exposure through varied learning contexts, thereby increasing opportunities for both receptive and productive vocabulary development.

The improvement observed in this study is consistent with findings from digital game-based learning research reporting substantial vocabulary gains in online and technology-supported environments. Chen and Li (2022) argue that gamification features such as immediate feedback and dynamic visual stimuli can support vocabulary learning. In the present study, Kahoot incorporated these features as part of the instructional design; however, their influence on learners’ motivation was not directly measured and is therefore discussed as a theoretical explanation rather than an empirically established outcome. Furthermore, Arsyad and Rosnawati (2022) emphasize that digital games enhance vocabulary mastery through interactive learning experiences, suggesting that technology-mediated environments can address motivational barriers often found in EFL classrooms. As Kahoot promoted peer participation and instant corrective feedback, learners displayed greater enthusiasm and reduced anxiety, which in turn supports vocabulary retention.

The multi-game approach also meets the cognitive demand for semantic depth. Hamid (2021) demonstrated that word games deepen semantic understanding by encouraging students to identify meaning relationships, which was especially evident during the Crossword activity. Similarly, Word Chain required students to retrieve vocabulary

spontaneously, strengthening mental associations and retrieval fluency, observed also by Diyanah and Nurahmi (2023) in their study of game-based vocabulary instruction. Because each game required students to process vocabulary differently—recognition, listening, retrieval, and application—the cumulative effect enhanced depth of knowledge and recall ability.

Although this study did not directly measure affective variables such as motivation, anxiety, or risk-taking through observational or self-report data, the observed improvement in vocabulary scores is consistent with prior research suggesting that game-based learning environments may support learner engagement and confidence (Siregar, 2021; Hornay & Lomi, 2024). Previous studies have shown that games can reduce affective barriers by creating low-pressure learning contexts; however, such affective outcomes cannot be empirically confirmed in the present study and should therefore be interpreted as theoretical explanations rather than direct findings.

In addition, results support the argument that repetition coupled with multimodality fosters retention. Kahoot introduced visual, auditory, and textual reinforcement, while Bingo and Word Chain encouraged spontaneous production. This is consistent with Mayer's (2017) multimedia learning theory, which posits that learning is maximized when visual and verbal channels operate simultaneously. Furthermore, Febriyanti and Adhitya's (2024) meta-analysis confirms that game-based environments stimulate multiple cognitive pathways, leading to quicker recall and deeper learning. Such multimodal repetition was integral to the multi-game intervention, particularly given that environmental vocabulary requires conceptual understanding rather than rote memorization.

The results of this study are consistent with Bin-Hady's (2023) argument that game-based learning has the potential to enhance linguistic competence by shifting instruction toward more learner-centered practices. Although the present study did not directly observe classroom interaction or collect qualitative data on learner behavior, the significant improvement in vocabulary scores suggests that the multi-game intervention may have supported more meaningful engagement with vocabulary learning compared to traditional memorization-oriented approaches. From a theoretical perspective, this outcome aligns with Canale and Swain's (1980) communicative competence framework, which emphasizes that language development involves not only knowledge of linguistic forms but also opportunities for meaningful language use. In this sense, interactive games can be understood as pedagogical tools that theoretically facilitate such opportunities, even though this study did not empirically measure communicative interaction.

Moreover, the substantial increase in student scores supports research showing that game-based learning enhances vocabulary comprehension across skill levels (Saputri & Ardi, 2022; Haryanto & Sutrisno, 2023). In particular, Web-based and digital vocabulary platforms demonstrate noticeable improvement in vocabulary mastery across Indonesian junior and senior high school learners (Andriani et al., 2024; Dewi & Putri, 2024; Rubykania et al., 2025). The present study extends such findings by combining multiple games, suggesting that varied formats may amplify these effects.

This coordinated multi-game intervention also addresses research calling for greater diversity in instructional modes. Prívvara and Valovičová (2023) argue that combining digital and non-digital games can satisfy varied learner preferences and support differentiated instruction. In the present study, Crossword and Bingo offered printed and auditory tasks, while Kahoot provided digital engagement—together responding to visual, auditory, and kinesthetic learning preferences. In addition, Word Chain developed fluency, something rarely targeted in single-game studies.

Several studies emphasize the motivational benefits of digital games (Kung & Wang, 2019; Tsai & Tsai, 2018; Jia & Zhang, 2022), while few explore broader pedagogical alignment. The present findings echo Hornay, Talok and Erom (2024), who emphasize the need to align students' learning preferences with teaching methods to increase engagement. This study shows that the multi-game model directly reflects such alignment by integrating interactive, playful, and student-centered approaches. The positive learning outcomes thus reinforce the necessity of shifting from traditional, teacher-centered instruction toward approaches compatible with contemporary learner profiles and digital learning expectations. Finally, the outcomes of this study also complement research that situates English classroom learning within wider social and technological transformations (Crystal, 2003; Wati, 2020). As Indonesian learners increasingly engage with digital media, new forms of vocabulary input emerge through environmental-themed content and gamified platforms (Utami & Susanto, 2023; Zhang, 2024). The present findings therefore suggest that classroom instruction should integrate such resources systematically rather than treat them as supplementary tools. This multi-game model offers a pedagogical bridge between learners' digital realities and academic vocabulary demands, particularly within topical areas such as environmental awareness, sustainability, and global citizenship. It is important to note that this study relied solely on test data; therefore, claims related to students' motivation, confidence, or anxiety reduction are not empirically substantiated and remain inferential.

This study has several limitations that should be acknowledged. First, the use of a pre-experimental one-group design limits causal interpretation, as no control group was included. Second, the small sample size (N = 17) restricts the generalizability of the findings to broader populations. Third, the study relied exclusively on test data. Future research is encouraged to employ quasi-experimental or experimental designs with larger samples and control groups. Incorporating qualitative data through classroom observations or learner interviews would provide deeper insight into affective and behavioral dimensions of game-based vocabulary learning. Longitudinal studies examining vocabulary retention over time would also strengthen understanding of the sustainability of learning gains.

CONCLUSION

This study concludes that the integration of Crossword Puzzles, Vocabulary Bingo, Word Chain, and Kahoot significantly improved Grade 11 students' environmental vocabulary mastery. The substantial gains in both mean scores and mastery levels demonstrate the effectiveness of the multi-game approach. While the findings demonstrate clear learning improvement, they are derived from a pre-experimental one-group design and therefore do not permit strong causal generalization. Future research may expand the sample size, include a control group, or explore long-term retention through delayed posttests.

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REFERENCES

- Andriani, R., Nurbayani, N., & Sukmawati, D. (2024). The use of web-based vocabulary games to improve junior high school students' vocabulary mastery in reading. *JET (Journal of English Teaching)*, 10(1), 1-12.
- Arsyad, S., & Rosnawati, R. (2022). The effectiveness of using digital games on students' vocabulary achievement. *Journal of English Language Teaching*, 11(1), 1-12.
- Journal of English Teaching, 12(1), February 2026. 84-95, DOI <https://doi.org/10.33541/jet.v12i1.7777>

- Bakhsh, S. A. (2021). The effectiveness of game-based learning strategies on primary ESL learners' vocabulary learning: A review. *International Journal of Academic Research in Progressive Education and Development*, 10(2), 241-255.
- Bin-Hady, W. R. A. (2023). The role of games in enhancing EFL students' vocabulary acquisition. *European Journal of English Language Teaching*, 8(5), 143-157.
- Canale, M., & Swain, M. (1980). Theoretical bases of communicative approaches to second language teaching and testing. *Applied Linguistics*, 1(1), 1-47.
- Chen, Y., & Li, Y. (2022). Gamifying vocabulary learning: The effectiveness of digital game-based learning in motivating EFL learners. *International Journal of Multicultural and Multireligious Understanding (IJMMU)*, 9(10), 1-12.
- Christopley, C. (2017). Developing students' vocabulary through watching English cartoon films at SMP BHAKTI. *Journal of English Teaching*, 3(1), 11-26.
<https://doi.org/10.33541/jet.v3i1.696>
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative and mixed methods approaches* (4th ed.). SAGE Publications.
- Crystal, D. (2003). *English as a global language* (2nd ed.). Cambridge University Press.
- Cuizon, L. B. (2020). Game-Based Learning Platform and Its Effects on Vocabulary Mastery in Online ESL Classroom. *International Journal of Advanced Research in Engineering and Technology*, 11(5), 183-195.
- Dakhi, S., & Fitria, T. N. (2019). The principles and the teaching of English vocabulary: A review. *Journal of English teaching*, 5(1)
- Dewi, N. A. H., & Putri, D. K. (2024). The implementation of word games to improve students' English vocabulary proficiency. *Jurnal Inovasi Pendidikan dan Kebudayaan*, 14(3), 101-110.
- Diyanah, I., & Nurahmi, I. E. (2023). The implementation of game-based learning (GBL) method to improve EFL students' vocabulary mastery. *Edusaintek: Jurnal Pendidikan, Sains dan Teknologi*, 10(1), 105-119.
- Febriyanti, E., & Adhitya, M. M. (2024). Students' gains in English as a second or foreign language through game-based learning: A meta-analysis. *OKARA: Jurnal Bahasa dan Sastra*, 18(1), 45-60.
- Hamid, F. (2021). Using word games to improve vocabulary retention in middle school EFL classes. *Journal of English Language Teaching and Learning*, 5(2), 110-120.
- Harmer, J. (2007). *The practice of English language teaching* (4th ed.). Pearson Longman.
- Haryanto, H., & Sutrisno, S. (2023). Game-Based Learning to Improve the Vocabulary Mastery in EFL Class. *Journal of Education and Teaching (JET)*, 4(2), 1-10.
- Hornay, P. M. A., Talok, D., & Erom, K. (2024). Bridging the gap: Aligning teachers' pedagogical beliefs with learners' preferences of English language learning in the adaptive learning era. *Jurnal Paedagogy*, 11(3), 483-495.
- Hornay, P. M. A., & Lomi, A. N. K. (2024). Unravelling self-efficacy in online discussion and presentation: Insights from English education students in Kupang, Indonesia. *International Journal of English Linguistics, Literature, and Education*, 6(1), 1-15.
<https://doi.org/10.32585/ijelle.v6i1.4446>
- Huyen, N. T. T., & Nga, K. T. T. (2003). Learning vocabulary through games: The effectiveness of learning vocabulary through games. *Asian EFL Journal*, 5(4), 1-10.
- Jia, W., & Zhang, H. (2022). Digital game-based learning's effectiveness on EFL learners' receptive and productive vocabulary knowledge. *Computer Assisted Language Learning*, 35(5), 1279-1300.

- Kung, S. H., & Wang, Y. L. (2019). The effectiveness of game-based learning on EFL learners' vocabulary acquisition and retention. *Journal of Educational Technology & Society*, 22(3), 11-23.
- Kustina, K., & Sudiar, N. (2022). The influence of Kahoot! on students' motivation and vocabulary mastery. *Jurnal Pendidikan Bahasa Inggris*, 11(2), 145-154.
- Laufer, B., & Nation, P. (1999). A vocabulary size test of controlled productive ability. *Language Testing*, 16(1), 33-51.
- Li, Y., & Yang, Y. T. C. (2023). Do mobile games improve language learning? A meta-analysis. *System*, 11(4), 1-15.
- Mayer, R. E. (2017). *Multimedia learning* (3rd ed.). Cambridge University Press.
- Nasution, A. (2023). The impact of environment-based education on students' vocabulary development at Junior High School. *IAIN Palopo Ideas Journal*, 11(2), 200-215.
- Prihandini, A. R., et al. (2021). The Impact of Online Gaming on English Vocabulary Mastery: A Study of Mechanical Engineering Students. *The International Journal of Social Sciences World (TIJOSW)*, 3(2), 101-112.
- Prívará, K., & Valovičová, Z. (2023). Digital game-based vocabulary learning: Where are we and where are we going? *Education Sciences*, 13(2), 1-15.
- Rahmi, F., & Risa, V. (2020). Korelasi penguasaan kosakata bidang lingkungan hidup dengan keterampilan menulis teks berita siswa kelas VIII SMP Negeri 18 Padang. *Jurnal Pendidikan Bahasa Indonesia*, 8(2), 77-88.
- Rubykania, R., Hidayat, S., & Rusdiyani, I. (2025). Enhancing vocabulary mastery and motivation using WordWall games: Implications for junior high education. *Tarbawi: Jurnal Keilmuan Manajemen Pendidikan*, 11(1), 1-15.
- Saputri, D., & Ardi, H. (2022). EFL learning gamification: Exploring high school learners' vocabulary acquisition through experimentation. *Journal of English Language Teaching and Linguistics*, 7(1), 351-365.
- Septria Meidy, R., & Zaitun. (2023). The effectiveness of using quartet cards game to promote 7th grade students' vocabulary mastery. *Modality: Jurnal Pendidikan Bahasa dan Sastra Inggris*, 8(2), 67-78.
- Siregar, T. Z. (2021). The Impact of Online Games On Students In Learning English Vocabulary. *Ta'uno - E-Journal Universitas Sintuwu Maroso*, 1(1), 1-15.
- Susanti, S. (2022). Effects of gamification on EFL learners' vocabulary achievement and classroom interaction. *International Journal for Research Trends in Social Science & Humanities*, 3(4), 135-149.
- Tebeweka, I. (2021). Digital game-based learning for vocabulary acquisition and retention. *International Journal of Foreign Language Teaching and Research*, 9(4), 159-170.
- Tsai, S. C., & Tsai, Y. L. (2018). Meta-analysis of the effectiveness of digital game-based learning on L2 vocabulary acquisition. *Educational Technology Research and Development*, 66(6), 1475-1490.
- Utami, A. S., & Susanto, R. (2023). The effect of environmental pollution game-based learning on improving students' conceptual understanding and environmental awareness. *Journal of Innovation in Educational and Cultural Research*, 4(1), 1-12.
- Wati, I. F. (2020, December). Digital game-based learning as a solution to fun learning challenges during the Covid-19 pandemic. In *1st International Conference on Information Technology and Education (ICITE 2020)* (pp. 202-210). Atlantis Press.
- Wilkins, D. A. (1972). *Linguistics in language teaching*. Edward Arnold.

- Winarsih, W., & Kusuma, A. P. (2021). Esvoc" educatif game for learning vocabulary toward the junior high school students. *Jurnal On Research*, 6(1), 38-47.
- Yudha, H. T., & Mandasari, B. (2021). The analysis of game usage for senior high school students to improve their vocabulary mastery. *Journal of English Language Teaching and Learning*, 2(2), 74-79.
- Zahro, M. (2013). The effect of guessing games on the eight year students' vocabulary achievement at SMPN 03 Balung Jember in the 2012/2013 academic year. *Pancaran Pendidikan*, 2(3).
- Zhang, Y. (2024). Environmental teaching supported by Web 2.0-based digital games for a sustainable life. *Sustainability*, 16(22), 9691.
- Zou, D., Liu, Y., & Tang, Y. (2021). Digital game-based learning for teaching vocabulary: A review on teachers' success and challenges. *iTELL Journal*, 16(1), 1-15.